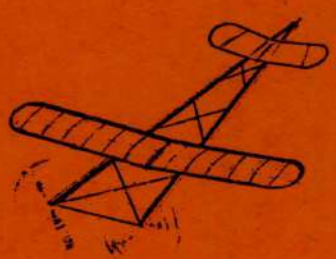
MODEL AIRPLANES and The American Boy

1927 · 1934



Frank Zaic

The YOUTH'S COMPANION
combined with
American Boy
June 1930
Founded 1827

Cover Painting by Harrison Cady

Baseball—"The Rope and the Bulldog," by Thomson Burtis—Aviation

PRICE 20 CENTS *$2.00 A YEAR*

The YOUTH'S COMPANION combined with American Boy Founded 1827

Volume 104 June, 1930 Number 6

Price: 20 cents a copy; $2.00 a year, $3.00 for three years in the United States and its possessions; 25c a year extra in Canada; 50c a year extra in foreign countries.

FOREWORD

This collection was started in 1966 when I had planned to include some of the more popular AMLA plans in the 1934 Yearbook Reprint. I had saved only two plans from the AMERICAN BOY magazines that my brother, John, and I read during the 1927-34 period. I started to look for more plans by letting my friends and correspondents know of my needs. Ed Franklin was one of the first to reply, letting me know he had several "reprints" which he obtained while a member of the "JUNIOR AVIATION LEAGUE" model airplane club sponsored by Gimble Brothers Department Store in New York. He loaned me the prints which I returned after making negatives. I also asked him if he would be willing to try locating more AMLA articles for me. He agreed to do so, but his efforts ended when he had a fatal accident.

I did not return to the project until 1968 when I visited the Los Angeles Library where I found fifteen copies of the AMERICAN BOY with AMLA articles. In a way, it was like finding and visiting an old friend. As I was going over the xerox copies that I had ordered, trying to determine how to cut up the 11" x 14" magazine size to fit the 5½" x 8½" Yearbook format, I realized the AMLA historic place in the free flight world and that I could only do it justice by reprinting the entire series in a book form. The only change that I had to make was to reduce the original page size, 11" x 14", to 8½" x 11".

The next problem was to find the missing issues. Although I knew they were published between 1927 and 1934, I had no idea which ones had the AMLA material so that I could ask for specific date and page when writing to libraries which might have the AMERICAN BOY. Then, in 1969, Jim Noonan sent me a complete INDEX of the AMLA articles. He had compiled it from a microfilm furnished by the Detroit Library to Milwaukee Library at Jim's request. Now, I was able to determine what I still needed, and start making a file.

In 1973, Bert Pond wrote that he had several reprints and suggested to whom I could write for further assistance. Thus, I obtained four original copies from Gene Schapp. Perhaps the most appreciated help from Bert, in addition to his own prints, was to advise that Dan Clini had twenty original AMERICAN BOY magazines, and that he would loan me the pages I needed for the negatives. Early in 1981, Vern McIntosh sent a letter stating that he had some magazines, and enclosed a copy of an index that he and his friend, Glenn Ledger, had compiled. It listed all of the model and aviation articles, fiction and factual, published in the AMERICAN BOY from 1924 to 1934. This index proved to be most helpful as it also included an index of model ads. With Jim's and Vern's lists on hand, I was able to simplify my requests for a particular item when writing to the libraries as I was now able to state date and page numbers.

Through Jim Noonan, Jay Hicks learned of my project and mentioned that he had twenty-seven copies, including most of the 1930 issues. He was very cooperative, sending me xerox copies of the issues that I needed. And later, arranging for the local graphic house to make the negatives. Finally, he offered the collection at a very nominal price so that I now own it. With actual magazines in my hands, I was able to select commercial ads and magazine features for inclusion in the book to give it the "contemporary" atmosphere. Many helped to make this book possible. Others who sent material were: Jim Cahill, John Brown, Walter Ehrbach, Don Garafalo, and Bill Drake. Ned Nepper did the cover. Also, thanks to J. P. Glass for his help.

By spring, 1981, I had all of the AMLA articles, with each month individually filed. Now I was able to make up a dummy copy of the book. However, I was not able to bring it to completion or make "flats" (positioning of the negatives on a large form from which the printing plates are made) as I did not have the complete set of negatives. I still needed ten original magazines from which to have the negatives made. Xerox copies could not be used for clear reproduction of photos, etc., especially at a reduced scale. The libraries were very cooperative in supplying the xerox copies, but very reluctant to let the actual magazines out of their rare book rooms. Luckily, again Jim Noonan came to the rescue. He was able to borrow the needed copies from the University of Wisconsin Library long enough to have the negatives made. His son, Barry, is a student at the University and he works in the history department. Now, with these final negatives at hand, I was able to lay out all of the "flats".

By one of those happy coincidences, I was able to add a bonus to the book. During one of Jim's visit to the University of Wisconsin Library, he found a series of model building articles by William Stout in the 1916 issues of the AMERICAN BOY. He sent me xerox copies. Then, when Vern McIntosh sent the Index, he also included a chapter from Stout's book, "So Away I Went!" The combination could not have been more timely. It discloses Stout's interest in model airplanes and his part in the formation of the AMLA.

And thus, after sixteen years, with the generous help from my many friends, we finally managed to get it all together.

May, 1982
Northridge, Calif.

Frank Zaic

Build Model Airplanes— and Fly Them!

Compete for Official Trophies, Cash Prizes, and a Trip to Europe!

Join the Airplane Model League of America

Follow Mr. Hamburg's directions and your planes will fly.

MANY of the great leaders in aviation got their start by building airplane models. They all agree that model building taught them the basic principles of aeronautics. And the sport is so fascinating that many of them—even though they are now engaged in designing or flying big ships—are still building and flying models! They just can't stop!

Now THE AMERICAN BOY is going to give you your start! We have asked one of the foremost model experts in the country to help you to build light, strong planes—the kind that will stay in the air for several minutes, that will circle, swoop, loop the loop, and glide to earth for all the world like big ships!

Here's a hobby for your scout troop, or club, or just you and a few of your best friends! Build planes—fly them! Then conduct a contest or stage an indoor flying circus! And later, get into the national contest. But—let us tell you about the whole program in detail.

First of all, we'll introduce THE AMERICAN BOY'S *model airplane editor, Mr. Merrill Hamburg.* During the next eight months, Mr. Hamburg will tell you how to build model airplanes that will fly. He is an outstanding authority on model planes. He studied mechanical engineering at the University of Michigan; worked under Mr. William B. Stout, who is now head of Stout Airways and the Stout All-Metal Airplane Corporation; and for four years has been teaching aviation in Detroit schools. During the past year, Mr. Hamburg has acted as national secretary of the Associated Model Airplane Clubs of America. In the last two years he has trained Jack Loughner, national outdoor model plane champion, and other winners in the national indoor and outdoor flying contests. Mr. Hamburg *knows* how to build light, strong planes—the kind that will fly for two or three minutes—and in THE AMERICAN BOY he will pass his information along to you, in clear, simple articles that any boy can follow. In addition, he'll undertake to answer, personally, your questions on construction.

Here are some of the planes you'll build: First, the R. O. G. (Rise Off the Ground) baby plane—a light, strong craft with a rubber-strand motor and a wingspread of twelve inches—one that will leave the floor under its own power, circle gracefully around your room for more than a minute, and swoop to a perfect three-point landing on its own landing gear. This is the type of plane with which Mr. Hamburg's students have won national indoor endurance titles. Mr. Hamburg will tell you how to build it in next month's AMERICAN BOY. Then other types: the outdoor endurance model, and the pusher model with two propellers back of the wings. Besides these, the scale models—exact duplications of some of the famous bigger ships like the *Spirit of St. Louis, Miss America*, and others. All this in a series of understandable articles, illustrated with diagrams and pictures, and supplemented with a question and answer service.

After you've learned how to build planes, Contests! Next May there'll be local contests, sponsored by some organization in your home town, or a near-by city. The winners of these contests, providing a local organization will pay their traveling expenses, will come to Detroit in June for the national indoor and outdoor flying championships. The National Aeronautic Association has designated THE AMERICAN BOY to conduct the two *official national contests*—the Stout Trophy races to determine the indoor champion, and the Mulvihill Trophy for outdoor champion.

Anyone may compete in the big national meet. If you'll be sixteen years or older on June 1, 1928, you'll belong to Class A. If you're fifteen years or younger on that date, you'll belong to Class B. (Younger boys may enter Class A, but older boys may not enter Class B.) You'll compete for six championships: first, the indoor titles, Class A and B, going to the plane that rises off the ground and stays in the air longest before it touches the ground again; second the outdoor Class A and B titles, going to the outdoor plane staying longest in the air, and to the plane that travels the farthest; third, the Class A and B scale model championships, going to the boys who build models that are the most perfect replicas of big ships. Any boy may enter this contest, by sending his model to THE AMERICAN BOY for inspection by the judges.

That trip to Europe! Winners of the *Class A* indoor and outdoor titles, (open to older and younger boys), in addition to receiving trophies and cash prizes, will go to England, accompanied by Mr. Hamburg, to exhibit their models and to compete against British champions.

Join the Airplane Model League of America. That's the coming organization for model plane enthusiasts. Its president is Mr. William B. Stout, noted himself as a model builder; its secretary, Mr. Hamburg; among its vice-presidents, Eddie Stinson, airplane manufacturer and famous World War pilot; Thomson Burtis, War pilot and noted air fiction writer; and Griffith Ogden Ellis, editor of THE AMERICAN BOY. THE AMERICAN BOY is sponsoring it.

Join now. There are no dues, or initiation fees, nor will there be assessments of any kind. Canadian boys are welcome to join, too. Fill in the coupon on the bottom of this page and send it to Airplane Model League of America, corner Second and Lafayette Boulevards, Detroit, Michigan. The League will send you back a membership card and a button. Membership in the League will entitle you to use THE AMERICAN BOY-Airplane Model League question and answer service, and to avail yourself of other League privileges to be announced later. *Be sure to enclose a two-cent stamp to bring back your membership card.*

Many great leaders in aviation got their start by building models. Glenn Curtiss built models. So did John Carisi, chief mechanic for the Columbia Aircraft Company, builders of the Bellanca plane that carried Clarence Chamberlin from New York to Germany. So did Walter Hinton, first man to fly across the Atlantic; Edgar Lott, chief pilot for the Colonial Air Transport; Charles W. Meyers, chief pilot of the Advance Aircraft Company; Norman McQueen, co-designer of the Fairchild monoplane.

They all say that model plane construction not only gave them many hours of fun, but taught them the fundamental principles of aeronautics.

Enroll to-day! Fill in this coupon and mail it to the Airplane Model League of America, Corner Second and Lafayette Boulevards, Detroit, Michigan. (But please ask no specific questions on plane construction until the articles are started!)

Maybe, after reading this announcement, some additional questions will come to your mind. Because our question and answer service cannot start until September 25, we'll try to anticipate several of them.

Question. Can a boy with no more than ordinary mechanical ability and no previous knowledge of airplane models expect to build miniature planes that will fly?

Answer. Yes. THE AMERICAN BOY'S articles will be so complete and so clearly diagrammed that any boy, if he follows directions carefully, should be able to make successful models.

Question. Do I have to be an AMERICAN BOY subscriber to join the Airplane Model League?

Answer. No. Anybody may join, without charge or obligation.

Question. What can we do, right away, to get ready to build model airplanes, besides sending for a membership card and button?

Answer. Organize your own Airplane Model Club. Discuss it with your friends, your scoutmaster, your Y. M. C. A. secretary, your school principal, your minister, your older brother. Get their suggestions. It's a lot more fun if a group of you work together. You can help each other build models, then match them against each other. See which ones will fly the farthest and best.

Brigadier General J. E. Fechet

Assistant Chief of the Air Corps

In a letter explaining the part that airplanes will play in the lives of the boys of to-day, says —"I am most heartily in accord with the endeavor being made by THE AMERICAN BOY to foster this instruction in the principles of aeronautics."

Here's What The American Boy Has Arranged for You

1. Directions for building the kind of model airplanes that are easiest to make, that fly the fastest and the farthest, that stay in the air the longest. The first of these articles, completely illustrated, comes *next month!*
2. Free membership in the Airplane Model League of America; better fill out the coupon on this page at once and send for your membership card and button.
3. A Question-and-Answer service that offers you personal, expert advice on the building of model airplanes. It will be conducted by THE AMERICAN BOY'S airplane editor, Merrill Hamburg, who has coached national and world's champions.
4. A chance to participate, in person, in the national indoor and outdoor airplane model contest at Detroit, next June, provided a local organization will pay your traveling expenses. You need not come to Detroit to compete in the scale model contest, however. Just send your plane to THE AMERICAN BOY for inspection by the judges. Full particulars of all contests will be published by THE AMERICAN BOY in later issues.
5. Winners of the national indoor and outdoor contests will go to England, as guests of THE AMERICAN BOY, to compete against English boys.

Please do not write for advance information about airplane models. The Question-and-Answer service begins on September 25, at which time the October issue will be in the hands of all subscribers.

Airplane Model League of America,
Corner Second and Lafayette Boulevards,
Detroit, Michigan.

.....19....

I am interested in aviation and model airplane building and wish to enroll in the Airplane Model League of America. Please send me, without charge, my membership card and button.

.....
Your name, printed clearly

Age..... Year in school.....

Home address .....
(*Street and number*)

City..... State.....
Full particulars next month.

Build Model Airplanes

Start with the Famous "Baby R. O. G."

By Merrill Hamburg

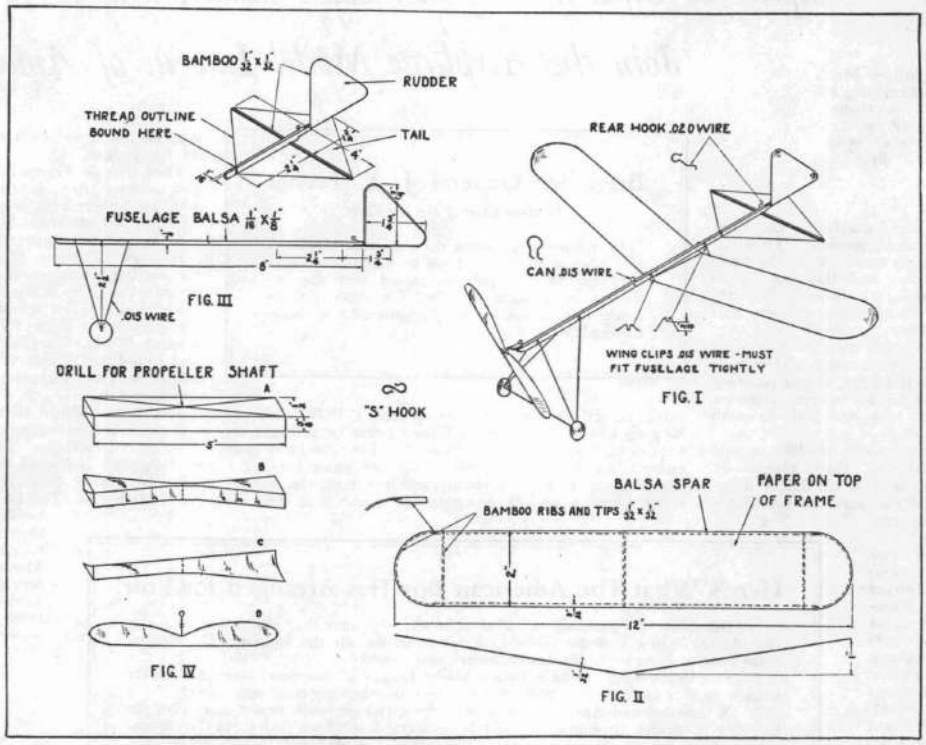
Secretary, The Airplane Model League of America

Merrill Hamburg *knows* model airplanes.

EVER build a model airplane? If you haven't, the Baby R. O. G. is just the one for you to start on. It's small — the wingspread is only 12 inches; it's light and strong; and the directions are simple and easy to follow. You won't need many tools; a good sharp jackknife, a pair of round-nose pliers and a small block plane will do the job.

You'll get a whale of a kick when you're ready to launch your first plane! You'll wind up the rubber motor, hold the propeller between your fingers, set the ship on the ground, and wonder doubtfully what will happen to it. Then for the surprise! If you've put your ship together with only a fair degree of accuracy, the propeller will whirl smoothly, the plane will scoot along the floor, take off like a soaring bird, circle up and up until it hits the ceiling, bounce downward and swoop up again, until finally it loses power, glides downward and makes a perfect three-point landing!

Scores of boys who have worked under me have done that very thing. They've followed the plans in this article and have had success with their first planes. They may have had to adjust the wings backward or forward slightly—but their first planes have flown! You're going to have the same success—if not with the first plane, most certainly with your second.



Follow this drawing and the text carefully and your first plane will fly.

And when you've become a model enthusiast, you'll have joined forces with some of the foremost leaders in aviation to-day. The majority of them were once model builders. Some of them still follow the hobby. The Wright brothers, Glenn Curtiss, E. M. Laird, designer and builder of the Laird *"Swallow"*, William B. Stout, general manager of the Ford Motor Company airplane interests, all started their careers by building models. And they'll all tell you that their hobby was of genuine educational value. Mr. Stout says that model building teaches you the basic principles of aeronautics. He'll tell you that airplane manufacturers, before they build a ship of new design, construct a model of it and test it out in the wind tunnel to see how it will work. You can see, then, that you're not merely whittling toys when you build models—you're entering upon an important and interesting study of aviation.

Just a word about THE AMERICAN BOY program of instruction. You'll learn, in this series, to build two kinds of models: scale models, and the "flying stick" kind. Scale models are built to resemble large ships, but in miniature. Usually, they're too heavy to fly. The flying stick type is so-called because its fuselage is built of one or more sticks and doesn't resemble the fuselage of a large ship. It's built for lightness and the strength to carry the motor strain—two necessary qualities.

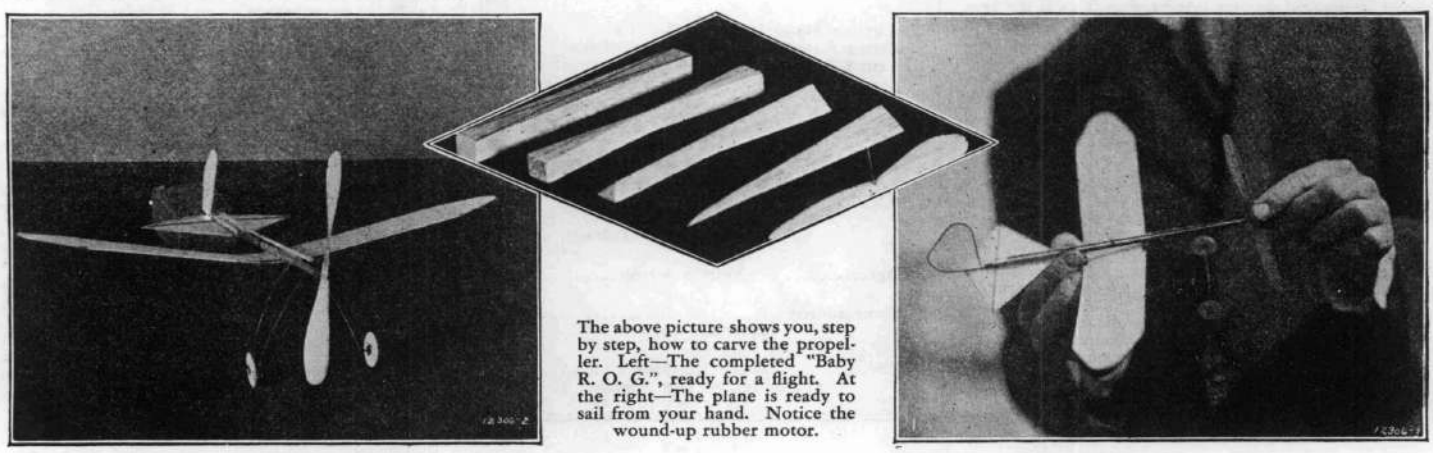
The Baby R. O. G. is a flying-stick plane. Remember, when you start building it, to follow the directions closely and to strive constantly to make the parts as light as the drawings indicate. THE AMERICAN BOY and the Airplane Model League have anticipated the difficulties you naturally might encounter in obtaining certain materials and in shaping the metal parts, and will send you a kit of parts and materials at cost. You can build the plane without this kit, but if you have trouble—at first—in bending the fine metal parts, or in obtaining light, strong wood and bamboo, you'd better send for a kit. You'll find a list of parts the Airplane Model League will supply, and the cost of each part, as well as the cost of the entire kit, announced elsewhere in this article. You can order any one piece, or the entire list, just as you please.

Now for the Baby R. O. G.—the plane you can fly in your own room or outdoors on calm days. Before you start working, study the drawings. Study, particularly, the drawing of the assembled plane in Fig. 1, so that you'll know where each part goes. Whenever you don't quite understand a statement in the directions, go back to the drawings. They'll clear up any doubt.

Build the Fuselage First

THE FUSELAGE — the part running from the propeller to the rudder—is shown in Fig. III. It's a single stick, 8 inches long, planed and sanded to 1/16 x 1/8 inch. Be sure not to make it thicker than that, because you'll want to keep the plane as light as possible. Balsa is the best wood for the fuselage. It's easy to shape, strong, and only half as heavy as cork. If you prefer, however, you can use any straight-grained soft wood such as white pine or basswood, although these are heavier and will cut down the time your ship will stay in the air. You'll not be able probably to get balsa locally because it comes from South America, but the Airplane Model League can supply it to you at cost. Most airplane supply houses handle it.

Now for the front bearing. That's the small metal part on the front end of the fuselage in Fig. 1, through which the wire propeller shaft runs. The front bearing is merely a small, flattened brad not more than 1/2 inch long and 1/8 inch wide. Drill a hole through the brad, near one end, with a Number 72 drill, and bend the brad in the middle until it's L-shaped. That's close work, and if you have difficulty with it you *(Continued on page 34)*



The above picture shows you, step by step, how to carve the propeller. Left—The completed "Baby R. O. G.", ready for a flight. At the right—The plane is ready to sail from your hand. Notice the wound-up rubber motor.

from the Airplane Model League. Or else, perhaps, a neighbor mechanic can shape the bearing and drill the hole for you. Cement the bearing to the top of the front end of the fuselage stick. If you use ambroid cement, just put a drop of the liquid on top of the fuselage stick. Place the bearing in it and hold it there a couple of minutes. After that, it will be securely set, and in another 25 minutes the fuselage stick will break before the cement will give.

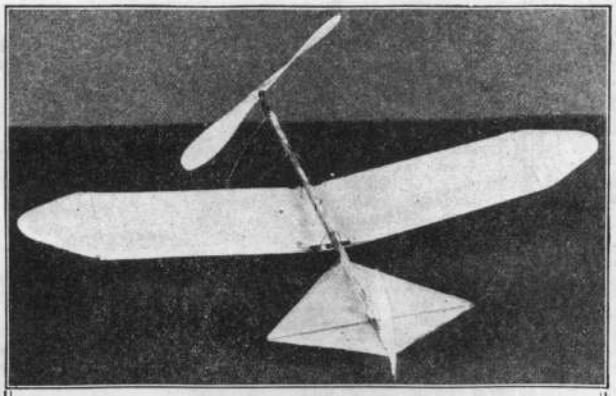
Next, bend the rear hook from a piece of .020 music wire as shown above Fig. 1. You can shape it with pliers, and you needn't bother about the exact dimensions, as long as the entire hook is not longer than ½ inch when it is finished. Cement this hook to the top of the rear end of the fuselage stick.

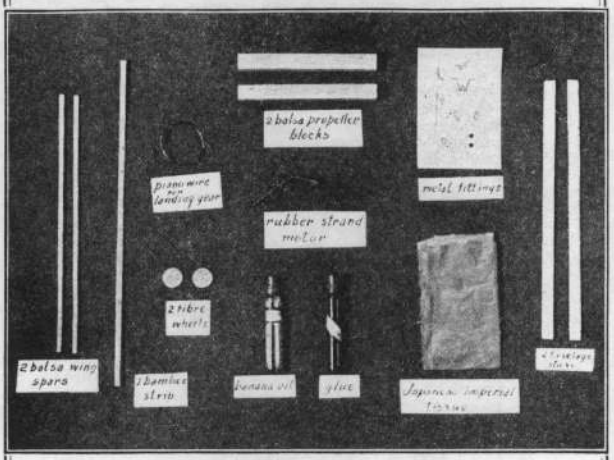
Now bend a wire *can* from .015 music wire. You'll find a picture of one above Fig. 1. The can should fit *over* the fuselage stick and extend about ¼ inch above it, just high enough so that it will clear a string extending from the propeller shaft bearing to the rear hook. Cement the can to the center of the stick as shown in the drawing.

Now for the Rudder

YOU'LL construct the rudder by bending a frame of bamboo and covering it with tissue paper. Study its shape and dimensions in Fig. III. It's the triangular part on the rear end of the fuselage stick. Then draw the outline of a rudder the exact size it is to be on a piece of paper. Next, take your stick of bamboo and split off a piece (Split, not cut) 1/32 inch square and 11 inches long. That's small, but you can do it without trouble. Heat the bamboo evenly over an open flame or the spout of a tea kettle, and you'll find that it bends easily. As you bend it, hold it over the outline you have drawn, so that you get it shaped exactly right. If you have trouble with the first one, it's probably because your piece of bamboo isn't of even thickness throughout. In that case, try it again, with another piece, more carefully split. Not so hard now, is it? Be sure, when you bend the frame, that the horizontal strip, along the bottom, extends beyond the frame a quarter inch.

To attach the rudder to the fuselage, study Fig. III. With your knife, cut a small groove in the bottom of the fuselage to receive the projecting base of the rudder. Ambroid the two together so as to form a continuous line with the under side of the fuselage. Be sure, too, that the rudder stands up perpendicularly.





Here's That Kit of Parts

SEVERAL months ago, when THE AMERICAN BOY talked with Mr. Merrill Hamburg about the details of his building plans and instructions for airplane models, Jack Loughner, outdoor model plane flying champion of America, suggested something that hadn't before occurred to us.

"The plans are fine," he said, "but many boys may have trouble getting some of the materials—balsa wood, for instance. And Japanese Imperial tissue paper."

Balsa wood comes from South America; it's only one-half as heavy as cork, and it's strong and easy to carve—the very best wood for model plane building. But, while most airplane supply houses carry balsa, few of them like to bother with small orders. Japanese tissue combines extreme lightness with great strength—just the right kind of paper for the wing and tail surface—but it, too, is hard to get in small quantities.

"Boys might find it a little difficult," went on Loughner, "to shape the metal fittings: the tiny bearings and wing clips and motor hooks. Piano wire is hard to bend, until you've had practice."

Loughner was right. You might have trouble getting these materials and shaping these parts. So Mr. Hamburg went to New York, on behalf of the Airplane Model League of America and THE AMERICAN BOY, to see the airplane supply companies about getting materials for you. As a result, the League has arranged to supply model builders with the kit shown in the picture. Besides containing balsa, Japanese Imperial tissue and metal fittings, it has a strip of bamboo for the ribs of the wing; banana oil, for painting the wing surfaces and securing them to the frame; ambroid cement, which will glue parts together so strongly that the wood will break sooner than the joint; and fine piano wire for the landing gear, and rubber strands for the motor.

You can build the plane without this kit. But if you're inexperienced in model building, the kit will just about guarantee that the very first plane you construct will fly. And you need the right materials if you want to break records.

The complete kit will cost you just what it costs the League—sixty-five cents. That covers the cost of postage and the stout mailing tube in which the kit is packed.

The Baby R. O. G. Kit

2 Balsa Wing Spars	$.05	1 Rear Hook	.05
2 Propeller Blocks	.06	1 S Hook	.02
2 Fuselage Sticks	.05	1 Sheet Japanese Tissue Paper	.02
2 Fibre Wheels	.02	.015 Music Wire for Landing Gear	.05
1 Piece Bamboo	.02	1 Small Bottle of Banana Oil	.05
1 Thrust Bearing	.05	1 Rubber Motor	.02
2 Washers	.02	1 Small Bottle of Cement	.05
2 Wing Clips	.10		
1 Propeller Shaft	.05		
1 Can	.05		

How to Get the Kit

If you want the complete kit, send sixty-five cents to Mr. Merrill Hamburg, Secretary of the Airplane Model League of America, Corner Second and Lafayette Boulevards, Detroit, Mich. Send either cash, stamps, or a money order made out to Mr. Hamburg. If you wish individual parts, send Mr. Hamburg the total cost of the parts, as shown in the foregoing list, and add five cents to cover handling and postage.

Canadian boys, the Canadian customs office tells us, will have to pay a duty of approximately twenty-two cents on the kit. This duty, however, the boy may pay himself, at his own post office, so that he need send Mr. Hamburg only sixty-five cents.

Caution: Ambroid cement dries quickly when exposed to the air. Don't uncork the bottle and leave it standing around. Uncork it only when you have to use the cement.

And the Tail Surface

TO MAKE the tail, first ambroid a stick of bamboo, 1/32 inch thick and 4 inches long to the under side of the fuselage, ¾ inch from the end, as shown in the drawing just above Fig. III. You will notice the fuselage is notched to receive this cross-piece. To make the frame of the tail, tie a piece of silk thread around the bamboo base of the rudder, one inch back of the end of the fuselage stick. Tie the thread so that there will be seven or eight inches of thread on each side of the knot. Then stretch the threads taut around the ends of the bamboo cross-piece and forward to the fuselage, at a point 2¼ inches in front of the bamboo cross-piece. When you're through, you'll have a four-sided thread frame, as shown above Fig. III. It's fine, delicate work, but not at all difficult.

Some builders prefer a smaller tail than that shown in the drawing—one measuring just two inches from the cross-piece to the front, and just 1¼ inches from the cross-piece to the rear. If you have trouble making your plane fly, try the smaller tail.

Now get your Japanese tissue paper, and iron it out smooth. If you've used a hot iron, let the paper cool to room temperature before covering the tail and rudder. First of all, cut a piece of the tissue slightly larger than the frame of the rudder. Then paint the bamboo frame of the rudder with banana oil or bronzing liquid. Be sure not to use thin banana oil, or it will not hold the paper. Lay the paper on the frame, being careful to smooth out all wrinkles. After you've covered the rudder, trim off the extra paper and coat the cut edge with banana oil to make it stick to the frame. Cover the tail in the same way as you did the rudder, but in this case do not fold the edge of the paper over the silk thread. Simply leave about 1/32 inch of paper extending beyond the thread on all sides.

The wing isn't straight, but it is in the shape of a very flat V, as shown in Fig. I. The angle formed by the two halves of the wing is known as the dihedral angle. The more pronounced the dihedral angle, the more stable will be your plane—and the less far it will travel. You'd better make your first wing with a fairly pronounced angle, so that your plane will be stable. Later, when you've had more experience, you can try a flatter wing. The flatter wing, you'll find, permits your plane to turn more easily, besides giving it more endurance in the air. Another point you'll learn is that landing gear helps to stabilize your plane, so that when your plane is equipped with landing gear your wing needs less angle.

To construct the wing, cut out a flat piece of balsa or other soft wood 1/32 x 5/16 x 10 inches long. Balsa is much to be preferred because it's lighter. Your next job is to split this piece down the middle to form your two wing spars as shown in Fig. II. To do that, lay a steel edge rule on the wood and follow it with a sharp knife. Don't attempt to cut through in one stroke, but repeat several times, increasing the depth each time. Now take your two spars and finish them carefully to 3/32 width.

Next, you'll want to bend the two spars in the middle to form the flat V—the dihedral angle—of the finished wing. There are several ways to do this. The simplest is to cut each spar exactly in the middle and glue the halves together at the proper angle. Here's the way you do it, to insure getting the same angle on each spar: Lay the halves in a V formed of two boards set on blocks, and join them with a drop of ambroid cement. A better way, although slightly more difficult, is to steam and bend the spars over the spout of a teakettle while they are still in one piece. You can split them apart after they're bent. Still another method is to bend the spars over a flame, but you must be sure, if you use this method, not to burn the wood. Take care to give both spars exactly the same angle. The proper angle is shown in Fig. II.

The three ribs are made of bamboo strips 2 inches long by 1/32 inch wide and 1/32 inch thick. These ribs join the two spars and determine the width of the wing. One rib is glued exactly in the middle of the wing, and the other two about a half inch from each end, as you'll see in Fig. II.

The wing tips, you'll notice in Fig. II, are two bent strips of bamboo. To insure the same curve on each tip, bend a single strip of bamboo 1/16 inch wide and by 1/32 inch thick, over a flame, and split it down the middle. To fit the curved tip neatly to the ends of the wing spars, lap the end of the spar as shown in the upper left-hand corner of Fig. II.

Your wing is now 2 inches wide. Airplane experts call the width "the chord." The length of your wing is 12 inches. Designers call that "the span."

You're ready, now, to bend the two wing clips, of .015 music wire, as shown in Fig. I. Be sure to bend them so they will fit the fuselage stick tightly, or the wing won't hold. Note, too, that the rear clip is ⅜ inch higher than the front clip. That's to give an upward slant to the wing, so that the plane will climb. Take care with the two clips, because if this upward slant—called the angle of incidence—is too great, the plane will try to climb too rapidly, and will stall. If it's too small, the plane won't climb. When you have the clips shaped just right, ambroid them exactly in the center of the two wing spars, as shown in Fig. I. If you have trouble with them, remember that the Airplane Model League will furnish you with clips either separately, or in the kit of parts.

Let Your Paper Cool

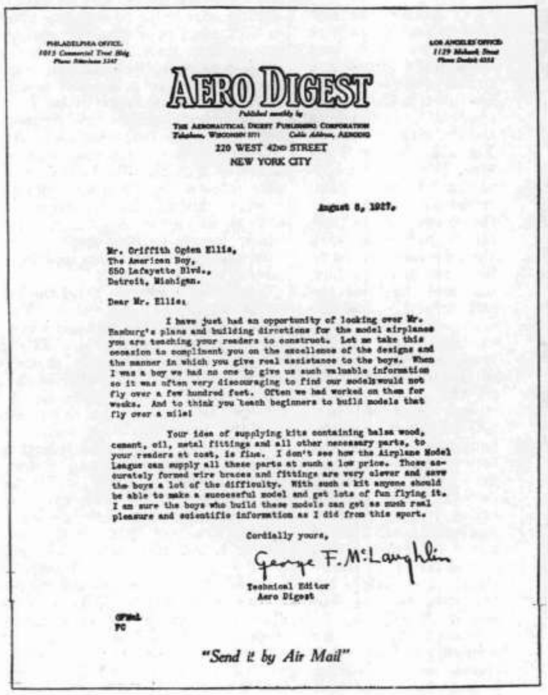
NOW to cover the wings. Iron out your Japanese tissue, let it cool, and then cut it slightly larger than the wing frame. Fasten the paper to the frame with banana oil, just as you did with the rudder and tail, starting with the center rib. Simply coat the center rib with oil

Build Model Airplanes

and place the paper in position upon it. After the center rib is dry, coat the spars by sections allowing each section to dry before beginning the next section, until all the wing is covered. You can then trim the paper close to the outside of the frame and give the edges another coat of banana oil. If you've done the covering with care, you'll have a smooth surface, without wrinkles. It isn't hard.

on a couple of small washers, or extremely small beads, to prevent friction between the propeller and the front bearing. Next, slip the hooked end of the shaft through the hole in the front bearing. This puts the propeller into position on the fuselage, as shown in Fig. I.

Your motor is a band of 1/16 by 1/32 inch rubber, tied in the middle with a square knot. The band should be long enough to allow about an inch of slack when one end is hooked on the propeller shaft and the other end to the rear hook.



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August 8, 1927.

Mr. Griffith Ogden Ellis,
The American Boy,
550 Lafayette Blvd.,
Detroit, Michigan.

Dear Mr. Ellis:

I have just had an opportunity of looking over Mr. Hamburg's plans and building directions for the model airplanes you are teaching your readers to construct. Let me take this occasion to compliment you on the excellence of the designs and the manner in which you give real assistance to the boys. When I was a boy we had no one to give us such valuable information so it was often very discouraging to find our models would not fly over a few hundred feet. Often we had worked on them for weeks. And to think you teach beginners to build models that fly over a mile!

Your idea of supplying kits containing balsa wood, cement, oil, metal fittings and all other necessary parts, to your readers at cost, is fine. I don't see how the Airplane Model League can supply all these parts at such a low price. Those accurately formed wire braces and fittings are very clever and save the boys a lot of the difficulty. With such a kit anyone should be able to make a successful model and get lots of fun flying it. I am sure the boys who build these models can get as much real pleasure and scientific information as I did from this sport.

Cordially yours,

George F. McLaughlin

Technical Editor
Aero Digest

GFMcL
FC

"Send it by Air Mail"

You make the propeller from a balsa block (or white pine) 3/8 x 1/2 x 5 inches. Square up the block on all sides with your plane, and then sand it, then draw diagonals, with a sharp pencil, on each half-inch-wide face, as shown in the top drawing of Fig. IV. At the intersection of the two diagonals, drill a hole by pushing a pin through the wood. Now carve the blank as shown in the B drawing. Fig. IV.

Be sure to leave the middle about 1/8 inch thick. Next draw a diagonal across the end of the block, as shown in B, Fig. IV. On the other end, draw a diagonal in the opposite direction. Cut away the wood, on each half of the propeller, above the diagonal. Drawing C, Fig. IV, shows you how the propeller will then look. Now, if you want to camber—put a slight curve in the surface of the propeller—you may do so with sandpaper. Then cut away the wood below the diagonals, until the blades are about 1/16 inch thick and the hub slightly less than 1/8. Then finish by sanding until the blades are not more than 1/32 and the hub 1/16.

If you have difficulty in following the directions for carving the propeller, study the photographs of an actual propeller in five stages of completion. We've had these specially taken to supplement the drawings in Fig. IV and make clear to you just how the carving is done. It might be best for you to practice on blocks of white pine, and save the balsa wood until you're sure of yourself.

The propeller shaft is shown in drawing D, Fig. IV. Study, in addition, Fig. I, until you understand just what it's for. Now take a piece of .020 music wire about 1¾ inches long and pass one end through the propeller, as in Fig. IV. Bend the front end into a square U and ambroid it into place. Now bend the rear end, as in Fig. IV, so that it will easily engage one end of the rubber motor. Then slip

Landing Gear Completes the Job

BEND your landing gear from .015 music wire, as shown in Figs. I and III. The chief requirement of the gear is that it keep the front end at least 2½ inches off the ground, so as to clear the propeller. The top of the gear fastens to the fuselage just as the wing clips do.

You don't need detailed instruction to shape the landing gear. Nearly every boy varies this part of the plane to suit himself. You can make wheels either of 1/16 inch thick fiber, or of cardboard. You may arrange either to have the wheels turn on the axle, or have the entire axle turn in a bearing made by looping the bottoms of the supports. Work it out to suit yourself, but be sure to have the front end of the plane at least 2½ inches off the floor.

After you've clipped on your landing gear and attached your rubber motor, you're ready for the test flight. Your work is done and your fun is about to begin.

Before you wind up the motor, let the plane glide from your hand to the floor. If it dives too rapidly, set the wing forward slightly and try again. If the plane tries to climb and then settles on its tail, set the wing back. When the plane glides evenly, it's ready for a flight.

If you're flying outdoors, leave the rudder straight. If you're flying in the house, curve the rudder to the left by holding it close to your mouth and breathing on it while you bend it slightly with your fingers. The amount of bend depends entirely upon the size of the room you're going to fly in. The plane won't be injured by striking the wall. If you've followed directions the model will be so light that it will careen off without damage.

To wind the motor, hold the fuselage between the thumb and forefinger of the left hand, with the propeller toward you. With the forefinger of the right hand, turn the propeller clockwise. When the rubber strands show a thick row of knots, they are tight enough. Turn the plane away from you, still holding the propeller. When you're ready, release the propeller with the right hand and let go the plane with your left.

Don't chase it or grab it. Just watch it shoot away from your hand, and then circle and climb. In no time at all it reaches the ceiling, hits it, swoops downward, and climbs again. If you've built the plane exactly according to the drawings—which you probably won't do on your *first attempt*—the Baby R. O. G. will stay in the air more than a minute, gracefully circling and then coming to earth. If the first one doesn't give you a long flight, you've probably made your parts too heavy. In that case, try again. No expert model builder to-day—no national contest winner—ever built a perfect plane on his first attempt. The fun will come when you construct other ones, profiting by your experiences to build a model that will perform like an actual ship!

Work on the Baby R. O. G. this month. Construct one that satisfies you. In the November issue you'll learn how to build the *indoor pusher*—the plane with the propeller in back of the wings.

When You're Stumped—Ask Questions

We've tried to make the building instructions for the Baby R. O. G. as complete and clear as possible. There's a chance, though, that some part of the construction will stump you. In that case, you'll want to take advantage of the free question and answer service of the Airplane Model League. Address your questions to Mr. Merrill Hamburg, Airplane Model League of America, Corner Second and Lafayette Boulevards, Detroit, Michigan. He's prepared to answer your queries on airplane models and—if you wish—aviation in general.

Build Planes, Fly Them, Try for a Championship

In November, you'll learn how to build a new type of plane—the indoor pusher. This kind is slightly larger than the Baby R. O. G. and has the propeller behind the wings. In December, you'll have the plans and instructions for the kind of ship that has been flown successfully in national contests: the indoor tractor. It's called the duration model because it holds the national indoor record for length of flight.

After that, you'll get the big outdoor models. And then the scale models: exact reproductions, in miniature, of actual large ships.

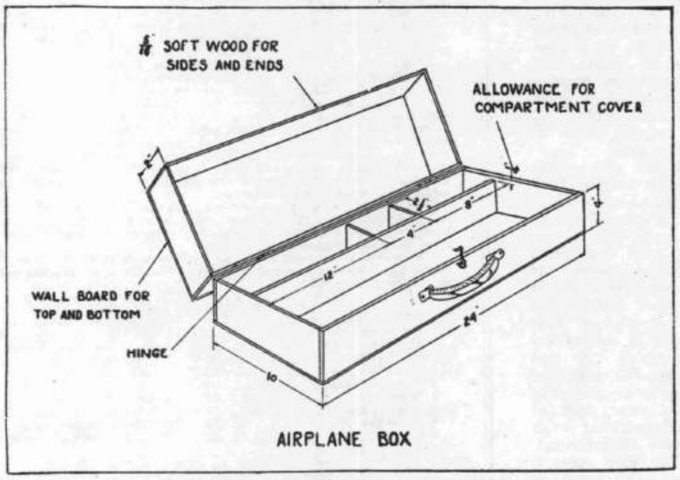
Every kind will give you a new flying thrill; and each one will increase your understanding of aeronautics. All of them—the indoor, outdoor and scale models—you'll be able to enter in local exhibitions and contests.

In June, provided you have won your local contest and are being financed by a sponsoring organization, you can bring your ships to Detroit and enter them in the national contests! There'll be three separate national contests, all of them approved by the National Aeronautic Association: The Stout contest for the indoor title, the Mulvihill for the outdoor, and the scale model contest. (In the last contest you may send your ship—you need not come to Detroit). You'll be competing for national trophies, $2,000 in cash prizes, two trips to Europe, medals and certificates!

You'll have your best chance to share in these prizes if you build a large number of planes. Don't stop with ordinary flights—go after record breakers. Keep building new models until you have a plane that will perform just the way you want it to perform!

For the Boys to Make

By Merrill Hamburg



Build a Model Plane Box

HERE'S a box, in which to carry around your plane and spare parts. You'll need a box when you transport your plane from place to place for exhibitions and contests. Any boy can construct a box from the accompanying drawing, without instruction. You'll have a neat looking job if you use white wood for the sides and ends, and beaver board for the top and bottom. Make the upper and lower halves of the box in one piece. Then draw a line four inches from bottom and saw the box in two along this line. This method insures a perfect fit between the two halves. Use small brass hinges to fasten the cover to the box and a hasp to keep it shut.

The compartments in the box are for spare parts, extra rubber motors, propellers, and so on. You may alter their size to fit your needs. Be sure to cover the compartments with a lid to prevent the parts from falling out and breaking the plane.

Build the Indoor Pusher

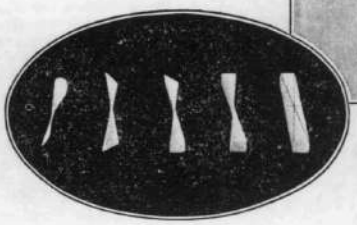
This Easily Constructed Plane Will Fly for Several Minutes

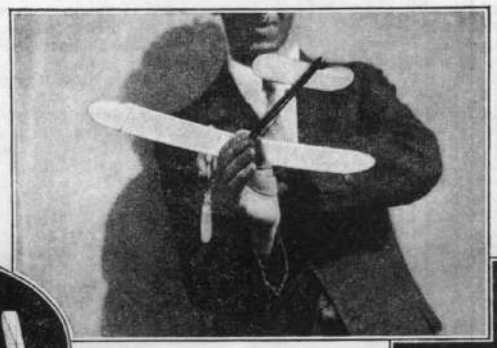
By Merrill Hamburg

Secretary, The Airplane Model League of America

THIS month you're going to learn to build the indoor pusher—a smoothly, steadily performing plane with a 16½ inch wingspread. The reason it is called a "pusher" is because the propeller is behind the wings, pushing the plane. The plane you built last month—the Baby R. O. G.—is called a tractor because the propeller is in front of the wings, pulling the craft.

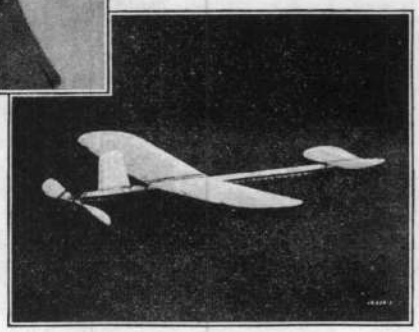
In the early days of aviation, most of the big ships were of the pusher type. Before long, though, this kind became extremely unpopular with aviators, because in a crash the engine, which was situated behind the cockpit, had the unpleasant habit of breaking loose from its moorings, sliding forward and crushing the pilot. Now you'll find the pusher type used only on extremely large planes such as the one that first crossed the Atlantic Ocean—the N. C. 4. This type uses both the pusher and tractor on the same ship.





The top picture shows you how to launch the pusher. A study of the left picture will make clear to you the tricky business of carving the propeller.

At the right, the completed plane. Note how the wing is held to the motor stick with a rubber band.



Model builders share the aviator's prejudice against the pusher.

"It doesn't look like a real ship," they say.

Maybe not, but it can fly! The Mulvihill outdoor trophy — the official national trophy for duration—has been won *five times with a pusher, and never with a tractor.* The pusher is not only a steady, reliable performer in the air, but it is simple and easy to construct.

Here's the material you'll need for building the indoor pusher:

One piece of balsa wood for the wing spars 1-16 x ⅜ x 13½ inches.

One piece of balsa for the propeller ¾ x 1⅛ x 7 inches.

One piece of balsa for the motor stick ¼ x ¼ x 15 inches.

One piece of balsa for the fin 1-32 x 1¾ x 1¾ inches.

One piece of bamboo for ribs and wing tips 15 inches long.

One ¾-inch brad for the thrust bearing.

Two hard bronze washers ⅛-inch in diameter and .020 thick.

One piece of .020 music wire 6 inches long.

One piece of .015 music wire 6 inches long.

One sheet of Japanese tissue 10 x 21 inches.

Two small rubber bands to hold wings and elevators in place.

½ ounce of banana oil.

One small can of ambroid cement.

One 30-inch strip of ⅛-inch flat rubber for motor.

Some of these parts you'll have difficulty in securing. Supply houses do not like to supply the balsa, Japanese tissue and music wire in small quantities. Few stores will carry the small bronze washers. To help you overcome this difficulty, The Airplane Model League of America will supply you with any of the above parts, or a kit containing all the parts, at cost. You'll find an announcement of this kit, giving you the cost of each part, in another part of this article. (If you do not belong to the League, write for your membership card and button. They're free, and they entitle you to full League privileges.)

Although you may substitute white pine for balsa in any of the foregoing wood parts, remember that white pine is heavier and will reduce the flying time of your plane. Balsa is the ideal wood because it is one-half lighter than cork—and it is strong.

Before you start actual construction, study the drawing. Many of you will be able to build your planes from the drawing alone, without the help of the text. The drawings show the assembled plane, and its five major parts, including the elevator, wing, motor stick, fin, and propeller. Whenever you get stuck on any part of the plane, study its diagram.

Figure II shows two views of the wing, one from the top and one from the side. Notice that it has a span (length) of 16½ inches and a chord (width) of 3 inches. Note that it has spars of balsa, tips and ribs of bamboo, and wing surfaces of Japanese Imperial tissue. If you substitute white pine or basswood for balsa, you'll want to finish the spars to about one-half the size shown in the drawing, so as to save weight.

You'll first want to make your two spars from the piece of balsa 1-16 x ⅜ x 13½ inches. This piece, when split down the middle, gives you your two spars. Before you split it, however, you'll need to bend it in the middle to form the angle shown in the lower drawing of Figure II. This is called the dihedral angle. The best way to bend it is, first, to mark the piece exactly in the middle and then hold it over the steam from the spout of a teakettle. After you've held it in the steam for about a minute, gradually bend it. You can check the amount of the angle by laying one half of the piece flat on the table. If, then, the other end is 1½ inches off the table you have exactly the correct dihedral angle.

Now you must split the piece in the middle to obtain your two spars. To do this without breaking the strip at the bend, lay one half flat on the table and split it carefully with a sharp knife. Don't attempt to split it in one stroke. Make several strokes, increasing the depth each time. Now split the other half in the same way, and you will have your two spars. Finish them exactly to 1-16 inch thick, 3-32 inch wide and 13½ inches long. Try to keep the dimensions even throughout, so as to insure perfect balance. You will want to undercut, or half-lap, the ends to receive the bamboo tips, as shown in the upper left-hand drawing of Figure II.

For your wing tips, finish a 7-inch bamboo strip to exactly 1-32 inch thickness and 1-16 inch width. Since the shiny side of the bamboo is the strongest, you may split off the under part and throw it away. (Remember that bamboo must be split, not cut.) Take care to finish the strip to exactly the same dimensions throughout.

Bend your strip, shiny part to the outside, over an open flame. Bamboo, you will find, becomes very flexible when heated. You'll find, too, that it chars easily if you hold it too close to the flame. If you have trouble getting a neat curve by the free-hand method, you'll find that you can easily bend the tip over a tin can or other metal object with a 3-inch diameter.

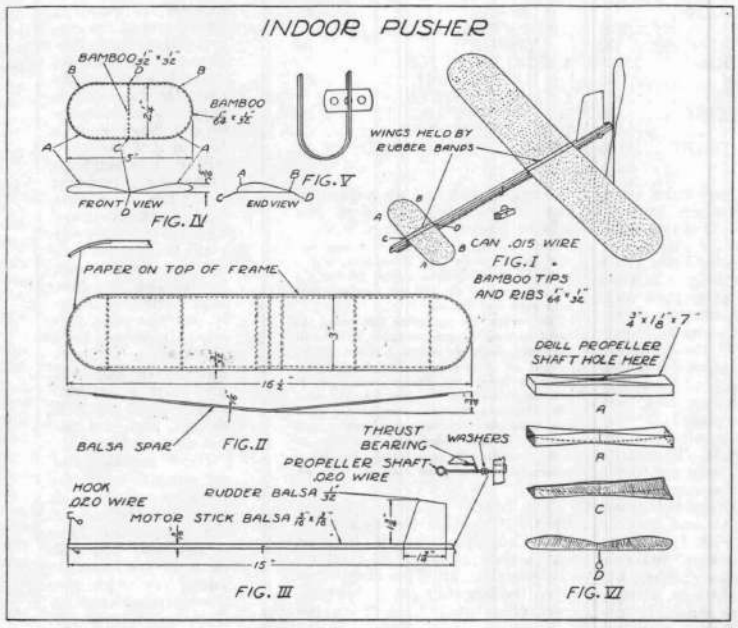
After the curved strip is cooled, split it down the middle to form your two wing tips. This, you'll find, comes easy, after a little practice. Now you'll want to finish the tips to just 1-64 inch thickness. Do this by splitting off tiny slivers from the under side, and then finishing off with sandpaper. Your tips are now 7 inches long, which is about 1½ inches longer than they need be. Cut them down to the right size and they're ready to be glued to the spars.

Next, make your seven bamboo ribs 1-64 x 1-32 x 3 inches. Glue them to the spars with ambroid cement at the locations shown in Figure II. Notice how the three are placed in the center to withstand the pull of the rubber band that holds the wing in place. Now glue your tips to the lapped ends of the spars, as shown in the same drawing. Make sure, when you glue on the tips, to keep them on the same plane with the spars. Do this by holding the ends of the spars flat upon the table when the glue is drying. (Ambroid glue dries rapidly. Keep it away from flame, and see that your bottle is always tightly sealed.)

Your frame, now completed, should be coated with banana oil and allowed to dry. This strengthens it.

Your next job is to cover the wing with Japanese Imperial tissue.

Iron the paper out smoothly and let it stand for several hours so that it will regain moisture and room temperature. Then cut out a piece slightly larger than the frame of the wing. Now coat the three center ribs with banana oil and lay the paper on it in the correct position. When the center ribs have dried, coat the spars up to and including the next rib and stretch the paper smoothly to it. Follow this procedure until (*Continued on page 28*)



When you are in doubt, study this drawing. It tells you everything you need to know.

Organize an Airplane Model Club

Among the fellows in your neighborhood. You'll find airplane modeling a whole lot more fun if you do. A group can not only work together and compare notes, but it can hold contests with other clubs, stage public exhibitions, and in addition have all the fun that a social organization can. Write for advice on forming a club, and for a suggested constitution, (or for airplane model information of any sort) to Merrill Hamburg, Secretary, The Airplane Model League of America, Corner Second and Lafayette Boulevards, Detroit, Mich. *Be sure to enclose a two-cent stamp to bring back your reply.*

Build the Indoor Pusher

(*Continued from page 26*)

the wing is covered. Then trim the paper close to the frame and give the ribs and spars a final coat of banana oil.

Your motor stick is a piece of balsa 3-16 x 3-16 x 15 inches coated with banana oil.

To hold your wing in place upon the motor stick, stretch a rubber band across the center of the wing and then push the motor stick through the two end loops of the band, underneath the wing, and the stick will be held tightly against the under side of the wing, as shown in Figure I. Later, when you're ready for your trial flight, you may want to move the wing backward or forward, to stabilize the plane.

Figure III shows you the motor stick with the rudder, or fin, attached. The same drawing shows you how to bend the front hook from .020 music wire. You will get this hook just the right shape by experimenting. Ambroid it to the front end of the motor stick (in the drawing this is the left end) as shown in Figure III. Your rear bearing is the small flattened brad with a hole large enough to receive the propeller shaft drilled through it. In the small drawing between Figures I and III this brad is called the "thrust bearing." It is glued to the rear end of the motor stick (in the drawing this is the right end) as shown in Figure III.

The can, bent from .015 music wire, is clearly shown in Figure I and it is glued to the center of the motor stick as shown in Figures I and III. (Remember that the can and all other metal parts described in this article are supplied by the Airplane Model League of America at cost.)

At the rear end of the motor stick is the fin. This is made from a flat piece of balsa wood 1-32 inch thick. It is glued vertically to the top of the motor stick, as shown in Figure III. You may vary the shape and dimensions of the fin to suit yourself, although you should keep it approximately 1¾ inches high and 1¾ inches wide. Be sure, too, that it is vertical. If it isn't, it will affect the performance of the plane.

The elevator, shown in Figure IV, is probably the hardest part of the plane to construct. And it is just about the most important. Study not only the three drawings showing the top, front and side, but the photographs, as well.

Note, in Figure I, how it goes on the front end of the motor stick. Your study of Figure IV will show you that the front or leading edge of the elevator is 5-16 inch higher at the tips (marked A) than the rear or trailing edge (marked B), except at the center where it rests on the stick. This center part is marked C and D. Do you get the idea?

Finish the bamboo for the frame of the elevator to 1-16 inch square. Perhaps the best method of shaping it is to bend the strip to form one-half the elevator, as Figure V indicates. Bend the strip over an open flame, just as you did the wing tips.

After the half has been bent to the proper shape you can split it into two pieces. With a razor blade, start first at one end then the other, splitting the strip toward the middle. Figure V shows you just how it's done. When these halves have been trimmed to 1-32 inch square and well sanded, the corresponding ends can be cemented together. While glueing the halves together, you may also ambroid the center rib in place. It is a good idea to put a small block under the points A while the cement is drying, to keep the frame from rolling. Be sure to see that the trailing edge BDB is flat on the table.

Now, the leading edge, marked ACA in the drawing, must be bent to form a flat V, with the points A 5-16 inch higher than the point C. The trailing edge marked BDB is perfectly flat. To get the delicate bend, heat point B and lift point A upward until it's 5-16 inch higher than B. Then heat point A and bend the frame gradually until C is flat on the table. Do this with both sides, and your leading edge ACA will have the proper curve.

Next, the frame is covered with tissue. Cover it in the same manner as you did the wings.

The elevator is held in place on the front end of the motor stick with a rubber band, just as the wings are.

You are now ready to carve the propeller from a balsa block ¾ x 1⅛ x 7 inches. Square and sand the block on all sides. Draw diagonals on the surface 1⅛ x 7 inches, as shown in Figure VI. Draw similar diagonals on the opposite face, and then drill a hole at the intersection by pushing a pin through the block. Now carve the block along these lines until it resembles the B drawing in Figure VI. Be sure to leave the middle at least ⅛ inch thick, so that the propeller won't break while you are working on it.

Your next step is to carve the block to the shape indicated in the C drawing, Figure VI. Note in C, the two curved lines at the end of the block drawn in opposite directions to one another. These indicate that the surface of the blade is slightly curved, or cambered. You get this curve with sandpaper after carving the surface flat. Your final step is to carve away the wood opposite the cambered surfaces until the blades are about 1-16 inch thick. Finish them, with fine sandpaper, to 1-32 inch everywhere except at the hub, which is left 1-16 inch. Round off the ends and the propeller is finished.

The propeller shaft is shown attached to the propeller in the D drawing, Figure VI and more in detail in the drawing between Figure II and Figure III. It is bent from a piece of .020 music wire about 3 inches long. It passes completely through the hub of the propeller shaft, and is bent into a square U and ambroided into place. The two bronze washers are slipped on next to the hub to prevent friction between the propeller and the rear bearing. The other end of the shaft is bent into a hook to engage the rubber motor. The shaft passes through the hole in the rear bearing.

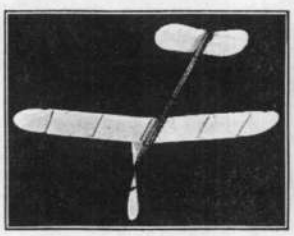
Your power is obtained from a strand of ⅛ inch flat rubber 30 inches long. The two ends of this are tied to form a 15 inch band, one end of which is hooked over the end of the propeller shaft and the other end (the end with the knot) over the front hook. The strands pass through the can. The rubber motor should be long enough to allow about an inch of slack when it is hooked in place.

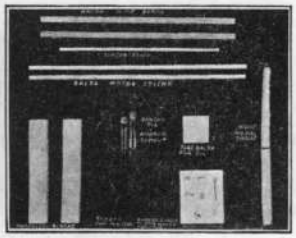
You are ready, now, to try out your second plane — the indoor pusher. Remember that it flies with the small end — the elevator end—to the front. Give the propeller about 300 turns and let the plane sail from your hands. If it misbehaves badly you've probably been careless in finishing your parts to the correct dimensions. Perhaps you have not set your fin correctly upon the motor stick. Maybe your elevator doesn't have enough lift. In that case, you will want to build another ship, profiting by your experience and working more carefully. If your plane climbs too rapidly, set the wing back toward the propeller. If it climbs too slowly, set the wing forward. Once you have the proper adjustment, your ship will give you a smooth, steady flight that will delight you and astonish your friends.

Next month, you are going to build the prize indoor plane of them all—the indoor duration model. This is the type you will enter in your local—and if you're lucky—the national contest. Turn to Page 63 for more information about this model.

This Is the Indoor Pusher Kit

You May Buy It at Cost from the Airplane Model League of America





Here's the complete kit, with the cost of each part:

INDOOR PUSHER KIT COMPLETE INCLUDING MAILING, 65c.	
2 BALSA SPARS	$.06
2 PROPELLER BLOCKS	.10
2 MOTOR STICKS	.06
WOOD FOR FIN	.02
1 PIECE BAMBOO	.03
1 THRUST BEARING	.05
2 WASHERS	.02
1 PROPELLER SHAFT	.05
1 CAN	.05
1 FRONT HOOK	.05
1 S HOOK	.05
1 SHEET JAPANESE TISSUE	.05
1 SMALL BOTTLE BANANA OIL	.05
1 SMALL BOTTLE CEMENT	.05
1 RUBBER MOTOR	.05
SPECIAL WING BANDS	.01

IT isn't easy to buy balsa wood, music wire, Japanese Imperial tissue and other materials, in small enough quantities for just one or two planes. And substitutes aren't very satisfactory. Balsa, the wood that is one-half lighter than cork, is the best possible wood for model airplanes. Japanese Imperial tissue is one of the strongest, lightest papers known. Ambroid cement will glue a joint so stoutly that it will be stronger even than other parts of the plane!

To get the best results, you will want these materials. To remove the difficulty of securing them, Merrill Hamburg, secretary of the Airplane Model League of America, has arranged to send you the following kit, at cost. It contains not only the necessary materials for building the indoor pusher, but the small metal fittings, already bent to the proper shape. It contains extra balsa for the propeller, the motor stick and wing spars, so that if you spoil one piece you will be able to try again.

Only A. M. L. A. members may buy this kit. If you're not a member, add a two-cent stamp to your order, fill out the coupon on page 64, and get your membership card and button.

To obtain the complete kit, send 65 cents in cash or money order to Merrill Hamburg, Secretary of the Airplane Model League of America, Corner Second and Lafayette Boulevards, Detroit, Michigan. If you want less than the complete kit, send Mr. Hamburg the total cost of the parts you wish plus five cents for packing and mailing. If your order totals less than 25 cents, stamps will be accepted. For larger orders, you must send cash or a money order.

The League has been informed by the Canadian Customs office that Canadian boys will have to pay a duty of about 22 cents on the complete kit. This duty, however, the boy may pay at his local post office when he receives the kit.

Next Month, the Indoor Duration Model!

NOW that you've tried out your wings, in October and November, on the Baby R. O. G. and indoor pusher planes, you're ready for the best indoor craft of them all—the duration model. We'll tell you a story about this model. It's the story of how Aram Abgarian, a Detroit high school boy who is young in years but old in national flying competition, won the title of "hard luck champion of the United States."

Aram built a beauty of an indoor duration plane—a nicely balanced, light and sturdy ship that promised to take the honors at the national indoor meet for the Stout trophy, held in Detroit last year. The meet was held in an immense auditorium with plenty of room for the planes to circle until their rubber motors ran down.

When his turn came, Aram launched his ship. It rose in a sweeping circle until it almost reached the high ceiling. Gracefully it circled while the stop watches ticked on to what seemed sure to be a record. Then, suddenly, the plane perversely picked out the one obstacle in the entire room that could stop its career. Ninety feet in the air, it glided gently over the rim of the huge indirect lighting bowl, and there made a perfect three-point landing. Aram couldn't get it down, so on his second trial he sent up another plane. This one too, ended its flight in the light bowl! Tough break Number One.

At the Michigan state outdoor meet, held at the Ford Airport last August, Aram was again entered. His first flight—with a big outdoor twin pusher—was second only to that of Jack Loughner, the present national outdoor champion. While Aram was waiting for his second flight, an official asked him, just as an accommodation, to demonstrate his indoor model before several magazine and newspaper men. Accordingly, Aram fished his indoor plane out of his box, wound it up and launched it. It rose several hundred feet and started drifting eastward in lazy circles. Timers and officials gazed at it. All at once, they awoke to the fact that they were witnessing a record-breaking performance.

"Has anyone timed it?" shouted an official. "That's the best flight any boy has made to-day!"

Not a man had timed it. While the crowd still gazed, the plane, as high up as ever and with Aram still following it, disappeared over a far hill. It was by far the finest performance of the afternoon, but it couldn't be counted, because the flight wasn't official! And Aram had narrowly missed winning another title. But he's not worrying. He's busy building other ships—and he'll be heard from in future contests.

Aram's type of plane—the kind that is used in indoor contests and that can give severe competition to the big outdoor models—you're going to learn to build next month.

In January, you'll start on the outdoor types. Later you'll construct scale models—small replicas of famous large planes. And all of them—the indoor, outdoor and scale models—you can enter in local exhibitions and contests. In June, if you've won your local contest, you'll have a chance to fly your plane or exhibit your scale models in the national competition to be held in Detroit. This is the official meet, approved by the National Aeronautic Association, for the Stout indoor trophy and the Mulvihill outdoor trophy. The winners of these two prizes will go to Europe, as guests of THE AMERICAN BOY, to demonstrate their planes and compete with English model builders.

If you wish to participate in this program to the fullest extent; if you'd like to get the maximum fun and profit from it, you'll want to belong to the Airplane Model League of America. Membership in the League costs you nothing.

Reprinted from the December, 1927, issue of THE AMERICAN BOY Magazine, Detroit, Michigan.

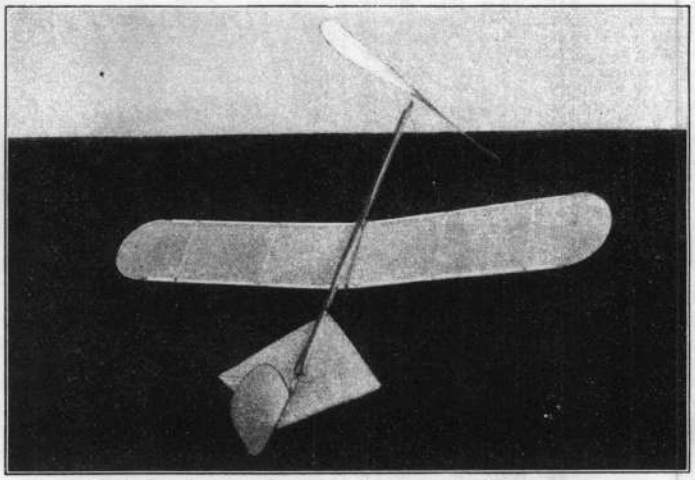
Build the Indoor Endurance Tractor

It Will Fly for Three Minutes!

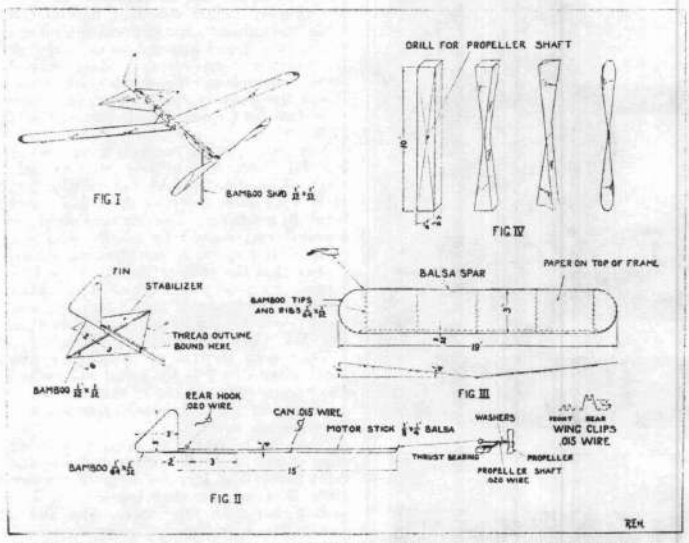
By Merrill Hamburg

Secretary of the Airplane Model League of America

The plane, the builder, and the trophies. Charles Dybvig holds both the national Stout indoor trophy (in the case) and the Detroit Airboard Metropolitan cup.



Here's the plane that flies longer than any other indoor model.



Study these drawings, read the instructions carefully, and you'll have no trouble.

HERE'S the model airplane you've been waiting for—the long-flying, highly efficient indoor endurance tractor. Of all indoor models, this is the most popular with model fans. You'll find it a bit more difficult to construct, a little more tricky to fly, than the Baby R. O. G. and the indoor pusher—the types you learned to build in October and November—but once you have it properly balanced and adjusted, you're due for a flying thrill.

The indoor endurance tractor is the type of ship that Detroit high school students flew before Commander Richard E. Byrd and Colonel Charles Lindbergh, much to the surprise and pleasure of the two great airmen. It's the type of ship you'll enter in your local contests, or fly at banquets and exhibitions. If you're one of the lucky ones, you'll take several indoor tractors to Detroit, next June, to enter in the national indoor contests for the Stout trophy.

Get started on it right away. With the experience you've gained on the Baby R. O. G. and the pusher, you will find it a simple job.

Here's the list of materials you'll need:

1 piece of balsa 1-8 by 1-4 by 15 inches, for the motor stick.

1 piece of balsa 1-16 by 3-8 by 16 inches, for the wing spars.

1 piece of balsa 11-16 by 1 1-4 by 10 inches, for the propeller.

2 pieces of bamboo 1-16 by 1-4 by 15 inches.

1 piece of Japanese tissue 10 by 21 inches for wing and tail surfaces.

1 piece of .015 music wire 6 inches long.

1 piece of .020 music wire 6 inches long.

2 hard brass or bronze washers, 1-8 inch outside diameter and a .025-inch hole.

1 small brad for thrust bearing.

1 strand of rubber 1-30 by 1-8 by 30 inches long, for motor.

A 3-4 ounce can of ambroid cement.

A 1-2 ounce bottle of banana oil.

You can obtain all the foregoing materials and parts by sending to the Airplane Model League of America for the kit, described in another part of this article. If necessary, of course, you may substitute the heavier white pine or basswood for the comparatively light balsa wood.

For tools, you'll need a pocket knife—a sharp one—and a pair of round-nosed pliers. You'll want a sheet of fine sandpaper for finishing the wooden parts to just the right thickness. Another handy tool will be a small block plane for planing the fuselage and spars.

Before you start construction, study the drawings. Picture the completed plane in your mind, so that when you make each part, you'll know instantly where it belongs and what purpose it serves. Then give your knife a few final swipes on the oilstone, and begin.

First of all, the motor stick, shown on Fig. II. This is a straight balsa stick, 1-8 by 1-4 by 15 inches. Experienced model builders will sandpaper the stick down to 3-32 by 3-16 by 15 inches, but there's danger of a stick of this size breaking unless it's perfectly made. For your first model, stick to the larger dimensions.

REMEMBER, though, that you're building this plane for endurance, and that weight cuts down your flying time. You can save weight by tapering the motor stick slightly toward each end, and by pointing the front of the stick under the thrust bearing, as shown on Fig. II. The weight you save in this way may mean a championship to you, some day.

The thrust bearing, shown on the front end of the motor stick, is made by flattening a 3-4 inch brad. Lay the brad on a flat piece of steel or iron and tap it with a hammer until it's a little more than 1-32 inch thick. Now drill a small hole, with a Number 72 drill, near one end of the brad. This hole is for the propeller shaft. Then bend it in the middle, as shown in the drawing, taking care not to break it. Be sure not to make the angle of the bend too sharp, or the propeller will rub against it. Glue the thrust bearing on the stick with ambroid cement, as shown in the drawing. The hole in the bearing should not be more than 1-4 inch higher than the stick.

Bend the rear hook, shown at the left end of the motor stick, from .020 music wire. Any other kind of wire will be likely to bend, under the strain of the rubber motor, or will prove to be too heavy for the model. Use your round-nosed pliers for this job. When the hook is properly bent, ambroid it on the rear end of the motor stick, as shown in Fig. II. Your hook should be just high enough above the stick so that the rubber will not rub. Take this caution to heart: If your thrust bearing and rear hook are too high the stick will bend when you wind up your motor. If they are too low, the rubber will not unwind freely because of contact with the stick. Experiment until you get them just right.

The can, shown in Fig. II, is bent from .015 music wire. Its diameter should be about 1-4 inch, so that it will clear the rubber on all sides. Glue it to the middle of the stick, as Fig. II shows. If you have trouble with any of these metal parts, remember that you can buy them from the Airplane Model League at cost.

While the cement is drying, make the parts for the tail group. This is shown on the drawing of the completed plane, and is shown in detail just above the rear end of Fig. II. It's composed of the fin (the vertical part) and the elevator (the horizontal part). The fin is made of bamboo frame, covered with Japanese Imperial tissue. If your Japanese tissue is at all wrinkled, iron it out flat and let it cool for a couple of hours so that it will regain room temperature and moisture.

You're now ready to bend the bamboo frames of the fin and elevator. There's an art to bending bamboo. When it's heated over a flame it's very pliable, but if you get it too hot, it will char. By experiment, you'll have to learn to heat it to the right temperature and then bend it while it's still hot.

Here's another tip on bamboo. The best part of this material is the shiny side. When you split your small pieces off the big strip, save as much of the shiny side as possible and split away the other side. You never cut bamboo; you always split it. You'll find, though, that the split tends to run to the side. When it does that, start a new crack with your safety razor blade or knife, closer to the line on which you originally started. Tricky—but not hard. Remember, too, always split off a strip of bamboo that's larger than the finished dimensions call for. Just before you bend it, you can trim it down to size by splitting small slivers from the side of the strip.

Now you're ready to bend the frame of the fin. This is made from a piece of bamboo 1-32 by 1-16 by 11 inches. An easy way to get the shape you wish is to draw the frame on a piece of paper and then bend the strip so that it fits exactly over the drawing. The base and height of the fin must be 3 inches, but the shape may be varied to suit your own (*Continued on second page*)

(*Continued from first page*)
ideas. The shape shown in the drawing, you'll find, is easy to bend. Your finished frame will be a triangular figure with the base at right angles to the front side. The base will extend 1-2 inch beyond the front end. This is the part that fits under the rear end of the motor stick.

Now that the frame is bent, you'll want to split it down to size. Perhaps you wonder why we didn't finish the piece to size before bending it. The chief reason is that bamboo is less likely to burn or crack when larger pieces are used. The wider the piece, the easier it is to bend. The piece you have now is large enough for several frames. All you'll have to do when you need a new frame is to split one off the larger piece. We've already told you how bamboo must be split. The finished size should be 1-64 wide by 1-32 thick. Better split off a larger piece and work it down.

Your next step is to cut a groove in the bottom of the rear end of the motor stick and ambroid the projecting base of the fin in the groove. Be sure that your fin sticks up, perpendicularly instead of on the slant! The best way to do this is to ambroid it to the motor stick, lay the stick on a flat table before the cement dries and check the fin with a tri-square, set on end. Your eye will almost tell you.

While you're waiting for the fin to dry, finish your propeller blocks to just the size shown at the left end of Fig. IV, and draw your lines on the top and bottom as the drawing indicates.

Now get back to the tail group. The stabilizer, shown just above the rear end of Fig. II, is a four-sided figure formed by stretching a thread from the base of the fin around the ends of a bamboo rib and back to the motor stick where it is fastened in place. This frame is covered with Japanese tissue.

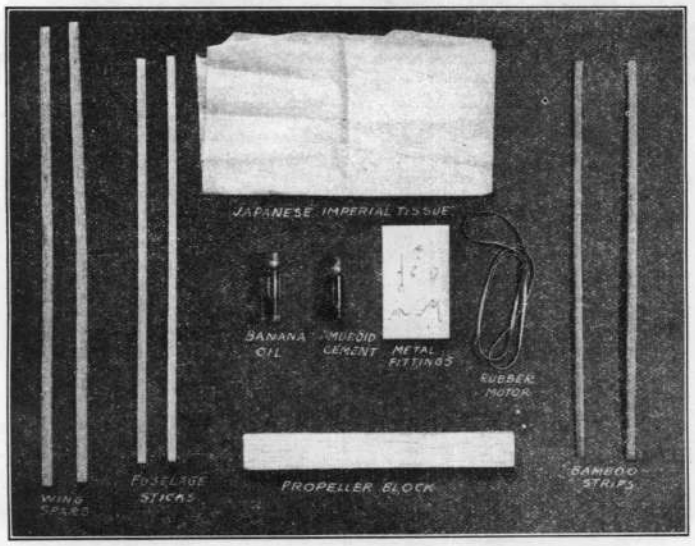
Split your rib, or crosspiece, to 1-32 inch square and 6 inches long. Make sure that the piece is perfectly straight and uniform in thickness. When it's finished, ambroid it to a groove in the under side of the motor stick. Study the drawing carefully. Note how the stick is set in a notch just 3-4 inch from the end of the motor stick. Be sure that the rib is perfectly horizontal, so that the stabilizer won't be tilted.

Your next job is to put on the thread outline. Here's the way it's done. Tie a piece of thread 20 inches long to the base of the fin, at a point 2 inches back of the crosspiece, in such a manner that each of the loose ends will be 10 inches long and the knot will be on the under side of the fin. That's not as hard to understand as it sounds. Now stretch each half of the thread around the ends of the crosspiece—just tight enough to avoid any slack—and tie them to the motor stick at a spot 3 inches in front of the crosspiece. Be sure when you do this, to pass the thread *under* the motor stick, first, and then over, so that the thread will run to the under side. This allows the whole frame to lie flat with the bottom of the motor stick. To hold your thread in position, just paint the points of contact with ambroid.

Now paint the whole outline, as well as the fin and motor stick, with banana oil. This strengthens the stick and helps the tissue paper to stick to the frame.

While the banana oil is drying, cut out your tissue for the fin and stabilizers. Cut each piece about 1-2 inch larger than the finished dimension, to allow for trimming. Next, give the frame of the fin another coat of banana oil and lay the tissue flat

(*Continued at top of col. 3*)



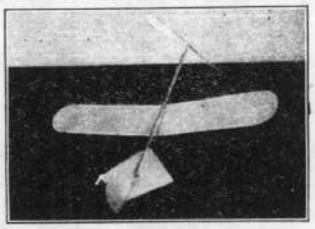
Get This Indoor Tractor Kit

IF you have trouble bending the fine metal parts for the indoor endurance tractor, or if you find it hard to secure the rare and light balsa wood and Japanese Imperial tissue, you'll want one of these kits. The Airplane Model League of America is preparing them and selling them at cost, as a service to model builders. You must belong to the League in order to buy it—fill out the coupon on Page 75.

The Kit Contains

2 SPARS	$.06
1 PROPELLER BLOCK	.06
2 MOTOR STICKS	.06
2 PIECES OF BAMBOO	.06
1 SHEET OF JAPANESE TISSUE	.05
2 BRASS WASHERS	.02
1 THRUST BEARING	.05
1 REAR HOOK	.05
1 CAN	.05
2 WING CLIPS (FRONT & REAR)	.10
1 PROPELLER SHAFT	.05
1 S HOOK	.05
1 SMALL BOTTLE BANANA OIL	.10
1 SMALL BOTTLE AMBROID	.10
1 RUBBER MOTOR	.05

To get the complete kit, send 75 cents



in cash or money order, to Mr. Merrill Hamburg, secretary of the Airplane Model League of America, Corner Second and Lafayette Boulevards, Detroit, Mich. If you care for only part of the kit, tell Mr. Hamburg just what parts you want and enclose enough money to cover the total cost of those parts, plus five cents for packing and mailing.

The Canadian customs office rules that Canadian boys will have to pay a duty of approximately 25 cents on the complete kit. This duty, however, the boy may pay himself, at his own post-office, so that he need send Mr. Hamburg only the cost of the kit, or of the parts he wants.

on it. You'll have no trouble with this operation, because the surface is so small that the tissue seldom wrinkles. When the oil is dry, the tissue will stick to the frame. Then you can trim it, close to the bamboo, with a safety razor blade.

COVERING the stabilizer is just as easy as covering the fin. Simply paint the entire thread outline, including the crosspiece and that part of the motor stick within the outline, with banana oil. Now holding the stick upside down, lay the tissue on the frame, making sure there are no wrinkles. When the oil is dry, trim the paper carefully with a razor blade, leaving at least 1-32 inch of paper outside the thread. *Don't fold the tissue over the thread.* Another coat of banana oil around the edges of the paper will complete the job.

You're now ready for the wing. Fig. I shows how the wing fits to the motor stick by means of wing clips, and Fig. III is the detail drawing.

First of all, finish a strip of balsa to exactly 1-16 by 3-8 by 16 inches. This piece, when split in two, will make your two wing spars. Notice, in Fig. III, that the wing is not flat, but is bent to form a very flat V. This angle is called the dihedral angle. Its purpose is to gave stability to the ship—to give the entire ship a lower center of gravity. If your wing were flat, you wouldn't be able to fly your plane.

You get this angle by bending your wing spars, and in order to get the same angle on each spar, you bend the two while they're in one piece. Probably the easiest way to do this, is to mark the exact center of the piece of balsa, hold it over the spout of a tea kettle for a few minutes, and then bend it. Check the angle by laying one side flat on the table and measuring the height of the other tip above the table. If it's just two inches above the table, your angle is correct.

Now that the piece is properly bent, you'll want to split it down the middle. Do this by laying one half flat on the table and guiding your knife with a metal-edged rule. Don't attempt to cut through the wood with one stroke. Make several strokes increasing the depth each time. When the piece is split in two, you have your two bent spars. Finish them to 3-32 inch wide.

Next, study your bamboo wing tips in Fig. III. Both tips are bent from a single piece of bamboo 1-32 by 1-8 by 6 inches. Heat your piece over an open flame and bend it gradually. The curve should be graceful and should fit evenly into the ends of the spars, as the drawing shows. Notice that the ends of the spars are half lapped, to receive the tips. When your piece is bent, split it into two parts and finish each to the dimensions shown in Fig. III. Then glue them in place.

Your next step is to finish your five bamboo ribs to 1-64 by 1-32 by 3 inches. Cement them to the top of the wing spars, as shown in Fig. III, spacing them about 3 3-4 inches apart.

Now you're ready to bend your wing clips. Note, in the drawing just below the right end of Fig. III, the shape of the two clips. Notice, too, that one clip is 7-16 inch higher than the other. The higher one is the rear clip, and serves to hold the wing at an angle to the motor stick. Fig. I will show you how the front or leading edge of the wing is closer to the motor stick than the rear or trailing edge. This angle, from front to rear, is called the angle of incidence and serves to give the plane lift.

Without question, the bending of the wing clips is the most particular job of the entire work. Unless you find yourself adept at bending music wire, you'd better get your first clips from the League. In the list of parts published on the opposite page you'll learn the cost of the clips and the address of the League.

Ambroid the two clips to the center of each wing spar.

THE wing is now ready to be covered. Cut a piece of Japanese tissue about 1-2 inch larger than the frame of the wing except at the center, where you should cut the paper just 3 inches wide so that it will fit between the wing clips. When the piece is cut out, coat the center rib with banana oil and place the paper in position upon it. When the oil has dried, paint the frame and the next rib, and with your fingers stretch the paper and hold it in position until dry. Continue in this manner until the wing is covered, taking care every minute to avoid wrinkles. Trim the paper close to the frame by rubbing the edges with sandpaper. After trimming, coat the rough edges with banana oil.

Fig. IV shows you the four steps to follow in carving the propeller. The propeller must be made of balsa wood. Any other wood will give you such a heavy propeller that you'll not be able to fly the ship unless you cut down the length of the propeller to 8 inches. A "prop" that is too small will turn too swiftly and decrease the duration of your plane.

If you lack experience, practice carving a propeller out of white pine before beginning your final one. This will make you surer of each step. First of all, check to see that your block is exactly 11-16 by 1 1-4 by 10 inches. Draw your diagonals, as Fig. IV indicates, on the 1 1-4 by 10 inch faces of the block. Push a pin through the block at the intersection of the lines, to make your hole for the propeller shaft. Then carve it to the shape shown in the second stage.

Now draw diagonals at the ends of the block, as the second and third stages indicate. Make sure that the diagonals at each end run at right angles to each other! As you carve the block to the third stage, note the slight curve given to the face of the propeller. This curve is called the camber, and it's important because a cambered blade is more efficient than a flat one. You can get this curve with fine sandpaper. At the finish of the third stage, one side of each blade is finished. The fourth stage is merely carving down the other side of the blades until they are about 1-32 inch thick at the center and 1-64 at the tips and edges. The hub of the finished propeller should not be over 5-64 inch thick.

The propeller shaft is shown in the drawing just below Fig. III. It's bent from a piece of .020 music wire about 2 inches long. Before you bend it, pass it through the hole in the hub of the propeller. At the leading edge of the propeller (the leading edge is the bottom edge in the fourth stage of Fig. IV) bend the shaft into a square U, sink the U into the wood, and ambroid it in place. Slip two small bronze washers on to the rear end of the shaft and then bend this end into a hook. The drawing below Fig. III makes this clear.

When you've built and flown several planes, try a 11-inch propeller instead of a 10-inch. The longer prop should give you slightly more duration.

Fig. I shows a bamboo skid glued to the front of the motor stick. You'll not need any directions for making this. It's easy.

And now the fun begins. The rubber motor is a 1-8 inch rubber strand 30 inches long. Tie the ends with a square knot to form a band 15 inches long. Hook one end of the band over the propeller shaft and the other end over the rear hook. Your plane is ready for its test flight.

Before you wind up the motor, let the ship glide from your hand to the floor. If it tries to climb and then settles back on its tail, move the wing back on the motor stick a fraction of an inch. If it dives too steeply, set the wing forward a bit. When it glides evenly, you're all set for the flight.

Wind up the motor by twirling the propeller until the rubber shows a double row of knots. To launch the plane, hold the motor stick in your right hand, and with your left hand prevent the propeller from turning. When you're ready, release the propeller with your left hand and the plane with your right. If you've followed directions carefully, the ship will soar away like a bird, climbing rapidly until it reaches the ceiling. As it loses power, it will gracefully glide floorward and come to rest on its skid and tail surface.

If the plane makes too large a circle, or flies in nearly a straight line, bend the rear end of the fin slightly in the opposite direction to that in which your propeller turns. Do this by holding the end of the fin close to your mouth and breath-

(*Continued on opposite side*)

December, 1927

Build the Indoor Endurance Tractor

ing on it while you bend it gently with your fingers.

Remember that this plane is so light that it won't injure itself by bumping the wall or any other object. The only way you can crack it up is by trying to catch it with your hand while it's in flight. Let it fly itself out.

The indoor tractor has twice won the National Indoor title, in competition with many other types of ships. It holds the world's record of 189 seconds. Shoot at this mark. If your first plane won't even approach it, build another. If you keep at it, there's no reason why you, yourself, shouldn't be the one to set a new record!

William B. Stout Offers International Model Plane Trophy

SOME time next summer, the model airplane championship of the world will be decided. The place will be England, and the contestants will be the two Americans, winners of the Stout and Mulvihill trophies, against the pick of English model plane builders. To the winner will be presented the new Stout International trophy.

The donor of this trophy is William B. Stout, president of the Airplane Model League of America, and head of the Ford Motor Company airplane interests. The American contestants for the trophy will be genuine aces. They'll have built and experimented with many planes, until they have achieved the perfectly performing ones. They'll have won their local contests. They'll have brought their planes to Detroit next June to the national model plane meet, to be conducted by THE AMERICAN BOY *Magazine with the approval of the National Aeronautic Association. They'll have won either the Stout or Mulvihill trophy in competition with the pick of this country's model builders. And, finally, they'll have gone to England as the guests of the magazine, and will have met the best model plane builders of Great Britain.*

Ten Minutes, Fourteen Seconds—Plus!

**Build a Record-breaking Outdoor Model Next Month
Then Get Ready for Local and National Contests**

THE type of model plane you're going to build next month—the outdoor twin pusher—holds the world's record for endurance. Authorities will tell you that the record flight was made by a twin pusher built by Robert Jaros, of Chicago, at the National Air Races at Dayton, Ohio, in 1924. The time, they'll tell you, is 10 minutes 14 seconds. In a way, they are correct. But in reality nobody knows just how long this record plane actually did fly!

Everybody saw it leave Jaros' hand and circle gracefully upwards. The three timers, with their stop watches, clocked it simultaneously at the start. But right then the fun began. There was a fairly strong wind, and before the plane had been up one minute, the timers were trotting over the ground, to keep up with it. At the end of four minutes, the timers were far away from the starting point, almost exhausted with their long run, and the plane was steadily drawing away from them. Something had to be done!

"Get the motorcycle cop!" one of them yelled.

That's just what they did, and while they mopped their brows, the motorcycle cop took up the chase of the fleeing model. Armed with a stop watch, he bounced and chugged after it, but the plane flying through the air, got the better of him. When it finally disappeared from sight, the stop watch read 10 minutes 14 seconds.

What the world's record is, nobody knows. All you'll have to do, with the twin pusher you build next month, is to beat 10 minutes and 14 seconds!

After the outdoor pusher, you'll learn to build scale models—exact replicas, in miniature, of famous large ships. Later, there'll be other types of outdoor flying models.

Build them all. And don't be satisfied with just one of each kind. Build ships until you have one that is light enough, well enough balanced, and strong enough to threaten existing records! Remember that the October AMERICAN BOY contained directions for building the Baby R. O. G. model, and the November issue a full description and diagrams of the Indoor Pusher. You may obtain a back copy of either issue by sending 20c to the Circulation Department of THE AMERICAN BOY Magazine.

In the spring you'll be flying your ships in local exhibitions and contests. In June, if you're lucky, you'll be bringing them to Detroit, to compete in the national meet for the Stout indoor trophy, the Mulvihill outdoor trophy, and the scale model championship—for $2,000 in cash prizes, certificates of merit, two trips to Europe, and other prizes to be announced!

Airplane Model League of America,
American Building,
Corner Second and Lafayette Blvds.,
Detroit, Michigan.

.........................19....

I wish to enroll in the Airplane Model League of America. Please send me, without charge or obligation, my membership card and button. I enclose a two-cent stamp to cover postage.

....
Your name, printed clearly

Age........ Year in school..........

Home address ....
(Street and number)

City........................ State..........

To make the fullest use of this program, you'll want to belong to the Airplane Model League of America. Membership in the League allows you to use the League's free question and answer service, to buy parts and materials for model planes at cost, and to enter the national contests. Fill out the above coupon and send it along—*with a two-cent stamp* to bring back your membership card and button—to Merrill Hamburg, secretary of the Airplane Model League of America, American Building, Corner Second and Lafayette Boulevards, Detroit, Mich.

November, 1927

The Model Plane That Went Up and Never Came Down

Merrill Hamburg Will Tell You How to Build It in the January American Boy

MAYBE your outdoor twin-pusher will surprise you. If you don't believe it, harken to the experience of Jack Loughner, holder of the national Mulvihill trophy for outdoor duration. Jack had just completed a nicely balanced plane and he wanted to try it out. He went out to the Ford Airport, the immense landing field near Detroit, and started to wind up his rubber motors. He noticed that it was a clear, sunshiny day with little breeze. Just the right conditions for a good flight. He lifted the plane and pointed it skyward, while Mr. Hamburg stood by with a stop watch.

Away sailed the ship from Jack's hands. Slowly, steadily it climbed while the stop watch clicked on. One minute—two minutes—three—and still it climbed. Great circles, that seemed to grow smaller as the craft rose. Five—six—seven minutes, and still it rose.

Mr. Hamburg and Jack had to strain their eyes, now, to keep the pusher in sight.

"Must be in a rising air current," muttered Mr. Hamburg.

At nine minutes, the plane disappeared into the blue, completely out of sight. The two waited for it to come down. They waited a quarter of an hour—a half hour. Then, knowing the plane's general drift, they started searching the countryside. The rest of the afternoon they searched diligently, but no pusher came to light.

And it hasn't been found yet, even though a Detroit paper carried a notice of its loss on the front page. Maybe it's roosting on the moon.

Commander Richard E. Byrd Is Your Honorary President

He Has Consented to Lead the A. M. L. A. (Airplane Model League of America)

WHEN Commander Richard E. Byrd, world-famous flyer and explorer, was asked to act as honorary president of the Airplane Model League of America, he replied simply, "I accept, with pleasure." And he meant it, because he's intensely interested not only in aviation and exploration, but in airplane models, as well.

Not long after he completed his history-making flight over the North Pole, he attended a banquet at which Mr. Hamburg, airplane model editor of THE AMERICAN BOY magazine, staged an indoor flying exhibition. Just as Commander Byrd entered the banquet hall in company with other notables, Mr. Hamburg's students launched their planes. As Commander Byrd walked toward the table, he saw the graceful ships circling and swooping above his head. People were being introduced to him, but he shook hands absently, unable to keep his eyes off the speedily traveling planes. He said in surprise that he had never seen model planes perform so beautifully before. Before the banquet was over, he had arranged for one of the models to be sent to him so that he might present it to a friend in the east!

Every member of the Airplane Model League is familiar with the unusual contributions Commander Byrd has made to aviation and science. In 1926, he flew a giant Fokker monoplane over the North Pole, risking his life to bring back scientific information of great value. This summer, with three companions, he flew from New York to the coast of France, in the Fokker ship "America," demonstrating that great, three-motored planes can carry large loads long distances. And now, because he's more interested in advancing aviation and scientific exploration than he is in personal security, he's planning to fly over the South Pole!

Such is the spirit of Commander Byrd, honorary president of the Airplane Model League.

Reprinted from the January, 1928, issue of THE AMERICAN BOY Magazine

Build the Outdoor Twin Pusher

This Type Holds the World's Outdoor Endurance Record

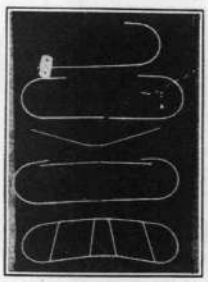
By Merrill Hamburg

Secretary of the Airplane Model League of America

HERE'S the big boy, the plane that holds the world's outdoor championship for duration of flight. It's called the twin pusher, because it has two propellers behind the wings, and flies elevator to the front, just like the indoor pusher you built in November.

Looks large, doesn't it? And more or less complicated. It *is* complicated, and unless you've built at least one indoor model, you'd better not tackle the twin pusher. If you've constructed one or more of the indoor types, you'll be able to work along without a hitch, unless you're unhandy with tools, and you'll produce a serviceable flying ship the first time out. But the chances are you'll be investing at least $3.00 in materials for this plane, and you'll want to be reasonably certain that your investment won't be wasted. It won't—if you have had previous experience, or if you are mechanically minded.

What a wallop you're going to get, when you take your first ship to the nearest large field for its maiden flight! Lindbergh, Wright, and Byrd will have nothing on you in the line of thrills when you see it leave your hands and sail away into the blue with propellers smoothly whirring and wings slightly rocking on the light breeze. If the field is small, don't wind the propellers up too strongly. There's no telling how far the outdoor twin pusher will fly, if it gets into the upper air currents!



Stages in Construction of Elevator.

This ship, you'll find, is heavier than anything you have built. It has to be, to withstand winds and shifting air currents. But it has the motor power and the wing surface to carry the weight. In proportion to its size, it's really lighter than the indoor models.

You can get all the materials and parts for making this model in the kit, described in another part of the article. Here's just what you'll need:

2 balsa blocks 15-16 by 1 1-4 by 10 1-2 inches long for the propellers.

2 balsa strips 5-32 by 3-8 by 40 inches for the frame.

2 balsa spars 1-8 by 5-16 by 17 7-8 inches for the wings.

2 balsa strips 3-8 by 3-8 by 17 inches for the leading edge.

1 balsa strip 1-16 by 1 3-4 by 36 inches for the ribs.

3 pieces of bamboo 1-16 by 1-4 by 15 inches.

2 pieces of bamboo 1-16 by 1-4 by 12 inches.

3 sheets of Japanese tissue for covering.

2 small 1-16-inch brads for thrust bearings.

1 piece of Number 10 music wire, two feet long.

1 piece of Number 15 music wire, 1 foot long.

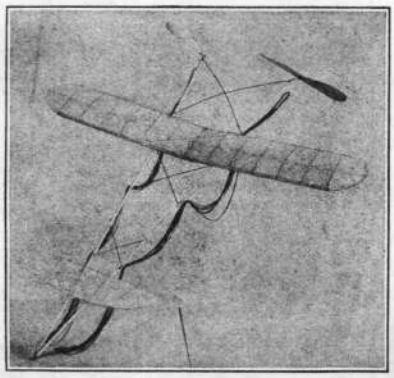
4 hard brass washers, outside diameter 1-4 inch, inside diameter .040 inch.

1 two-ounce can of ambroid cement.

1 ounce of banana oil.

1 ounce of acetone.

Although white pine may be substituted for balsa, it's advisable to use balsa on models that are built for duration. This is so much lighter than other woods—it's half as heavy as cork—and is so strong—it has a structural strength half that of good spruce—that you'll surely want to use it on your contest models.



The Outdoor Pusher Complete.

You'll need the same tools you used on the indoor models: a sharp knife, a small block plane, a pair of round-nosed pliers and some fine sandpaper.

Before you begin, remember to refer to the drawings at every spot in the road. The text merely supplements the information that's already in the drawings.

Start with the wing. The wing used in the twin pusher is known as a "built up," or double-surface wing. In the early days of aviation, airplanes had wings designed to imitate those of a bird. They were built up with ribs and spars and covered on the top side only. Experiment soon showed that the wing became more effective when both sides were covered, enclosing the ribs and spars. The modern airplane has wings with known curves given to the upper and lower surfaces. These curves give definite flying results. The modern wing is called an "airfoil," and a cross section of the wing is called an "airfoil section," or wing section.

Take a look at the wing section drawing for the outdoor twin pusher, page 40. Two sections are shown. The upper, marked A, is called the Clark Y, and is used on such big ships as the Curtiss *Hawk*, the *Spirit of St. Louis*, the Stinson monoplane, the Hess *Bluebird*, the Buhl *Airsedan*, and many others. All that needs to be said about the lower section is that it's the section used by Jack Loughner in winning the 1926 national Mulvihill contest at Philadelphia. If you're a beginner, you would do well to select the Clark Y, as the thicker section permits you to use a larger spar through the center. This prevents the wing from warping while you're working on it.

The Wing Tip.

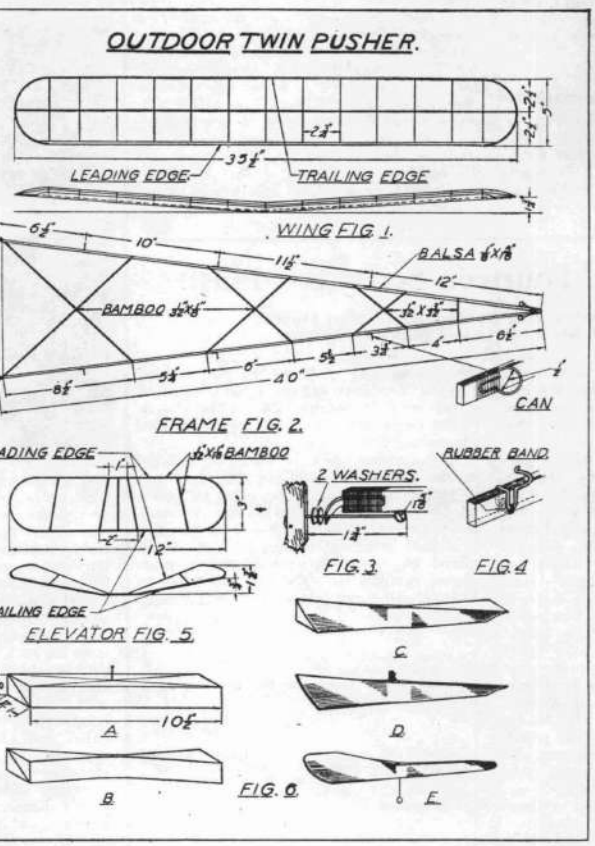
Thirteen finished ribs, of the exact shape shown in the upper section drawing, are furnished with the twin pusher kit. If you prefer to make them, here's the way to do it. The wing section drawings reproduced with this article are the exact size of the finished rib. Select the one you want—probably the Clark Y—and cut it out of the magazine. Paste it on to a piece of sheet brass. With a pair of snips, cut around the edge of the pattern and finish by filing the brass to the line. If you haven't a pair of snips, go to the nearest tinsmith or hardware clerk and ask him to do the job for you. The brass rib you obtain in this way is called a template, and you'll use it to make all 13 of your balsa ribs. This will guarantee your getting all ribs exactly the same shape. And that's necessary, if you want a balanced wing!

The slot for the spar may vary in size. The drawing calls for 3-64 by 1-4 inch. This is just right for the endurance plane but the beginner should have a larger spar, especially when using the Clark Y. A slot 1-8 by 5-16 inch for the Clark Y and 1-8 by 1-4 inch for section B is recommended. Don't attempt to cut this slot in your brass template, but drill a small hole at each end of the slot, using a drill with a diameter equal to the width of the slot. If you can't get a drill you can locate the ends of the slot by driving a victrola needle through the brass template. This will permit you later to mark the balsa ribs through these holes. You must get this slot exactly the same in each rib, or your ribs will not line up and your wing will be out of shape.

The round holes are to lighten the ribs. Although they're not absolutely essential, they help to cut down weight considerably. The best way to transfer these is to use the victrola needle method of making a hole through the brass template at the exact center of each circle. You'll notice that the holes are of different sizes. The three larger holes, section A, should have a 3-8-inch diameter and the other two should have diameters of 5-16 inch and 1-4 inch, respectively. There are only four holes in section B because it's a thinner section. The largest of these is 5-16 inch in diameter and the next two have diameters of 1-4 inch and the smallest one, 3-16 inch.

Now your template is complete. Do you understand how to use it? Just lay your brass template over your strip of balsa, cut the balsa out, mark the location of the holes and the slot through the holes in the template, and you know that every rib will be constructed just the same as every other.

(Over)



Two Ships of the Most Improved Type

BOB HAYES, expert model builder, recently demonstrated his outdoor twin pusher to Lieutenants R. L. Schoenlein (left) and A. G. Person (right) of the famous First Pursuit Group, at Selfridge Field.

"A dandy model," said Lieut. Schoenlein.

"And some ship!" returned Bob, with a sidewise glance at the pursuit plane. Known as the Curtiss Hawk, this army plane will travel faster than 160 miles an hour, and as slow as 50 miles an hour without even threatening to stall!

"Right enough," smiled Lieut. Person. "Schoenlein and I went up to 18,000 feet one day, and took a notion we'd like to see how far we could dive. Schoenlein, here, headed his ship straight down, cut off his motor and dropped 16,000 feet before he pulled her out!"

"Well," replied Bob, "this model has never been up 18,000 feet, but a friend of mine sent one up—a plane just like this one—and it never did come down! He hasn't found it to this day."

There's just one part of the wing section that the template doesn't provide for. That's the leading edge. Notice the shaded part in the wing section drawing? It's just a quarter inch deep. This part of the wing is formed by a solid balsa beam, shaped to the curve of the shaded part of the drawing. The ribs are butt-jointed to this beam in a way that will be explained later. The photograph of the tip of the wing makes the leading edge clear to you. You should know that the front edge of the wing is called the leading edge and the rear edge the trailing edge.

To shape the leading edge, you'll need another template the exact shape and size of the "leading edge" drawing opposite the drawing of the wing section. Simply cut this drawing out, paste it on sheet brass, and cut and file the brass to the proper shape. A needle file is the tool to use here. Now, with the proper tools, you're ready to move swiftly and surely.

You'll cut the thirteen ribs from flat balsa stock about 1-16 inch in thickness. Lay the template flat on the piece and cut around it with a sharp knife or safety razor blade. Before you remove the template, mark the slot and the center of the round holes with a sharp pencil or a victrola needle. Take care to make every one of the ribs identical!

Now, with the point of your knife, or a razor blade, cut out the slot. Outline the round holes with a compass. To cut them out, use a wood-bit—if you have one—cutting lightly first on one side until the point of the bit comes through, and then on the other, until the outside cutting edge of the bit has gone through and the round piece of wood is ready to drop out. If you do not have wood bits, you may use a sharp-pointed knife.

After your ribs are done, make your two leading edge beams—one for each half of the wing. Look at the photograph of the wing tip and fix in your mind the appearance of the leading edge. Each one is made from a piece of balsa 3-8 inch square by 16 1-4 inches long. You can rough out the curve with your block plane, or with a jackknife. Check the shape frequently with the brass template, and when you have the leading edge almost down to size, finish it exactly by using the template as a scraper. Do this by drawing the scraper toward you and at the same time inclining it toward the beam. Be careful not to let the template twist in your hand, or it will gouge the beam and spoil it.

Now you're ready to construct your tips. The drawing shows round tips, but you may change these to any shape you wish. If you wish, you can pattern your tips after the drawings and pictures of planes in aviation magazines such as the *Aero Digest*. Since the tips are less easy to cover than other parts of the wing, many boys let their end ribs act as tips. This gives them a wing with a square tip. The round kind is most efficient.

If you decide on other than the square type, bend your wing tips from bamboo. Take your large piece of bamboo and carefully split off a piece 15 inches long. Finish it down to 1-16 inch square by splitting small slivers off the side and then sanding it until it's uniform in thickness throughout its entire length.

As you already know, bamboo can be bent to any desired shape when it's hot. Heat it gently over an open flame—be careful that it doesn't char—and bend it slowly with your fingers. To check the shape lay it on a full size drawing of the curve. This curve, you'll notice, has a diameter of 5 inches, which is just the width — or chord — of the wing. Notice, too, that the tip goes from the front surface of the leading edge around to the trailing edge. Fig. I, and the photograph of the wing tip will make this clear to you. Note that the tip overlaps the leading edge at least 1-2 inch, and fits nicely into a groove.

Part of the trailing edge is formed by the continuation of the tip. (See the photograph of the wing tip.)

Now you have one tip, properly bent, and 1-16 inch square. Split it carefully along its entire length, and you have your two tips, identically the same.

Your trailing edge is made of bamboo 1-64 by 3-64 inch, extending from one wing tip to the other. When it's in place, the flat side is up and the thin edges are to the front and rear.

At last you're ready to assemble the wing. You assemble only one-half of it at a time. Your first step is to taper the end of the leading edge to fit the wing tips. See the lower drawing in Fig. I and the photograph of the wing tip. Notice that all the tapering is done on top, to leave the bottom edge flat. After tapering, groove the leading edge to receive the wing tip.

Your center spar, which is simply a straight piece of balsa 17 3-4 inches long by 1-8 inch thick and 5-16 inch wide, should also be tapered down to the point where it meets the wing tip. (See the photograph.)

Now mark the position of your ribs on the leading edge 2 3-4 inches apart. Cut shallow grooves into the flat side of the leading edge at each of these marks to receive the ends of the ribs. The grooves should be just the width of the ribs and about 1-64 inch deep.

Next, slide the ribs on to the center spar and fit them into the grooves in the leading edge. At this point, check up the wing for trueness by laying it on a flat table top. Make sure that every rib touches the table along its entire length. If it doesn't you'll want to enlarge the slot in the rib that's out of line, to allow the spar a bit of play. After you're sure that the wing is perfectly flat, and that your ribs are at right angles to the spar, ambroid the ribs in place on the leading edge and center spar. Make sure that the top of the rib makes a continuous line with the leading edge.

When you've made your other half of the wing up to this point, you're ready to assemble the two. First, though, take a look at the bottom drawing in Fig. I. The two halves, you'll see, slant downward to the middle, to form what is called the dihedral angle. To get this angle, place a block 1 3-4 inch square and 6 inches long under each tip so that the leading edge beams overlap—one in front of the other—about 1-8 inch. This will permit you to cut down through both beams at the same time with a razor blade. In this manner, you'll get a perfectly fitting butt joint at the middle, both for the leading edge beams and the center spars.

Now slip your center rib (the thirteenth rib) into place and ambroid all joints. Leave the wing on the blocks for an hour or so, until the ambroid is perfectly dry.

Next, half lap the rear end of the wing tip to receive the strip of bamboo that acts as the trailing edge. Cut the trailing edge to fit, put it in place, take a few turns of silk thread around each joint and ambroid the strip in place. This completes the frame of the wing.

Your next job is to cover the wing with Japanese tissue. This is done on one-half the wing at a time, using separate pieces of paper for each half. Banana oil is what fastens the paper to the frame. Paint the center rib with banana oil and stretch the edge of your paper across the top from the trailing edge to the leading edge. The paper should overlap the trailing edge about 1-16 inch. This part is later turned under.

The rest of the paper should extend past the leading edge far enough to fold under and completely cover the bottom of the wing. As soon as your center rib is dry, paint the frame up to and including the next rib. Then cover this section. Be sure you draw your paper tight, lengthwise rather than crosswise, in order to preserve the correct shape of your section. Proceeding in this manner, section by section, cover the entire wing.

REMEMBER that you always work from the center to the tip and that if you stretch and hold your paper in place, wrinkles can be prevented. After finishing the top of the wing, fold the overlapping paper under and cover the bottom of the wing in the same way as you did the top.

After you have completely covered the wing, "dope" it with a mixture of five parts of acetone to one of banana oil. Two coats of this will glaze and shrink your paper in place. If you use too much dope, the paper will shrink until it warps the wing all out of shape.

The A-shaped frame, shown in Figure 2, is made by fastening two balsa beams together to form a large A, using cross-bracing to support and strengthen the whole. For a light model these beams may be 1-8 by 1-4 inch and rounded well at all corners. If you're a beginner, though, you should use beams 1-S by 5-16 inch. Unless you construct the lighter frame perfectly, you'll crack it up rather easily. After you've studied the drawing, cut your two balsa sticks just 40 inches long, plane and sand them down to size. Where the beams are to be joined together, cut the ends at an angle, to insure a good joint.

The cross-bracing is the strongest bracing yet developed and enables the frame to withstand almost double the strain ordinary bracing would allow. The braces are made entirely of bamboo. Notice that the drawing shows heavier bamboo being used in the widest part of the frame as this is the place where the most strain is exerted. The first two crosses are made with 1-32 by 1-8 inch bamboo, and the last two, 1-32 by 3-32 inch pieces.

Now take a look at Fig. 2. Notice the points in the frame at which each cross-piece extends through the beams. At every one of these places, you must cut a hole in the beam by working your knife point through. After you've done this, cut your bamboo pieces long enough to extend well through the beams when they are in position with the open ends 10 1-2 inches apart. Then put all your cross-pieces in place and ambroid all joints including the apex of the frame. Before the ambroid dries, check up to see that the frame is absolutely straight and true. When the ambroid is dry, trim the protruding ends of the braces flush with the frame. Bind the center of each X with thread and ambroid.

At the left end of each beam in Fig. 2, you'll notice a thrust bearing (Fig. 3 shows one in detail). These are 1-16-inch flattened nails, or brads, drilled to allow the propeller shaft to pass through them. Bend them, as shown in the drawing, so that the hole isn't more than 3-8 inch from the beam. (Thrust bearings, already bent and drilled, are furnished in the kit.) Flatten the part that lies along the beam considerably more than the rest, to insure a good fit on the beam. Bind the bearings in place with silk thread, and ambroid them.

The six cans, or hooks, along the side of the frame prevent the frame from bending and breaking under the strain of the rubber. In the same manner, the eyelets on a fish pole reduce the strain on the rod. These cans are bent from No. 10 music wire and their shape is clearly shown in the drawing just below the right end of Fig. 2.

You should leave the cans open at the top to allow the rubber to be slipped into place when it is wound. The correct position for each can is shown in Fig. 2.

Your front hook—shown at the apex of the A frame—is made of No. 15 music wire and is bent around the front of the frame to form a yoke with an eye on each side. These eyes, or hooks, do not need to be large, since S hooks are used to fasten the rubber to them. The front hook should be bound with silk and then ambroided.

Some fellows strengthen their frame by stretching a silk thread across it 1-2 inch from the points where the propeller bearings fasten to the beams. A coat of banana oil over the entire frame will add considerable strength.

YOUR next job—making the elevator—is not at all difficult, but it does require care. Look at Fig. 5. Resolve, before you start, that you are going to build both halves identical. If the two sides aren't balanced, the plane will not fly properly. Notice that the trailing edge forms a flat V and the leading edge forms a sharper V so that the outer point of the leading edge is 3-4 of an inch higher than that of the trailing edge. Got the idea? If you haven't, study the drawing with a friend until you have the proper picture in your mind.

Before you start, study the photograph showing the different stages in elevator construction. You'll want to get this just right. All set?

First of all, make a full-size drawing of the elevator with the round tip 3 inches in diameter as shown in the upper view of Fig. 5. Now split off a piece of bamboo 1-16 by 1-8 by 11 inches. Bend this to fit the round tip of your drawing, as shown in the top view of the photograph.

This piece is now split down the middle, as shown in the photograph, to form the two tips and the trailing edge of your elevator.

Now cut off the waste so that the piece, from the round tip to the end, will be just 6 1-4 inches long. Then bend the straight ends of your two halves, one inch from the end, to give the upward slant to the completed elevator. (Study Fig. 5.)

You're now ready to bend the leading edge. This is made from one piece 1-32 by 1-16 by 10 inches long, and is bent as shown in the photograph. When the flat center lies on the table, the tips should be 1 3-4 inches high.

Now comes a rather delicate job. Bend the round tips upward from the trailing edge to fit the tips of the leading edge. Cut your ends to fit, half lap all joints, bind them with thread, and ambroid them. Check your frame to make sure that the outer ends of the leading edge are 3-4 inch higher than the outer ends of the trailing edge. This is extremely important, because the angle of incidence thus formed determines the angle at which the ship shall fly.

Cover the elevator frame with Japanese Imperial tissue in the same way you did the wings, except that you cover the top side, only. Dope the paper to shrink it.

Your last job is carving the propellers. There are two of these; one right hand and one left hand. They must turn in opposite directions to one another to keep the ship on an even keel. Start out by squaring up and sanding both propeller blocks to 7-8 by 1 1-4 by 10 1-2 inches. These dimensions may be altered to a slight extent without much change in the performance of the model. Now, draw diagonals at the top and bottom—as shown in A drawing, Fig. 6—and at their intersections, carefully drill a 1-32-inch hole. If you cannot procure a drill you may make the hole by forcing a large common pin through the wood. This hole must be absolutely square, both ways, with the top side of the blank.

The propeller can now be carved to these diagonals, see A and B, Fig. 6, leaving about 1-8 inch stock at the center of the blank where the diagonals cross. When you have both of these blanks thus carved you may lay out the end diagonals. The diagonals for the right hand propeller are drawn just opposite to those of the left hand propeller. In order to be sure you don't make a mistake, lay your propellers side by side and draw the lines first on one then the other. Remember that on each blank the end diagonals run opposite to each other.

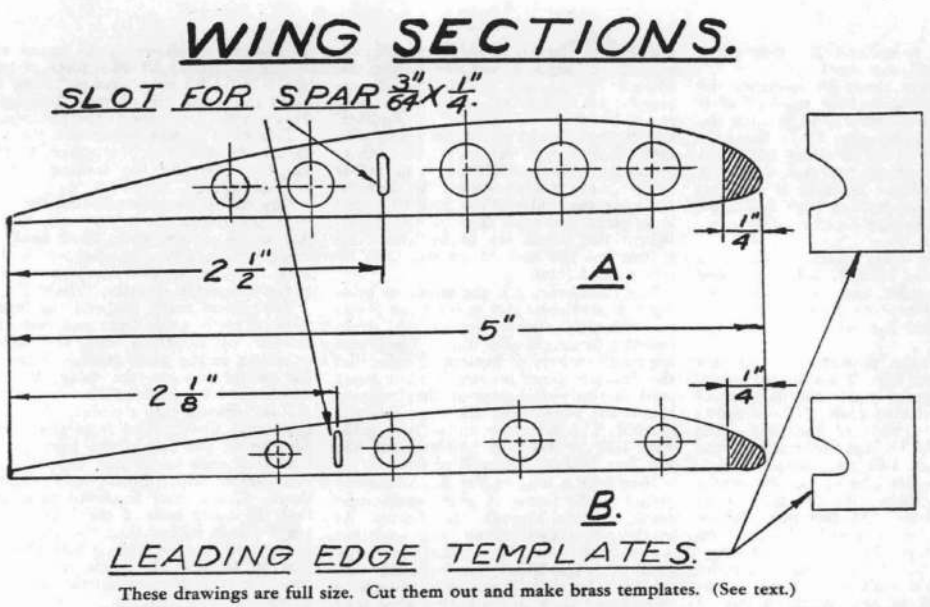
Now you're ready to carve the blades. The curved face of the propeller is always carved first. (C Fig. 6). When you have carved the blank to resemble C, you may hollow each blade out with fine sandpaper to form a very slight curve. This is known as the camber. You may now finish the other side of the blade, rounding it to suit the camber on the first side, and to give a uniform thickness. (D, Fig. 6).

WHEN you have carefully shaped and sanded the blade with fine sandpaper until you can see through it when you hold it to the light, you may round the ends slightly. You should do this with a template so that all four blades will be identical. The center of the trailing edge of the propeller may now be cut away as shown in the drawing (E, Fig. 6).

This section is cut away because of the inefficiency of the center part of the propeller. It offers more or less resistance in gliding, and as the weight is also a drawback, it might as well be cut away as much as possible.

Your next step is to pass the propeller shaft through the hub and bend it in a U as shown in assembly drawing, Fig. 3. This U part is forced into the wood and ambroided in place.

The small 1-4-inch washers that you see in Fig. 3 are made from sheet brass or can be bought in department stores where spangles for ladies' dresses are sold. These are used to cut down friction between the propeller and the bearing.



These drawings are full size. Cut them out and make brass templates. (See text.)

front hooks, at the apex of the frame. In launching the plane, grasp the two propellers as shown in the photograph, gradually lift the nose in the air until it is tilted slightly upward, and then, with a slight push, send the ship away from you.

If it comes right back at you, you've made a mistake common even to experienced model builders—you've wound up the propellers backward. In that case, you can afford to release a wide grin before you try again.

If you've followed directions, ten to one your first flight is successful, which means that on your next trial, you can wind the motor more tightly and eventually, perhaps, give it 1200 turns without fear of the frame breaking. But if you do give it that many turns, better have a bicycle handy so that you can chase your ship in case it decides whimsically to travel into the next county!

THE END.

Win an Honor Certificate With Your Airplane Model

WILL your Baby R.O.G. fly 30 seconds? Will your indoor pusher stay in the air 65 seconds? Can you build an indoor endurance plane that will do 100 seconds or an outdoor twin pusher that will fly two minutes? If you can equal any one of these performances, you are eligible for an honor certificate bearing the printed signatures of Commander Richard E. Byrd, William B. Stout, and other officers of the League.

This certificate, to which the League's official gold seal is affixed, will be issued to you as a recognition of your craftsmanship and knowledge of aeronautics. A worthwhile acknowledgment of your skill by great leaders in aviation!

Start now, to be the first League member in your town to win a certificate! When you've built a model that you believe can meet the requirements, go to your manual training teacher, your scoutmaster, or any other adult, and ask him to act as your flight witness. Let him time your flight with a stop watch. Then ask him to fill out your application, so that you can send it, with ten cents to cover the cost of issuing and mailing, to League headquarters.

Further instructions and information are printed on the application blank. Qualify, fill it out, and send it in!

Honor Certificate Department, ..., 19....
Airplane Model League of America
American Building, Second Blvd. at Lafayette
Detroit, Mich.
Gentlemen:

Enclosed is ten cents to cover cost of issuing and mailing an honor certificate to ....., of
(Name of A. M. L. A. Member)
.....
(Street) (City) (State)
who in my presence, on....., 19...., flew a model airplane of the ..... type a total of ..... seconds, sustained flight. To my knowledge this plane was built by himself.

.....(Flight Witness)

Remarks .....

.....

.....

Instructions to Flight Witnesses: Any adult may be a flight judge. First satisfy yourself that the A. M. L. A. member actually built the plane he proposes to fly. Then take out your watch, direct him to launch his plane from any height under six feet, and compute his "duration." "Duration" begins when the plane leaves his hand—it ends when the plane lands on the ground or floor. If the plane (determine its type in advance) exceeds the following minimum durations it is entitled to a certificate and this coupon should be filled out: Baby R. O. G., 30 seconds; Indoor Pusher, 65 seconds; Indoor Tractor, 100 seconds; Outdoor Pusher, 120 seconds. Flights of the first three models must take place indoors—the larger and higher the room, the better. The Outdoor Pusher must be flown outdoors.

your membership card and button, the privilege of buying and at cost of [illegible] questions on aviation and airplane models, and entering official flying contests. Fill out this coupon.

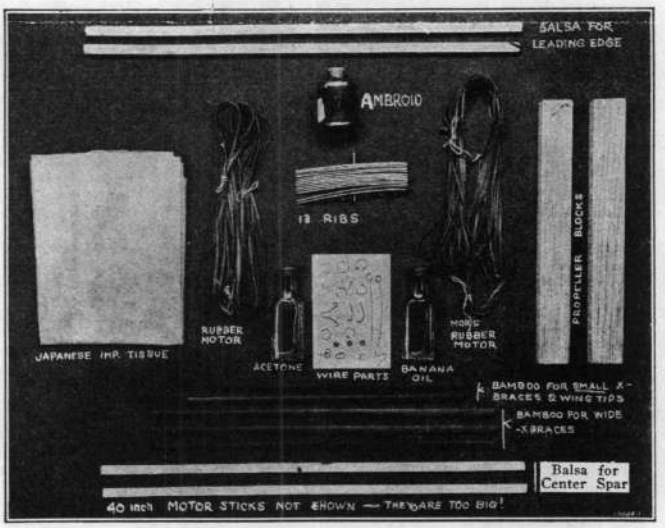
Mr. Merrill Hamburg, Secretary A. M. L. A.,
American Building, Corner Second and Lafayette Boulevards,
Detroit, Michigan.

I am enclosing a two-cent stamp. Please send me my free A. M.

Address.....
(street) (city and state)

Signed.....

The Outdoor Twin Pusher Kit Makes Building Easy



Complete Kit Costs $3.00

COMPARED to the Baby R.O.G., the outdoor twin pusher looks like an Atlantic liner alongside a yacht! And look at the kit! Sixteen strands of rubber for your two powerful motors! Five strips of bamboo! Propeller blocks 10 1-2 inches long! A whole can of ambroid! Thirteen shaped balsa ribs, innumerable metal parts, Japanese tissue! And the fuselage sticks were so large we couldn't get them in the picture!

The kit for the outdoor pusher costs $3 and it's worth it, because it cuts in half the time it takes to construct the plane. Those metal parts, and finished ribs, particularly, are life savers.

Here's just what the kit contains. Opposite each part is the cost of that one item, so that you may order any part of the kit you desire.

2 Propeller Blocks	$ .14
2 Motor Sticks	.14
2 Wing Spars	.08
2 Leading Edges	.08
13 Ribs Finished	.50
5 Pieces of Bamboo	.15
3 Sheets Japanese Tissue	.15
2 Thrust Bearings	.12
2 Propeller Shafts	.12
6 Cans	.36
1 Front Hook	.06
2 S Hooks	.10
4 Washers (Brass)	.05
4 Wing Clips	.24
1 Special Elevator Band	.02
2 Rubber Motors (each eight-strand, tied)	.60
1 Can Ambroid, 2 oz.	.30
1 Oz. Banana Oil	.15
1 Oz. Acetone	.15

To get this kit, send $3 by check or money order to Merrill Hamburg, secretary of the Airplane Model League of America, American Building, Corner Second and Lafayette Boulevards, Detroit, Michigan. This kit is furnished at cost, and you must be a member of the A. M. L. A. to get it. If you're not a member already, fill out the coupon on the inside back cover or make one like it, and send it in.

If you want to order less than the complete kit, send Mr. Hamburg the total cost of the parts you wish plus fifteen cents for packing and mailing. If you are ordering only wire parts, add just five cents for packing and mailing.

The plane derives its power from 16 strands of 1-8-inch flat rubber—8 on each motor. This rubber should have about 2 inches of slack when laid unwound in the cans. The loops of rubber are engaged in the rear, by the hook on the propeller shaft, and at the front, by the S hook.

To assemble your plane, fasten the elevator to the A frame near the apex with a rubber band in such a manner that the band goes under the frame, over the middle of the elevator, and under the frame again. Be sure that the leading edge of the elevator is toward the apex. Next, fasten your wing to the frame by means of four clips—two on each beam—such as those shown in Fig. 4. Notice that the clips are held to the beams with rubber bands so that the wing may be adjusted backward or forward on the frame.

It takes two men to wind up an outdoor pusher—and you'll want to use the egg-beater winder that's described in detail on page 55. Don't try to get along without this winder—if you don't want to invest in one yourself invite several of your friends to share the expense with you. Ask your companion to hold the plane by the two propellers so that they won't turn in his hand. Then engage the rubber motors to the winder by means of the S hooks. When you've done this, back away from your companion four or five feet so as to stretch the rubber before you start winding it. In this way, you can give the rubber more turns. Turn the winder so that the rubber is turned in the direction the propellers should turn in flight.

Don't attempt your first flight until the plane has been adjusted to glide evenly. If it dives too steeply from your hand to the ground, set your wing forward (toward the apex of the frame). If it attempts to climb and then stalls, set your wing back toward the propellers.

Now you're ready to wind up your motors for a test flight. Give them only about 500 turns. Then take the S hooks off your winder and engage them in the

(*Next column, top of page*)

Coming in the February *American Boy*

A New Model Plane—the A. M. L. A. FALCON

You Can Build and Fly the Falcon in Twenty Minutes!

WHETHER you're an experienced model builder, or a beginner, you'll get a thrill out of the easy-to-build, fun-to-fly *Falcon!* The hundred thousand new readers of THE AMERICAN BOY who are just becoming acquainted with airplane models will find it just the plane to start on. It's simple. Has few parts. Is strongly powered. Will give you a swift, thrumming flight. And it will prepare you for the more scientific, longer-flying models described in past and coming issues of THE AMERICAN BOY. (The announcement in the center of this page tells you how to obtain back copies of the magazine describing the Baby R.O.G., the indoor pusher and the indoor tractor.)

If you're an experienced model builder, you'll get a new kind of kick out of this active ship with balsa wings. If you've been puzzled over any point in the construction of the Baby R.O.G., the pusher, or the tractor, the *Falcon* will help clear it up and give you a new start. No carving or glueing—it comes to you all ready to assemble. Observe the propeller, the tail surface, and other details of this staunch little ship. Then get busy on other more difficult models.

Make room in your indoor airport for the arrival of the *Falcon*, in February!

Clear the Skies for the Hawk!

In February, you'll find complete plans for constructing a scale model of the famous Curtiss Hawk. This is the army pursuit biplane, the ship that roars through the skies at 160 miles per hour! The same issue will carry directions for building the Ford tri-motor ship, the big, commercial monoplane that carries 14 passengers!

You know what a scale model is. You build it, not to fly, but to reproduce, exactly, some larger ship. On every scale model, you construct the wing *exactly* 24 *inches long*, and the other parts in proportion. You strive for neatness, workmanship, and similarity to the large ship. What a wallop you'll get, in February, reproducing that superb fighting ship, the Curtiss Hawk, and that impressive passenger ship, the Ford all-metal tri-motor! Later we'll tell you how to enter your scale models in a big national contest.

In March, you'll learn to build a hydroplane—a ship that rises from and lands on water. A new experience, and another step forward in model aeronautics!

And later, commercial models! Like the scale model, the commercial model is built to resemble a large ship. Unlike the scale model, it will fly. It's big, powerful and impressive! A fitting climax to your year of model plane construction!

Win an Honor Certificate

Can you build a Baby R.O.G. that will fly 30 seconds?

An indoor pusher that will stay in the air 65 seconds?

An indoor tractor that will soar for 100 seconds?

An outdoor twin pusher that will fly 120 seconds?

If you can equal any one of these performances you're eligible to the new honor certificate of the Airplane Model League of America. This certificate, beautifully printed, is a recognition of your skill and technical knowledge. An acknowledgment by Commander Richard E. Byrd, Clarence Chamberlin, William B. Stout, and other officers of the League. If you want to be the first in your town to win a certificate, read the announcement on Page 57 and see how soon you can qualify.

Join the A. M. L. A.

To be eligible for the honor certificate, and to gain the greatest value from your plane building, join the Airplane Model League of America. Membership costs you nothing. Just fill out the coupon at the bottom of this page (or make one like it) and send it, with a two-cent stamp, to League headquarters. You'll receive back a membership card and button that will entitle you to—

Funds of air information—

Under the supervision of William B. Stout, head of the Henry Ford airplane interests, the League will undertake to answer your questions on aviation. What is torque? Where are landing lights placed? What is streamline? What is the gasoline consumption of the Wright whirlwind motor?

Your questions on airplane models will be answered by Merrill Hamburg, secretary of the League.

Parts and Materials at Cost —

Model planes are made of balsa—the wood that's one-half lighter than cork; of Japanese Imperial tissue—the light, tough paper for wing and tail surfaces; bamboo, piano wire, banana oil, ambroid cement. To save you any difficulty in obtaining these materials, the League will supply you with kits—sold at cost—for every plane described in THE AMERICAN BOY. Every construction article carries a kit announcement, and your membership card makes you eligible to buy it, or such parts of it as you want.

Help in Organizing a Club—

Upon your request, as a member, the League will send you a letter telling you how to get your club started, and how to keep it humming with a fascinating program of activities. With the letter comes a suggested club constitution that you can adapt to your own needs.

Help in Conducting Contests—

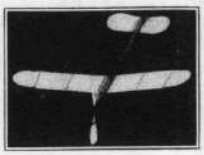
Your club will want to hold contests, stage stunts, and give exhibitions. The League will tell you just how to go about it.

To join the League, to obtain any of this information, or to buy kits, write Mr. Merrill Hamburg, Secretary of the Airplane Model League of America, American Building, Corner Second and Lafayette Boulevards, Detroit, Michigan.

What You Can Get from Past Issues of The AMERICAN BOY

In October, **The BABY R. O. G.**

Full plans and instructions for building this smallest of indoor models. Its wing span is 12 inches. Fuselage, 8 inches. Double strand rubber motor. Best flight 60 seconds

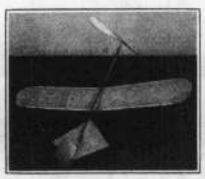


November, **The INDOOR PUSHER**

Complete plans and instructions. The pusher has a wing span of 10½ inches. Fuselage 13 inches. Double-strand rubber motor. Best flight, 160 seconds.

December, **The INDOOR TRACTOR**

Complete plans and instructions. Wing span 19 inches. Fuselage, 15 inches. Best flight, 173 seconds. This plane holds the world's indoor endurance record.



HOW TO GET BACK COPIES

Write the Circulation Department, AMERICAN BOY Magazine, 550 W. Lafayette Boulevard., Detroit, Michigan, for back copies. Enclose twenty cents for each copy you request. Each issue tells you how to obtain a kit containing all the necessary materials and machined metal parts for building the plane described in that issue. These kits are supplied by the A. M. L. A. ***at cost. Order your back copies today, obtain the kits and start building planes.***

PHOTO BY AERO DIGEST, NEW YORK

He's Vice President of the A. M. L. A.

Clarence D. Chamberlin, the first aviator to carry a passenger across the ocean in a non-stop flight—the first man to fly from New York to Germany!—has accepted a vice-presidency in the Airplane Model League of America because he's intensely interested in the coming generation of fliers. Recently, in the office of the Aero Digest in New York, he flew the indoor endurance plane he's holding in the picture.

"I've never seen a model plane perform like that," he commented. "Boys who build this type have an edge on those of us who built models ten years ago. They learn more about aeronautics."

Prepare Now for Local and National Contests

When you've built planes that will perform creditably, join up with the other model enthusiasts of the neighborhood and hold a flying contest. Write the League for help in conducting it. A later issue of THE AMERICAN BOY will tell you about the big local contests in which you'll compete, next May, for city championships.

The National Meet

The National Aeronautic Association has designated THE AMERICAN BOY and the League to conduct the national official flying meet in Detroit, June 29-30. If you're a winner in your local contest, or if you've constructed a plane that can make a creditable flight, you'll be eligible to participate in this meet. There'll be three contests, the indoor contest for the Stout trophy, the outdoor for the Mulvihill trophy, and the scale model contest. Each is divided into Class A, open to everybody, and Class B, open to boys of 15 or younger.

In each class of each contest, you'll compete for the following prizes:

Cash prizes ranging from $200 to $10.
Four gold medals.
Four silver medals.
Twenty-five bronze medals.
Honor certificates for every boy who enters.

The two winners of the Mulvihill and Stout trophies—the official national champions—will go to Europe at the expense of THE AMERICAN BOY, in company with Mr. Hamburg, to compete against English model builders, and to exhibit in Paris.

The winner of the senior division of the scale model contest will go to the Pulitzer Air Races, in company with one parent, at the expense of the *Aero Digest.* (Full details of the national contest will be published later.)

In the meantime, build the planes described in THE AMERICAN BOY, win those honor certificates, and link yourself with leaders in aviation by joining the A. M. L. A.

SEND IN THIS COUPON

AIRPLANE MODEL LEAGUE OF AMERICA,
American Building
Corner Second and Lafayette Boulevards,
Detroit, Michigan.

_____19____

Gentlemen:

Please enroll me in the Airplane Model League of America. Enclosed is a two-cent stamp to cover postage on my membership card and button.

Sincerely,

..... Full Name	..... Street Number
..... Age	..... City
..... Grade in School	..... State

163

Build These Scale Models

Reproduce the Fighting Hawk and the Big Trimotor

By Merrill Hamburg

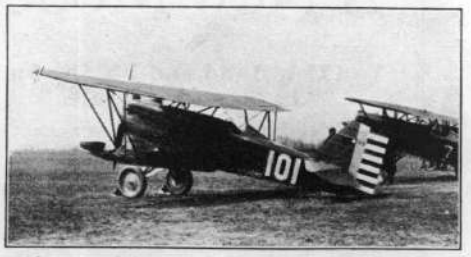
Secretary of the Airplane Model League of America

Coming Your Way—The A. M. L. A. Falcon!

Prepare your workshop airport for the arrival of the A. M. L. A. Falcon, the all-wood plane, designed by experts of the Airplane Model League of America, that can be assembled and flown in twenty minutes!

It's on its way. You read the announcement of its take-off in the January AMERICAN BOY. Its arrival was expected this month, but its designers, eager to give you the best plane possible, are making changes that will give the Falcon an extra five or ten seconds duration. In March—or at the latest, April—it will swoop down on you.

The Falcon will come to you all finished and ready to assemble. Attach the balsa wing to the balsa motor stick, connect and wind up your motor, release the ship, and it will sail from your hands on its first flight. If you've had difficulties in constructing the other flying models described in THE AMERICAN BOY, the Falcon will help clear them up. It will show you the general shape of propeller, wing, and tail surface. It will teach you the relationship of each part. It will give you the principles of flight. It will not fly as long as the model whose wings are covered with tissue because it's heavier, but it will give you an exceptionally good flight. Be on the lookout for the speedy, easy-to-assemble Falcon!



Side view of the scrappy Hawk. Note the N-struts, the shape of the wheels and the tail markings.

HERE they are, you model aviators! For months you've been asking for scale models. In this article you get plans and photographs for two great ships, the famous Curtiss Army Hawk and the big Ford Trimotor passenger ship. We're giving you these two because most of you have asked for them, and because they combine most of the desirable features of design found in modern airplanes.

There's a world of difference between building airplane models that fly, and scale models. The "flying stick" models, described in the past four issues of the magazine, are designed to give you the longest possible flight, and they don't greatly resemble large ships. When you build a scale model, you pay no attention to flying quality, but attempt to duplicate, as exactly as possible, some large ship.

Genuine scale models don't fly. The wings, for one thing, are too far forward. On a large ship, the wings must be well forward to support the weight of the engine. But there is no engine on a scale model. Of course, on your model, you could set the wing farther back in order to balance the ship—but the minute you do that, you no longer have a scale model. The scale model, remember, is built to duplicate, exactly, a large ship. It doesn't fly.

Constructing the scale models described in this article will be a new and extremely worthwhile experience. It will teach you the essentials of big ship design. It will test your originality, because the article doesn't specify just what materials you shall use or how you shall put the planes together. Here are the drawings, scaled down, so that the wing of each plane will have a span of just 24 inches. All the dimensions in the drawings are in inches. Here, too, are pictures of the planes. The rest is up to you.

On June 29 and 30, you'll be entering your scale model in the first official national scale model contest, to be conducted by THE AMERICAN BOY in Detroit. There'll be cash prizes, trophies, medals and certificates for the best planes, and the winner of first place will get a free trip to the Pulitzer Air Races, (probably to be held at Los Angeles), as guests of THE AERO DIGEST. In the May issue you'll learn just how you may enter your ship without actually coming to Detroit yourself.

The national contest will require that all scale models have a wing span, including ailerons, of just 24 inches. Parts such as wheels, propeller and rudder will not have to be movable. The ships will be judged for their craftsmanship, and the accuracy with which they duplicate the large ship. If you enter a model other than one of those described in THE AMERICAN BOY, it will have to be accompanied by a drawing containing all necessary dimensions. To this drawing must be attached a letter from the company building the plane, stating that the drawing is correct.

Bear these rules in mind as you work on the Hawk and the Ford Trimotor. Remember that the ship does not have to fly, that parts do not have to be movable, and that the wing must have a span of just 24 inches.

Can you reproduce the Hawk in miniature? Try it. This picture will help you with the details.

Use any method or any material to build your plane. The Airplane Model League of America, which has furnished kits for all the flying models, is not supplying kits for scale models, because kits would limit you more or less to one method of construction. Some of you will carve most of your ship from solid wood. Others will try to reproduce as nearly as possible the open inside structure of the large ship. You may use either method.

Every boy who is reasonably clever with tools can construct satisfactory scale models from the drawings and photographs with this article. But as an added help, the A. M. L. A. has prepared special drawings of the Hawk and Trimotor. Each drawing is scale size—the full size you'll want to construct your model. The wings are just 24 inches in span, and all other parts are in proportion. The drawing enables you to measure distances on the print itself to obtain the dimension of any part. On each drawing the airfoil sections are laid out at every point where the trailing edge or leading edge makes a sharp bend. Since the drawing is scale size, the airfoils may be used as templates, or patterns.

You can get these scale-size prints by sending 20 cents *for each* to Merrill Hamburg, Secretary, The Airplane Model League of America, American Building, Corner Second and Lafayette Boulevards, Detroit, Michigan. If you wish only one, be sure to specify whether you want the print of the Curtiss Hawk, or the Ford Trimotor.

Remember that you can't reproduce all the inside structure of the big ship. For instance, the Hawk has 26 ribs in the upper wing and 19 in each of the lower wings. That's too many for a model. You should try to reproduce the exterior shape of the ship rather than the inside construction.

The drawings give you the exact shape of the airfoils on these ships. But if you want to study them further, send ten cents to the National Advisory Committee for Aeronautics, Washington, D. C., and ask for Report 244. This contains all details of the Clark Y section, used on the Hawk, and the Gottingen 387, a modification of which is used on the Ford Trimotor. If you've studied aeronautics, this report will enable you to lay out your own templates, or patterns, for the ribs on your model. But if you're not an experienced builder, the report won't be very helpful to you.

The Curtiss Hawk is the army pursuit ship that will roar through the clouds at 160 miles an hour. It's one of the best examples of the small, fast, extremely controllable type of plane. It's designed to outrun and outtrick an enemy airplane. Before you start on it, study the drawings and photographs. Notice the radiator under the cowling. Corrugated cardboard, painted over, will do nicely here. For your two gun barrels, you might use 1-8 inch tubing, or small wooden pins, painted black. Perhaps the easiest way to reproduce the nose of the ship will be to carve it from a solid block. Remember that no part, such as aileron or propeller, need be movable.

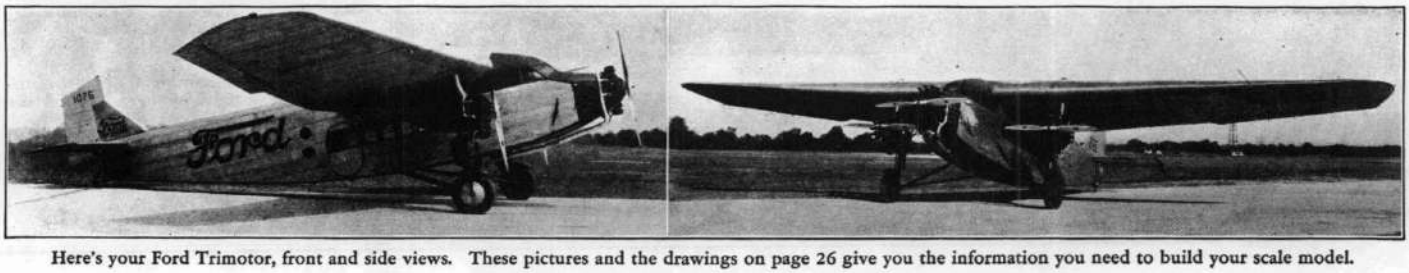
The drawing shows you that the lower wing has a dihedral angle of one and one-half degrees, measured on the top surface. (The dihedral angle, you'll remember, refers to the upward slant of the wings from the center to the tips.) The drawing shows, too, that the upper wing is perfectly flat. From the side view in the drawing you'll notice that the upper wing is 2 11-32 inches in advance of the lower. In the big ship, this enables the pilot to see better ahead and below. It cuts down his blind area—and that's important in air fighting!

Notice, in the photographs, the N-type struts, and their position. Notice the two extra struts—one on each wing—to control the aileron.

One more point in regard to the wings: each wing has a negative angle of incidence of two degrees. The angle of incidence is the angle between the thrust line of the propeller and by the chord—front-to-rear line—of the wing. The *negative* angle means that when the ship is in horizontal flight, the lower surface of the wing is pointing downward two degrees. Study the side view in the drawing and you'll see this point clearly.

When you've finished the ship, paint it an army khaki. There are seven red and six white horizontal stripes on the rudder. The vertical stripe, shown in the photograph at the front of the rudder, is blue.

The Ford three-engine, 12-passenger transport is built



Here's your Ford Trimotor, front and side views. These pictures and the drawings on page 26 give you the information you need to build your scale model.

entirely of metal. (It was designed by William B. Stout, president of the Airplane Model League of America.) The metal is corrugated and the corrugations run parallel to the flying direction.

Although you'll not want to go into too much detail with the inside construction of this plane, you'll be interested to know that the cabin is divided into five separate compartments. Farthest forward is the control cabin which is entered through a door from the main cabin in the rear. It contains two seats for pilots, and two sets of controls. Behind the control cabin and just ahead of the wing is a small observation compartment with windows in the upper half of it. The side picture shows you this clearly. In back of the observation compartment is the main cabin, equipped either with wicker chairs or three berths. Behind the main cabin is the washroom, and space for luggage.

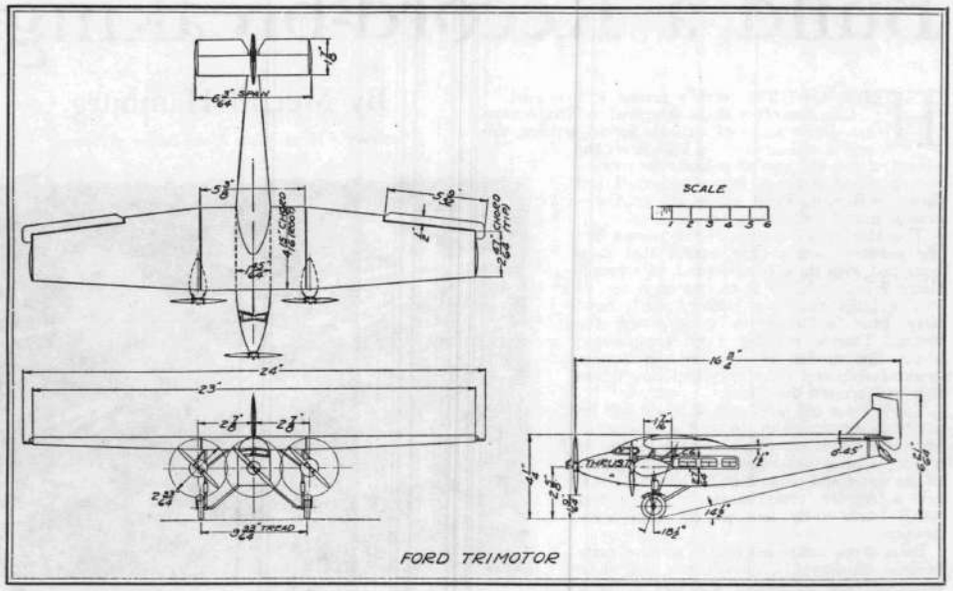
The door, you'll notice, is at the rear of the main cabin on the right side of the ship. There are five windows on the left side of the ship and four on the right.

The scale-size drawing of the Stout Trimotor that you can obtain from the A. M. L. A. for 20 cents shows you the airfoil section of the wing. If you want to study this section further, you'll find it in Report No. 244, mentioned earlier in the article. The Ford section is a modified Gottingen 387. It differs from the section shown in Report 244 in that the lower surface of the wing is entirely flat and the camber on the upper surface is increased from .1536 of the chord to .2000. This gives you a thicker section. This information will interest you only if you are planning to lay out your own curves instead of following the scale-size drawing furnished by the League. And if you're new at scale model construction, you'd better not try laying out your own curves.

Notice, in the photographs and drawings, the streamline landing gear struts, and the oleo cylinder and compression rubber springs on the landing gear and tail skid.

Your Ford Trimotor, when completed, should be painted a bright aluminum color.

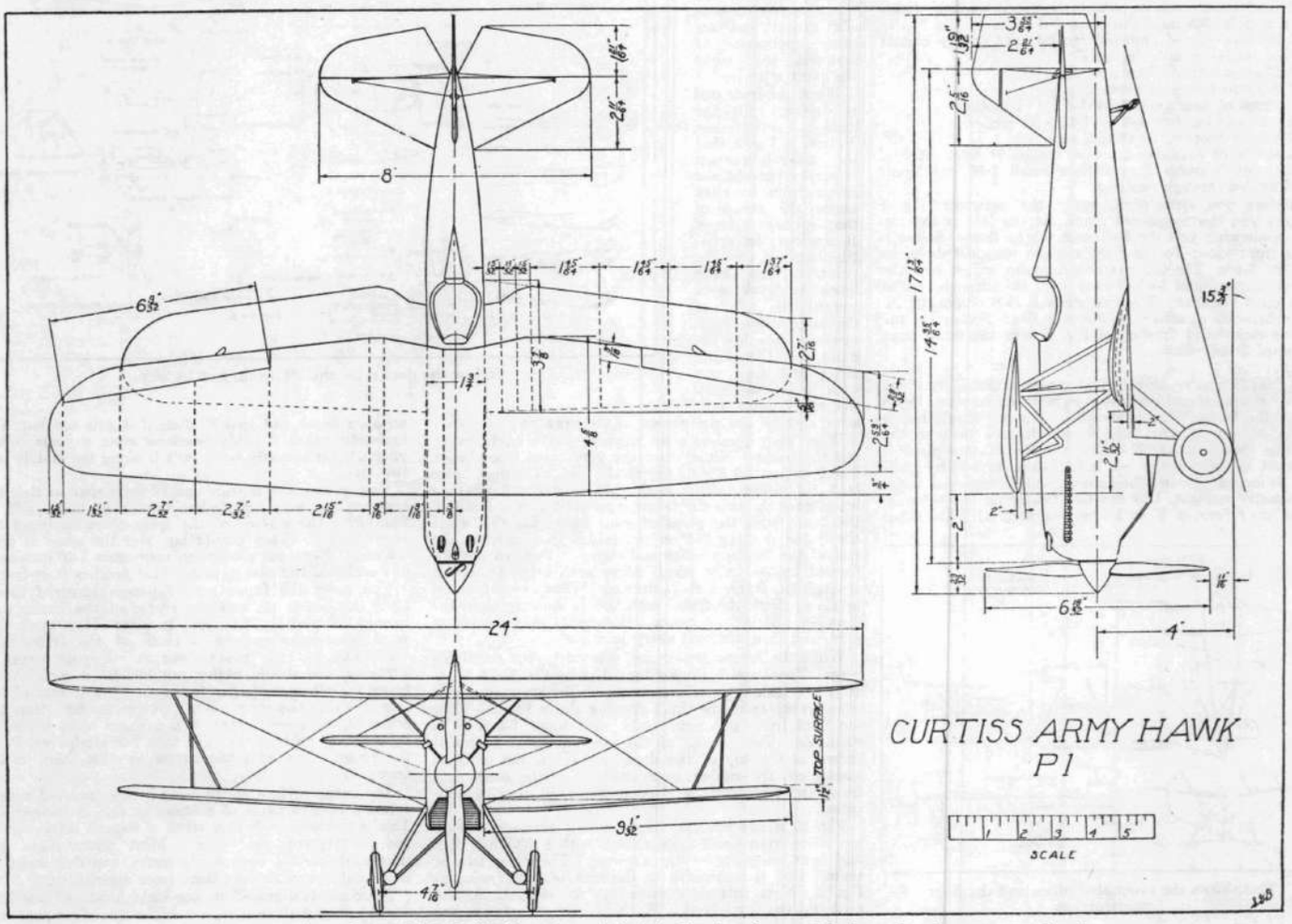
These brief descriptions have called your attention to just a few of the details of these two widely different types of airplanes. The exact process you follow, and the materials you use, depend entirely upon your ingenuity. As you work, keep on the alert to get the location of each part just right. See that your struts and wires are properly placed. See how closely you can duplicate the shape of the wings, the types of propellers, and every other detail. The final result will depend to a great degree upon your accuracy in interpreting the pictures and drawing.



Here are all your dimensions, in inches, for the Trimotor. Study the drawing carefully—and then go ahead.

Remember, as you work, that you will probably be sending your ship to Detroit, next June, to compete in the national scale model contest. Perhaps you will win a trophy, part of the $500 in prize money, or one of the medals or certificates. Perhaps you will win the grand prize—a trip to the Pulitzer Air Races! You'll get, in April, the complete instructions on how to enter the contest—please do not ask for them in advance.

It's easier to work from a large drawing than a small one. The drawings on this page must necessarily be small in order to fit the page. The scale-size maps of the Trimotor and the Hawk, supplied by the A. M. L. A., are 30 by 36 inches! Each part is drawn the exact size you will construct it! Turn to page 53 and read the announcement telling you how little these maps cost and how easily you may obtain them.



Here's a test in craftsmanship! Build this scale model of the Hawk and enter it in the national contest next June!

Build a Record-breaking Hydroplane

By Merrill Hamburg

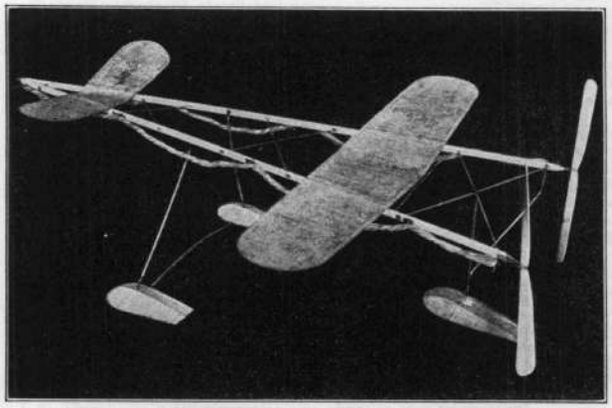
Secretary of the Airplane Model League of America

HERE it is! The world's record hydroplane! Like the other ships described in THE AMERICAN BOY's series of airplane model articles, this one is a champion. In 1921 it set the record of two minutes 52 seconds for rubber-driven model hydros. It was designed and flown by Bertram Pond, one of the most successful model builders in the country.

This ship, you'll notice, is very much like the outdoor twin pusher, except that it is equipped with three bamboo and waterproof-tissue floats, to allow it to rest on water. If you've built the twin pusher, you'll have very little difficulty in constructing the hydro. There's nothing very complicated about this model. It just requires careful workmanship and the ability to follow drawings and printed directions.

You'll get a big thrill out of it. It will be a new flying experience to see the product of your own hands scooting along the surface of a lake, sending out ripples, then pulling free of the water and rising high in the air! You'll get a regular transatlantic wallop! And you'll learn many new principles of aeronautics.

Balsa is recommended for the wooden parts because it's light. If, though, you use white pine, be sure to reduce the size of each wooden part so that you won't increase the weight of the ship too greatly.



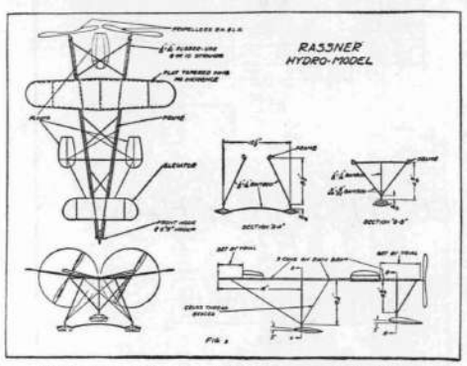
Here's the twin pusher that takes off from water, and flies!

You may buy a kit containing all the necessary parts and materials for the hydro from the Airplane Model League of America. This kit is described on page 53. If you prefer to get your materials yourself, here's just what you'll need:

2 balsa strips 3-16 by 1-2 by 38 inches, for frame.
2 balsa blocks 9-16 by 1 1-4 by 11 1-2 inches, for propellers.
4 balsa strips 3-16 by 1-4 by 13 inches, for wing spars.
1 balsa strip 1-16 by 1 1-2 by 12 inches for pontoon formers.
1 24-inch strip of .033 music wire.
1 24-inch strip of .028 music wire.
4 hard brass washers, outside diameter 1-4 inch, diameter of hole .035 inch, thickness .005 inch.
1 2-ounce can of ambroid (to be kept tightly corked except when actually in use.)
1 2-ounce bottle of banana oil.
1 1-ounce bottle of acetone.
3 strips of bamboo 1-8 by 1-4 by 12 inches.
3 strips of bamboo 1-8 by 1-4 by 15 inches.
2 rubber motors, 10 strands each.
2 sheets of Japanese Imperial tissue, 21 by 31 inches.
2 thrust bearings, forged from small 1-16 inch brads and drilled through one end.

Before you start work, study the drawings. Fig. I shows you the assembled plane. At the left is the top view, showing you the locations of the floats. Below it is a front view. To the right are two sectional drawings of the floats. The one marked A-A shows just how the front floats would look if they were cut through just at the cross bracings. The one marked B-B shows the inside bamboo structure of the rear float. Notice, in the lower right-hand drawing of Fig. I, how the floats slant upward 3 degrees.

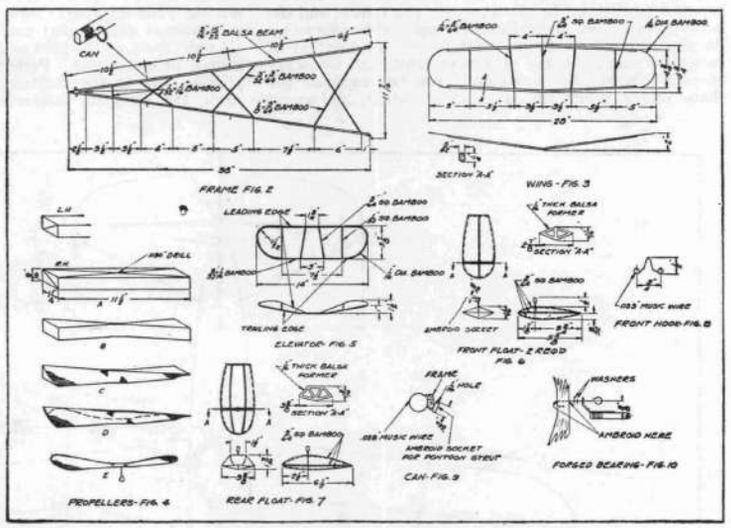
WHEN you've absorbed all possible detail from the drawings and pictures, you're ready to start. Begin with the frame. This is shown in Fig. 2. You'll notice it is of the A type, with heavy frames to take the strains that a R. O. W.—Rise Off the Water—plane is subject to. Finish the two balsa beams to 3-16 by 15-32 by 38 inches Round the corners, and be sure each beam is exactly straight. Lay the two beams on the table so that they form a V with the rear ends 11 7-16 inches apart. Sand off the front ends at a slant (mitre them) so that they'll form a neat joint, and ambroid them. Be sure to cork your ambroid bottle the moment you have used it so that it won't be weakened by exposure to air.



This shows the assembled plane and the float construction.

Figure 8 shows you the yoke, or front hook. Bend this of .033 music wire according to the drawing, and ambroid it to the apex of the frame. A few turns of silk thread and another application of ambroid will make the joint stronger.

While the front end is drying, split the bamboo for the frame. Notice, in Fig. 2, that the longer braces are larger to prevent the frame from buckling under the strain of the rubber motors. Remember, in splitting bamboo, that the point of the knife tends to work over toward the edge of the large piece. Split carefully, keeping the point of the knife along the line you wish to follow. Work the strips down with sandpaper to the size shown in the drawing.



Follow the details on this drawing, step by step.

When your bamboo is all finished, you're ready to lay out the frame. Notice that the very short front brace, Fig. 2, is just 2 1-2 inches from the end. The next brace is 3 1-2 inches farther back. At each point where a brace goes through the beam, you must pierce a slit in the beam with the point of your knife. Do this while the frame is lying flat on the table. Then sharpen the end of the bamboo brace and shove it through the slit formed by the knife point. Allow each brace to extend through the frame a short distance. When every brace is in place, check the frame with the measurements in the drawing. Make any minor adjustments that are necessary, and then ambroid every joint.

While the braces are drying, construct your metal fittings. These are in the kit furnished by the A. M. L. A. If you're making your own, begin on the six cans, whose shape is shown in the small drawing above Fig. 2. They are bent from .028 music wire with loops 1-2 inch in diameter. The spacing of the cans along the beams is shown at the top of the drawing. When the plane is assembled, the rubber motor will lie in the cans. Ambroid and bind them in place as the small drawing indicates.

Fig. 10 shows you the forged thrust bearings. These are made from small nails, drilled with a .035-inch drill and bent according to the drawing. There are two of them. One is ambroided to the rear of each beam, in Fig. 2. Note that they extend to the side, as do the cans and the front hooks. That's because the motors are to run along the side, not the top, of the frame. The hole in the thrust bearing should be just 3-8 inch from the beam.

Now that your thrust bearings are in place, you may trim off the end of each bamboo brace flush with the frame. Then give the entire frame 5 coats of banana oil to waterproof and strengthen it.

NEXT, build the wing. This is a single surface flat wing, in many ways resembling the ones you made for your indoor models. Examine Fig. 3, and fix the wing details in your mind. Finish four balsa spars to the shape shown in Section A-A, 11 5-8 inches long. Mark off on each spar the position of the 5 ribs, as shown in the drawing.

Before you assemble the spars and ribs, make a large drawing the exact size of the wing. Draw not only the top view but the front view, showing the angle at which the spars are set. Two spars, end to end, with the curved side underneath, form the leading and trailing edges. The spars are one inch closer together at the ends than they are at the center. Place a block 1 11-16 inches high under the outer ends of the spars. With your knife, cut the spars to form a neat joint at the center and then ambroid.

While your spars are drying, bend your wing tips. Bend both tips from a single strip of bamboo 1-16 by 1-8 by 9 inches to fit the form of your drawing. You know that bamboo is pliable when heated over an open flame, but that it chars if it gets too hot. You know, too, that it holds its shape when it cools. When your strip is properly bent, split it along the middle into two tips.

Now groove the outside end of each spar so that the ends of the wing tips, when they're in place, will be flush with the surface of the spar. Now ambroid the tips in place. They should lap over the spars at least 1-2 inch. Next, cut grooves in your spars 1-16 inch deep and ambroid the ribs in place. That finishes your frame.

You cover the frame with Japanese Imperial tissue. Coat the center rib and the center of the frame with banana oil, and lay the paper in place. Then work outward, coating successive sections of the frame and smoothing out the paper upon it. If your paper is wrinkled, you should iron it out and let it cool several hours (to allow the paper to regain room moisture) before covering the wing. When you're finished, trim the edges of the paper either with a sharp razor blade, or by carefully rubbing the edge with fine sandpaper. Paint the rough edges with banana oil to stick them to the frame.

The entire surface of the wing is later painted with a solution of five parts of acetone to one of banana oil. This is followed with four coats of banana oil to shrink and waterproof the wing. Most hydroplanes get thoroughly wet, in their flying career, and they must be made waterproof to save them from destruction.

There are two propellers, one right hand and one left, so that they may turn in (*Continued on page 51*)

Build a Record-breaking Hydroplane

(*Continued from page 19*)

opposite directions and thus neutralize the torque. (The torque is the twisting force of the propellers.) To begin with, square up your balsa blocks to 9-16 by 1 1-4 by 11 1-2 inches. Then lay out your diagonals on top and bottom, as shown in A, Fig. 4. So far, you treat both blocks just the same. For one block, lay out your end diagonals according to A. (The diagonal at the other end of the block runs between opposite corners of the block.) For the other block, lay out your end diagonals just opposite, as shown in the small drawing above A. This will give you your right and left hand propellers. Push a pin through the block at the intersection of your long diagonals, for your propeller shafts. This hole must not be on a slant, or your propellers will not run true.

Now cut the blocks along the diagonals, to the shape of B, making sure that you leave about 1-8 inch at the center for your hub. Examine C for your next step. This shows you how you carve the block to form one side of each blade. Note the dish, or camber, in the surface of the blade. You get this by hollowing slightly with sandpaper the entire length of the blades. The camber shouldn't be more than 1-32 inch deep at any point. Now cut away the wood opposite the camber until your propeller is in the shape shown in D. The dotted lines in D indicate how you will cut away wood at the hub. The center of the propeller is never very efficient, and you may as well save space by cutting it down. Note, also, how the ends are rounded.

FINISH the center, for the hub, to about 1-16 inch in thickness. Your blades should be so thin that you can see light through them. The propeller shaft is shown in E, and more in detail, in Fig. 10. It's bent into a hook from .033 music wire and passed through the hole in the hub of the propeller. Then the straight end is bent into a square U which is pushed back into the wood and ambroided. Give your propeller 5 coats of banana oil to waterproof it, and the job is done.

Fig. 5 shows two views of the elevator. Study them carefully before you start work. The entire frame is bamboo, bent to the shape in the drawing. As in the wing, you should lay out a full size drawing to work to.

Trim a strip of bamboo to 1-16 by 1-8 by 15 inches. This, when bent and split in two, will be the two halves of your elevator frame, except for a couple of inches at the center of the trailing edge. As you bend the strip, check it constantly with your full-size drawing. When your tips are shaped just right, split the piece in two. Later, to complete the outline, you'll have to half-lap the ends at the trailing edge and fit a small strip to them.

The hardest part of the construction of the elevator comes next. But it won't be half as difficult as it seems, if you can get just the right idea of the shape of the elevator. Notice, first, that the ends are higher than the middle. Notice, second, that the outer tips of the leading edge are 1 1-2 inches high, while the outer tips of the trailing edge are only an inch high. This is what helps give lift to your ship.

Notice, on the leading edge, that the center of your elevator is flat for a distance of 1 3-4 inches. At the trailing edge, the drawing shows, the center is flat for 3 inches. Now, you must so bend your bamboo that the elevator will have this flat area in the center, and so that the tip is 1 1-2 inches high at the leading edge and 1 inch high at the trailing edge. Careful work will give you just this shape. When your bending is done, you must ambroid your little strip into the trailing edge to complete the outline of the frame.

Now ambroid the two halves together. If your frame is made correctly, the center part should rest flat on the table and the tips of both halves should check with the drawing. Ambroid your ribs in place and cover the frame with tissue in the same manner as you did the wing. Like the wing, the elevator must be doped, and painted with banana oil, to protect it from possible ducking.

The success of the entire plane as a hydro depends upon the floats. These must not only be properly constructed, but must be assembled correctly if the plane is to get off the water. In designing pontoons we have to make them large enough so that when they are totally immersed, the weight of the water displaced will be three times the weight of the entire plane. This allows the floats to sit well up on the water when supporting the ship.

Notice, in Fig. I, that the floats are at an angle of 3 degrees. This may vary from 2 to 5 degrees without much change in the efficiency of the floats. The V-bottom floats are much better than the flat type, so common on models, because they prevent the plane from turning on its course when taking off. This type also gets off the water more quickly as it cuts down suction on the bottom of the float. The V type also takes up the shock of landing more nicely.

The floats are formed of 3-64 inch bamboo, bent around the balsa "former," shown in the drawings. This former is cut from 1-16-inch flat balsa to the shape shown in Figs. 6 and 7. The triangular pieces are cut out according to the drawings, to lighten the whole. Paint the corners of the formers with ambroid to strengthen them and prevent chipping.

Build the two front floats, Fig. 6, first. Make a full-size drawing of the top view so that you can check the shape as you bend the bamboo. Your frame is bent from 3-64 by 1-8 by 15-inch bamboo. The parts for the two front floats are bent in one piece, the exact size of your drawing, and then split apart. Complete the side strips first, and ambroid them to the balsa former. Then bend the top and bottom pieces, as shown in the side view, and ambroid them in place. This completes the frame of your floats. Take care that the nose of each float is rounded—or blunt—so that it will not nose under in rough water.

BEFORE you cover the float, you must ambroid the bamboo strut in place on the balsa former, as shown in Fig. 6. These struts are made of 1-16-inch square bamboo about 1-2 inch long. They support the ambroid socket. The object of the socket is to allow you to take apart your model when you wish to carry it from place to place. Form your socket by rolling tissue about a 1-16-inch nail, and covering the whole with several coats of ambroid. You wind the tube thus formed with thread, to increase its strength. When these sockets are dry they can be slipped off the nail and ambroided to the short strut on the pontoon, as shown in the drawing. They'll be quite strong and serviceable. Similar sockets are ambroided to the beams and to the cross bracing where the long pontoon struts are fastened to the frame.

Cover your floats with tissue and give them 5 coats of banana oil to waterproof them.

Now study the assembly drawing of the plane and the pictures, to fix the shape of the struts firmly in your mind. These struts are constructed of 1-16 by 1-8 bamboo and are rounded at both ends to fit into the sockets. Each front pontoon has a strut running to the frame, long enough to hold the front of the ship about 9 inches above the water. The two front pontoons are held apart by a curved brace of bamboo, which is ambroided to the edge of the pontoon at the "former."

Additional bracing is given the front floats and under carriage by two threads running from the sockets to the second cross brace on the frame 6 inches from the nose of the plane. Two other threads cross each other in the other direction to opposite sides of the frame. This is shown in the assembly drawing, Fig. 1.

The rear float is supported by three struts. The center one fits into the socket

(*Continued on page 53*)

(*Continued from page 51*)

at the intersection of the last cross bracing of the frame of the ship, and extends down to the socket on the pontoon. It should be long enough to hold the rear end of the ship about 7 inches from the water. The other two struts extend from this central strut, at a point just above the pontoon socket, to a point just one inch from the ends of the two beams. They are ambroided to the center strut, but at the beams they fit into sockets, so that they may be removed at will. There's work to these struts, but it's not at all difficult if you study the photographs and drawings.

The motive power for the ship is derived from two ten-strand rubber motors, of 1-8-inch rubber. The strands are 40 inches long. Each motor is attached to its front hook by means of an S hook, bent from .033 piano wire in the form of a capital S. At the other end, the motors are attached to the hook on the propeller shaft which rests in the thrust bearing. Along the beam, the motors are guided by the cans.

The wing and elevator are held to the frame by rubber bands, just as are the wings of the indoor pusher. The illustration shows you how this is done. The bands loop over the wing and elevator and under the fuselage.

Glide the ship before attempting to fly it. Since the pontoons are easily punctured, do your gliding in soft grass. If the plane attempts to climb, or nose up, set the wing back. If it dives, set the wing forward.

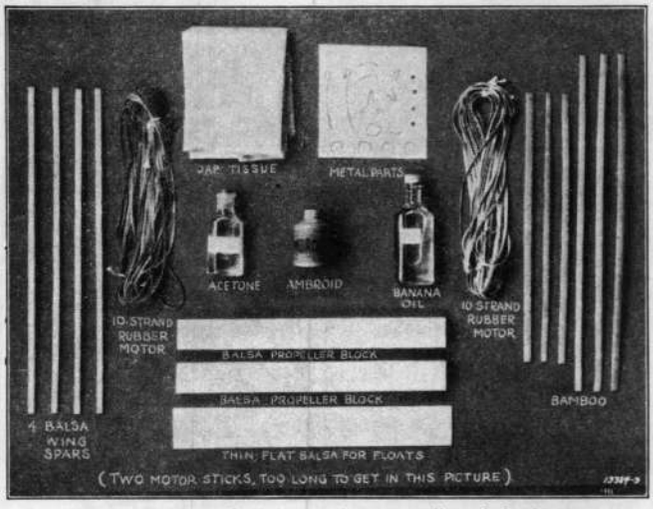
For your first launching, wind the motors with a double winder, giving each motor about 600 turns. If you don't have a double—or egg beater—winder, you will find the instructions for constructing it in the January AMERICAN BOY. You will transfer the motor from winder to front hook by means of the S hook.

When the motor is wound, set the plane on the water and hold it by the propellers. Release both propellers at the same instant. If the plane is properly constructed and adjusted, it will skim lightly over the water for a short distance. As it gathers speed, it will slowly rise from the surface. It will sail through the air and descend to a beautiful landing.

Like all other outdoor planes, you must launch the hydro against the wind if you would avoid a crack-up. If you have difficulty in getting a flight, there's just one thing to do—take your ship back to the workshop and check up the construction. If you've built it according to directions, it will most certainly give you a soul-satisfying flight.

(To join the A.M.L.A. see page 56.)

Send for the Hydro Kit

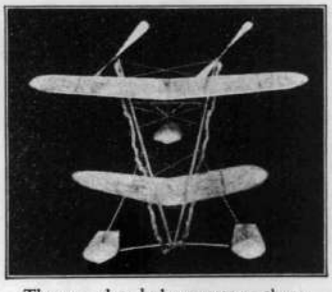


All the material and all the metal parts you'll need, for $2.50.

The kit for that twin pusher hydroplane, containing enough parts and more than enough material to build one ship, costs just $2.50. If you've never before constructed models, you will want to build the indoor types — described in the October to December numbers of THE AMERICAN BOY—before you invest in the hydro kit. If you have had model-building experience, the hydro will lead you to new flying thrills. The kit contains:

2 balsa motor sticks 3-16 by 1-2 by 38 inches	$.14
2 balsa propeller blocks 9-16 by 1 1-4 by 11 1-2 inches	.14
4 wing spars 5-32 by 1-4 by 14 inches	.08
Flat balsa 1-16 by 1 1-2 by 12 inches	.05
6 cans	.36
2 propeller shafts	.12
1 yoke	.06
2 S-hooks	.10
2 thrust bearings	.12
4 washers	.05
1 2-ounce can of ambroid cement	.30
1 2-ounce bottle of banana oil	.20
1 1-ounce bottle of acetone	.15
3 strips of bamboo 1-16 by 1-4 by 15 inches	.09
3 strips of bamboo 1-16 by 1-4 by 12 inches	.06
2 rubber motors, ten strands each	.60
2 sheets Jap tissue 21 by 31 inches	.20

How does one rubber band hold a wing to a motor stick? This photo shows you.



The completed plane rests on three pontoons. It's called the R. O. W., because it rises off the water.

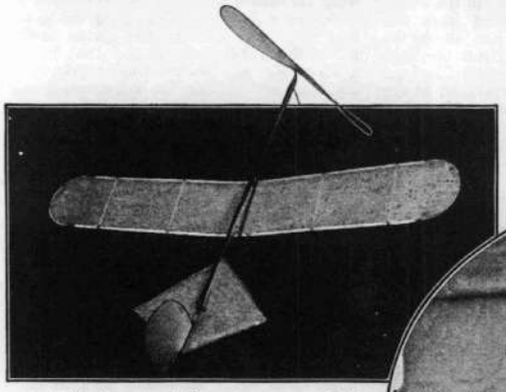
To get the complete kit, send $2.50 in cash or money order to Mr. Merrill Hamburg, secretary of the Airplane Model League of America, Corner Second and Lafayette Boulevards, Detroit, Michigan. If you want less than the complete kit, send Mr. Hamburg the total cost of the parts you wish, plus 15 cents for the cost of mailing. If you order only wire parts, just add five cents for mailing.

To be eligible to buy airplane model parts and materials, at cost, you must belong to the Airplane Model League of America. Membership costs you just a two-cent stamp. It entitles you to many valuable privileges, and links you up with Commander Richard E. Byrd, William B. Stout, Clarence Chamberlin, and other officers of the League. Fill out the coupon on page 56 and send it in, with a two-cent stamp, to-day.

Get Your Contest Models in Shape

By Merrill Hamburg

Secretary of the Airplane Model League of America



This is your indoor contest model.

Jack Loughner, national outdoor champion, demonstrates the outdoor contest model to the crack flyers at Selfridge Field.

WHEN you enter that model plane flying contest—be prepared!

You're almost sure to fly your indoor endurance tractor or your outdoor twin pusher in a contest this summer. Newspapers in forty cities, from Portland, Maine, to Seattle, Washington, are conducting contests for the Airplane Model League of America in May and June. On June 29 and 30, at Detroit, THE AMERICAN BOY will conduct the National Aeronautic Association's official national contest, which is open to everybody.

In addition, departments of recreation are holding contests in various cities throughout the country. Winners of these playground contests will go to Atlantic City in October.

If your city isn't conducting one of these many meets, start something. Go to your high school instructors, to your chamber of commerce, or your airport commission, and get them interested. Tell them to write the A. M. L. A., American Building, Second Boulevard at Lafayette, Detroit, and ask for instructions on holding a flying meet. You'll get action—because model aviation is sweeping the country like good news!

Start, now, to get ready for that contest. In your indoor meet, you'll fly the indoor endurance tractor that you learned how to construct in the December AMERICAN BOY. In your outdoor contest, you'll enter the twin pusher, described in the January magazine. Here are several tips that hold good for both contests:

First, have more than one model. The rules say that you may use as many as three models to complete your three official flights. So get busy now and build at least two more tractors and two more pushers. Then, if one ship cracks up on your first official flight, you'll have others in reserve.

Second, assemble a kit of tools and materials. When you go to the contest, you'll want to have a kit containing a pair of round-nosed pliers, a small block plane, sandpaper, a sharp knife, extra wire parts, a bottle of ambroid, a bottle of banana oil, several rubber motors, bamboo, Japanese Imperial tissue, and silk thread. This kit does not cost a great deal and it may win you a championship.

Third, carry four or five extra propellers for each model. Don't be caught without a propeller to take the place of the one that some spectator accidentally breaks or that cracks itself on the ground in landing.

Build a box in which to carry your planes. Plans for a box large enough to contain all your contest models appeared in the January magazine.

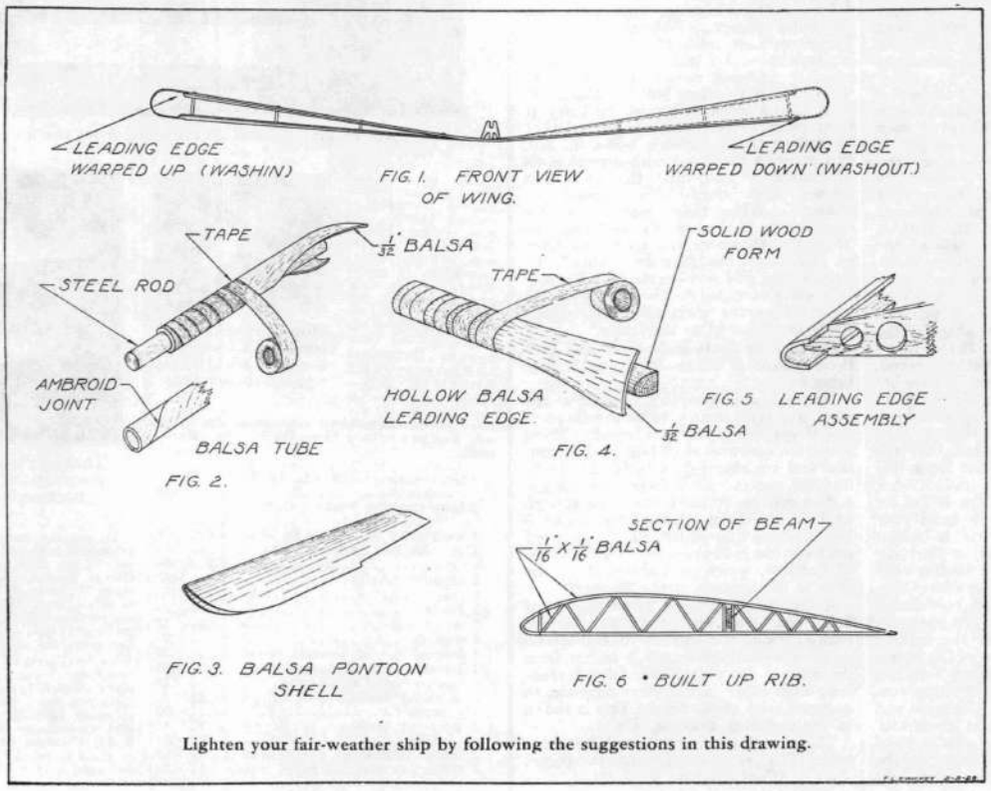
Preserve the life in your rubber motors by taking proper care of them. If rubber is exposed to air, it becomes dry, and loses its resiliency. Keep your extra motors in an air-tight, painted jar through which the light can't shine. In addition, dope them with talc, or with a lubricant such as glycerine. Some builders prefer glycerine because they say it permits the rubber to wind up without sticking and to unwind with less friction, but other builders use talc. Talc, they maintain, is not so messy, and it doesn't weigh so much. The A. M. L. A. recommends talc.

Use a winder! This is by far the most important factor in guaranteeing good results from your motors. The indoor tractor will take 700 turns, and each motor of the outdoor twin pusher will take 1200 turns. Winding your contest models by hand would become a chore. The egg-beater winder, described in the January AMERICAN BOY, makes play of the job. Every turn of the winder's handle gives five turns to the rubber. In the case of the outdoor twin pusher, where you have two motors, the winder enables you to wind both motors at the same time!

Another important reason for using the winder is that it permits you to stretch the rubber. Stretched rubber takes many more turns than unstretched rubber. Your indoor tractor motor, for example, is about 15 inches long. Stretch a new rubber to 30 inches, or twice its length, and it will take 860 turns before breaking. Stretch it to 60 inches, or four times its length, and it will take over 1200 turns with safety! Unstretched rubber, on the other hand, will break at about 800 turns.

WHEN you wind by hand, you cannot stretch the rubber at all. But in using the winder, your partner can hold the plane, while you, with the rubber attached to the winder, can back away until the rubber is prop-

(*Cont. on page 52*)



Lighten your fair-weather ship by following the suggestions in this drawing.

Get Your Contest Models in Shape

(*Continued from page 24*)

erly stretched before winding. Then, as you turn the handle, you can slowly move toward the plane. When the motor is fully wound, you can unhook it from the winder and attach it to the propeller shaft by means of the S-hook. Easy.

Here's another tip that will give your motors greater capacity: pre-wind your motor at least once before using it in a contest flight! Investigations conducted by the A. M. L. A. show that you can increase the number of turns your rubber will take, by pre-winding. For instance, if you wind up an absolutely unused 15-inch motor, after stretching it to 30 inches, you can give it 860 turns. But if you wind it up once to 500 turns, and then let it unwind, you'll find that on second winding it will take 960 turns. A hundred more turns simply because you pre-wound your motor once!

The conclusion to draw is that you must always stretch your rubber before winding it, and that you must pre-wind it at least once before using it in an official flight. This is extremely valuable knowledge for the contest entrant!

(If you don't have a winder, the best way to obtain one is to take the instructions in the January AMERICAN BOY to a machine shop, and get the shop to make you up one. It doesn't cost very much and it's absolutely necessary to have a winder. Or, if you wish the League to have one made for you, send $2.50 by check or money order to Merrill Hamburg, Airplane Model League of America, American Building, Second Boulevard at Lafayette, Detroit, Mich.)

In preparing for the outdoor contest, take a hint from experienced builders, and construct at least one twin pusher for windy days and two for calm days. On a windy day, you'll need a stout ship, one with fairly heavy beams and wing, to stand the added strain. On a calm day, you should have the lightest possible plane. The drawing suggests how the most up-to-date builders are reducing the weight of their ships.

Fig. 4 shows how you may construct a hollow leading edge for your wing. The leading edge you now have is solid balsa rounded from a beam 1-4 by 1-4 inch. Using the method shown in Fig. 4, you can construct a leading edge of 1-32-inch flat balsa! If you soak, or steam, flat balsa, it becomes pliable. Bend a strip of it 18 inches long and about an inch wide over a wood form and bind it with tape. When the wood dries, the tape may be taken off, and the flat balsa will retain its bent shape.

Fig. 5 shows how your solid rib may be carved to fit into the hollow leading edge. Ambroid glue will hold the rib to the leading edge.

YOU may further lighten your calm-weather ship by fitting your wing with built-up balsa ribs instead of the solid ones you are now using. Fig. 6 shows you a built-up rib. Its construction isn't at all hard. Simply use 1-16 by 1-16 balsa, shaped and braced as the drawing shows, and glued with ambroid. The only piece that needs bending is the top strip, and you can easily figure out a method of doing that. Some builders trace a rib on a flat piece of wood, and then glue a series of little blocks around the upper curve. They can bend their thin strips of balsa between these blocks.

Perhaps you can figure out other ways of lightening your ship. Check over all dimensions and see that they're right down to size. Be sure that your propeller blades are thin enough. Try using thread for the trailing edge of your wing. The trailing edge you're now using is 1-64 by 3-64 bamboo. If you wish, you can substitute a single strand of thread for the bamboo except between the ribs at the two places where the wing crosses the A-frame.

Your indoor tractor will need to be as symmetrical, well-balanced and light as it can be made if you are to go after that championship. Build two or three of them —no contestant is satisfied with less than three good ships. If you have one that seems to be built according to directions but doesn't fly as steadily as you'd like, study Fig. 1. This shows you how you may adjust your wings to help control the tractor's direction.

Let's suppose that your plane turns in too small a circle. It tilts rather sharply to the left and tends to sideslip or dive in a spiral. The way to correct this is to twist the wing in your two hands, bending up the leading edge on the left side and bending down the leading edge on the right. By bending up the leading edge at the left, you allow the rush of air to strike underneath the wing and push it up. This is called "washin." It prevents that side from tilting down and compels your ship to fly in a larger circle. By bending down the leading edge at the other tip, you give that side "washout" which reduces the lifting power on that side and tends still further to make your ship fly in a large circle.

Experiment with washin and washout. Just warp the wing by twisting it gently with your two hands. You'll find that by this method, and by bending the rudder you can govern exactly the circle in which your ship will fly.

You've just learned how to build a leading edge of flat balsa. Fig. 2 shows you how you may construct your motor stick of the same material (This isn't so advisable on a contest model, but it is an interesting experiment for your Baby R. O. G. or your indoor pusher.) The drawing explains itself. Take a strip of flat balsa, not too wide, soak it, and wrap it around a 1-2 inch steel rod. Tape it up until it dries. Then take off the tape and ambroid the spiral joint the full length of the tube. Your rubber motor will run inside this tube. A thin strip of metal with a hole in it running across the front end of the tube and ambroided in place, will suffice for the bearing in which your propeller shaft will run.

In the hydroplane article (March AMERICAN BOY) you learned how to construct bamboo and tissue floats. Fig. 3 suggests how you may construct the top of your float with flat balsa. The details you can easily work out yourself. The float should be exactly like those described in March except that its top should be flat balsa instead of tissue. Apply several coats of banana oil to make the wood waterproof.

All the tips given in this article are pages from the experience of model aviators who've built many planes and entered many contests. Remember them. Don't be caught, as others have been, without a fresh motor to replace a worn-out one, without a new propeller to replace a broken one, or without tools and materials to make minor repairs on your ship. Have more than one ship. Use a winder. Practice flying your models until you know all their peculiarities and how to correct them.

Go to that contest prepared!

Join the Procession!

Get a Kit and Start Building Airplane Models

The A. M. L. A. *Falcon*, fleet all-wood plane announced in the March AMERICAN BOY, isn't going to be offered to members of the Airplane Model League of America for awhile. The League had planned to send you this ship at cost, completely finished and ready to assemble and fly. But the *Falcon*, because it's entirely made of wood, and because a boy doesn't construct it himself, is not a duration model and is not eligible to compete in flying contests. So the League is postponing the arrival of the *Falcon* and concentrating on contest models!

If you haven't built the duration types described in The AMERICAN BOY since last October, start now. Here's how you may buy—at cost—the kits containing balsa wood, Japanese Imperial tissue, bamboo, metal parts, banana oil, ambroid cement and all other necessary construction materials plus complete instructions for building the plane:

Send cash or money order (the amount depending on the kit you order) to Merrill Hamburg, Secretary, A. M. L. A., American Building, Second Boulevard at Lafayette, Detroit, Michigan.

October, 1927

Join the Airplane Model League

HERE'S the first enrolled member of the Airplane Model League of America—Frank A. Tichenor, 606 W. 116th St., New York City. Tichenor is a natural-born air enthusiast. He's flown often in actual ships, has built and flown models, and has already organized a model plane club. His father, Frank A. Tichenor, Sr., is publisher of the *Aero Digest*. Thousands of new names are being added to the rolls of the League each week. If you want to join the procession, fill out the accompanying coupon—or make another one just like it on blank paper—and send it to League headquarters, Second and Lafayette Boulevards, Detroit, together with a two-cent stamp for return postage. The League will send you a free membership button and card, making you eligible to use the free question and answer service, to buy model plane parts and materials at cost, and to take advantage of other League privileges, to be announced later. There are no League dues or assessments. William B. Stout, general manager of the Henry Ford airplane interests, is its president.

January, 1928

To Wind Twin

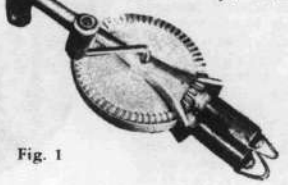
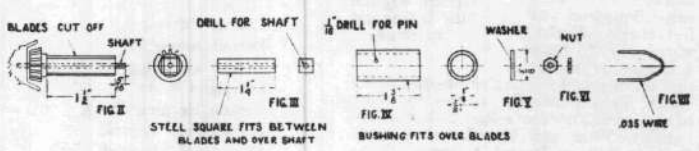


Fig. 1

HERE'S the egg beater winder for that twin pusher model airplane you're building—and for your other planes as well when you want faster winding than you can get by hand.

You can get half again as many turns on a rubber band if you stretch it twice its length before winding. That means a 50 per cent increase in efficiency over the unstretched band. Stretch a six strand, 40 inch motor, for example, and it will take, with a good margin of safety, more than 1,000 turns. Try getting that many turns on the same rubber without stretching it first and you're likely to need a new motor!

Look at the illustration and you will see that the egg beater winder has two shafts, one for each of the twin pusher's motors. To get an even flight, of course, both motors must have the same number of turns. Winding the motors one after the other is too slow, because the rubber on the first propeller "goes dead" before the other is ready. Model builders have found that the egg beater winder makes it possible to stretch the rubber, to wind both propellers at once, and to speed up the whole process.



Unless you have had a chance to work in a machine shop enough so that you are familiar with metal-working tools, you'd better not try to make the winder yourself. Take your drawings to a mechanic and have him make it. The machine work is too difficult for a beginner, but a skilled worker can do it in two hours.

The photograph shows a winder built from an aluminum egg beater. You can buy one at any hardware or department store. Buy the type shown in the picture. It runs smoothly and won't bind as some other types do. One turn of the handle gives five turns to the rubber, as the large gear has five times as many teeth as the small ones. Some beaters give only four turns of the blades to one of the handle, but you can check the ratio yourself by counting them. You can see that a winder geared at a five to one ratio has a decided advantage in winding a motor, for 200 turns of the handle will give 1000 turns on the rubber. That means a great saving of time over the old hand method.

In the drawing, the details are shown in the positions in which they are assembled on the winder. Fig. II shows the blades or beaters cut off 1 1-2 inches from the small bevel gear, except for the center shaft, which is left 5-16 of an inch longer. A 3-32 thread must be cut on this shaft to a point even with the blades. Fig. III shows a piece of 5-16 square stock 1 1-4 inches long with a 1-8-inch hole drilled through the length of it. This steel block slides in between the cut off blades, with the center shaft running through the hole. The cross section shows how the block fits firmly inside the stumps of the blades. The bushing shown in Fig. IV can be cut from 5-8 inch round steel. It is made to slip tightly over the cut-off blades, as you can see from the photograph. A small washer, Fig. V, is then placed over the end, and a small hexagonal nut is attached to hold block, blades, bushing and washer in place. Don't tighten the nut too much, or the winder will be hard to turn. Now the U-shaped piece, Fig. VII, is bent from .035 music wire. The photograph shows how it is soldered to the bushing.

The last operation is the drilling of a 1-16-inch pin hole in the bushing. This must be done after the winder is completely assembled. The hole must be drilled to one side of the center so as to miss the shaft and yet go through the square block. A piece of 1-16 inch rod is then driven through the hole and soldered at each end to keep it from working loose. Make sure that the winder works freely, and then solder the nut to the shaft to prevent it from ever coming off.

Of course, the process is the same for both shafts, so that the two sets of blades should be cut together and the process should be followed through for the winders on both gears at the same time.

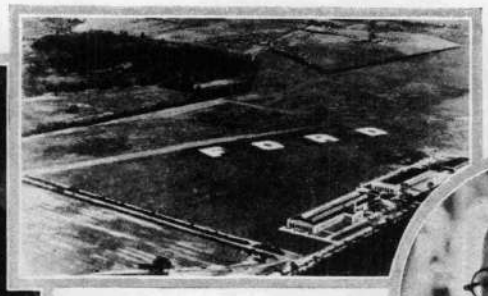
You will find this winder a sure, swift, easy device for winding your motors. Longer flights for your twin pusher and longer life to your rubber motors will be the result.

Come to the Big National Contest

By Franklin Mering Reck

At Selfridge Field you'll fly your outdoor planes and meet the Army fliers of the famous First Pursuit Squadron.

"Take it—if you can!" says Jack Loughner, present holder of the beautiful bronze Mulvihill outdoor trophy.



You'll witness, at the Ford Airport, the start of the National Reliability Tour and the International James Gordon Bennett Balloon Race.

You will meet Frank Tichenor, publisher of *Aero Digest*.

The Statler Hotel, on Grand Circus Park, will be your headquarters.

GREAT fun—keen competition—the thrill of notable events in aviation—these are waiting for the model aviators who come to Detroit, June 29 and 30, to compete in the National Airplane Model Flying Meet.

This is the official 1928 contest, that the National Aeronautic Association has designated THE AMERICAN BOY to conduct. Records made at the contest will be internationally certified. Entrants will compete for the famous Stout indoor trophy, the Mulvihill outdoor, for trips to Europe and to the Pulitzer Air Races to be held at Los Angeles, for $3,000 in cash prizes, for innumerable medals, special prizes and honor certificates!

But the prizes, worthwhile as they are, tell only part of the story. THE AMERICAN BOY—in co-operation with the N. A. A., leaders in aviation, and Detroit civic groups—is planning two days of entertainment that will make the contest memorable to every model builder who comes.

Griffith Ogden Ellis is General Chairman.

Entrants will meet famous flying men. They'll see the inside of great airplane factories. They will be the guests of army aviators of the renowned First Pursuit Squadron at Selfridge Field, where they'll have a chance to inspect that unsurpassed fighting plane—the Army Hawk. They'll actually witness the start of two great air events—the National Reliability Tour and the James Gordon Bennett Balloon Races! A liberal education, here, in aviation!

Anyone who has constructed a model plane may enter it in the national contest—provided he belongs to the Airplane Model League of America, or any other model plane club recognized by the National Aeronautic Association. The contestant need not use materials or kits supplied by the A. M. L. A. His only reason for doing so will be that these materials—specially selected and prepared for contest models—will give him a better chance of winning.

The cost of competing will not be great. You can figure just what the expense will be by adding up the round-trip railroad fare and pullman, meals en route, and a maximum of $20 to cover your expense during the two days in Detroit.

If you've built an indoor or outdoor plane that has made flights of two minutes, or over, you'll have an excellent chance of winning a place in one of the contests. Even if your plane will not fly that long, you will find it worth while to enter, because, while you may not win a prize, you'll become acquainted with the best model plane builders in the country. You'll be able to study their ships and learn their methods of constructing and flying contest models.

And the entertainment program, alone, will repay you for coming.

If you can't afford to pay your own expenses, you will be able—more than likely—to find some organization that is willing to send you. Perhaps your airport commission, the chamber of commerce, a newspaper, or one of the civic clubs—Rotary, Kiwanis, or Lions, for example—will pay the cost. Consult your manual training teacher or your principal. Show him this article. Tell him you want to enter the national contest and get him to interest some civic-minded group in sending you.

At Detroit, you may enter three separate contests. You will fly your big twin pusher in the outdoor competition for the Mulvihill trophy. The present holder of this trophy is Jack Loughner, of Detroit, who won it at the Sesquicentennial Celebration, at Philadelphia, in 1926. There are two classes in the outdoor contest—A and B. If you're 16 years old, or older, on June 1, 1928, you'll enter Class A. If you're 15, or younger, on that date, you will compete in Class B. But younger entrants may compete for the Class A championship, while older entrants *may not* compete in Class B.

Go after the Stout Indoor Trophy!

In each class, you'll compete for $500 divided into eight prizes ranging from $200 to $10; for gold, silver, and bronze medals, and for certificates of merit. The builder under 21 years, who makes the best showing in the outdoor, Class A, will go to Europe as the guest of THE AMERICAN BOY, in company with Merrill Hamburg!

The second great contest you may enter is the indoor for the Stout trophy. This trophy, constructed entirely of that light, strong airplane metal—duralumin—is held by Charles Dybvig, of Ann Arbor. It is provided by William B. Stout, president of the Airplane Model League of America and builder of the famous Stout all-metal airplane.

The Stout contest, too, is divided into Classes A and B, with similar cash prizes, medals and certificates. In this division, too, the boy under 21 who makes the best showing goes to Europe.

The third big division of the meet is the scale model contest. This, as well, is divided into Classes A and B, each one offering a trophy, $500 in cash, medals, and certificates. The Class A winner will go to the Pulitzer Air Races to be held in Los Angeles, in company with one parent, as the guest of Mr. Frank A. Tichenor, publisher of the *Aero Digest*.

You may enter the scale model contest

Follow One of These Newspapers

IN co-operation with THE AMERICAN BOY, the following newspapers and magazines are sponsoring the Airplane Model League of America. Read them, as well as THE AMERICAN BOY, for information on local contests, the building of airplane models, and the national meet in Detroit.

Chicago Tribune,
Detroit News,
New York Telegram,
Cleveland News,
Buffalo Evening News,
Philadelphia Record,
Minneapolis Journal,
DesMoines Tribune-Capital,
Columbus Dispatch,
Toledo News-Bee,
San Francisco News,
Seattle Times,
Rochester Democrat and Chronicle,
Oklahoman (Oklahoma City),
Oakland (Calif.) Tribune,
Washington Post,
New Orleans Item,
Louisville Times,
Milwaukee Leader,
Tulsa World,
Syracuse Herald,
Harrisburg Telegraph,
Albany Evening News,
Portland (Me.) Evening Express and Press Herald,
Allentown (Pa.) Call,
Winnipeg Tribune,
Aero Digest,
Youngstown (Ohio) Vindicator,
Johnstown (Pa.) Tribune,
Springfield (Mass.) Union,
Tacoma News Tribune,
Chattanooga News,
Fort Worth Press,
Macon Telegraph,
South Bend Tribune,
Wisconsin State Journal,
Reading Times,
New Bedford (Mass.) Times,
Fall River (Mass.) Herald News,
Williamsport (Pa.) Sun,
Berkshire Evening Eagle (Pittsfield, Mass.)
Spokane Press,
Honolulu Star-Bulletin,
Watertown (N. Y.) Times,
Springfield (Ohio) Sun,
Paterson (N. J.) Press-Guardian,
Palm Beach Post,
Richmond (Ind.) Palladium,
Webster (Mass.) Evening Times,
Pratt (Kans.) Daily Tribune,
Sweetwater (Tex.) Reporter,
Abilene (Kans.) Chronicle.

July, 1928

without coming to Detroit! Since scale models are judged for workmanship, and exactness with which they represent the larger ship, they can be fairly judged without the builder's actual presence. Just build an exact replica of the Curtiss Army Hawk, the Ford trimotor (these two were described in the February AMERICAN BOY), or any other man-carrying ship, and send it to Detroit. The June issue of the AMERICAN BOY will tell you how to box your scale model and just where to send it. (Please do not ask for advance information about this contest—the rules at the end of this article give you all the details you need to know in order to construct scale models that will be eligible for competition:)

In every contest, entrants of 15 or under may compete in the Class A division, but boys of 16 or older may not compete in Class B.

Every minute of your time, while you are in Detroit, will be taken up with a varied and worthwhile program. You'll arrive in Detroit, probably, some time Thursday. Perhaps you'll pull into the long concrete and steel sheds of the new Michigan Central depot; or into the Grand Trunk, down by the international highway, the Detroit River, where long freighters and many-decked passenger boats endlessly pass; or into the busy, crowded Union Station located not far from the site of the fort where moccasined Indians came to trade a hundred and fifty years ago.

You'll go immediately to the Statler Hotel, whose thousands of windows look out upon Grand Circus Park—a green clearing in a forest of tall buildings, of motion picture theaters, exclusive clubs, and stores. Across the park from the hotel, above the trees, rises the spire of the First Methodist Church, one hundred years old, whose pastor is Dr. Lynn Harold Hough, former president of Northwestern University.

The Statler will be your headquarters—the A. M. L. A. has arranged special low rates for you. There you'll meet Gurney Williams, who rode that balky motorcycle *Freddo* all over Europe, and tells about it in that tickling series of articles called "Two Boobs Abroad." One chapter of their adventures is in this issue. You'll remember Gurney as the author of "Four Thousand Miles of What Next," the series of transcontinental laughs that appeared in THE AMERICAN BOY two years ago. You'll meet, also, Fred Williams, Gurney's partner in crime. If you press Gurney, he'll reluctantly admit that Fred is his brother.

These two, Gurney and Fred, are Chairmen of Everything. They'll be at your service 24 hours a day. Ask them anything. If you want to know about the contests, about the best or cheapest places to eat, about stores, transportation, or train schedules, ask Gurney and Fred. They'll live right in the hotel—in a special A. M. L. A.—AMERICAN BOY headquarters—and they'll be eager to do favors for you, any time and all the time.

First of all, these two will register you. Then they'll issue you a pass book, entitling you to free movies for Thursday night, to free bus transportation during the two days of the meet, to banquets and other valuable privileges. If you want to work on your planes Thursday evening, they'll show you the Statler workroom, where you can get free tools, free ambroid, free banana oil, and free materials to repair your ships and fit them for the contest. Big long tables and plenty of space, you'll find in the workroom, and you're welcome to stay there as long as you like.

Better get to bed fairly early Thursday night because Friday will be a big day. If you are entering the indoor contest, you'll be taken to the Olympia—Detroit's immense new sports arena—where you must be ready to start flying your indoor endurance models at eight o'clock in the morning. Model planes will be new to the Olympia's high, steel-vaulted expanse. Her walls have rung to the zing of hockey skates, the thud of basketballs, and the cheers of 12,000 massed spectators at nearly every kind of athletic contest.

You will initiate the Olympia, and its patrons, to model aviation. You'll find the arena ideal for record-breaking flights. With two oval banks of seats, the top one reaching ninety feet above the floor, the Olympia looks for all the world like a football bowl, roofed over. The floor space, nearly as large as a gridiron, and the high roof, will give each balsa craft every chance to circle widely and rise to its "ceiling."

If you're entering the outdoor meet, you must be ready at seven-thirty to pile into big General Motor busses for a trip to Selfridge Field, nineteen miles away. Busses will make regular trips between the Olympia and Selfridge Field, so that when you finish your flights in one contest, you may depart, within an hour, for the other.

Selfridge Field is the home of the famous First Pursuit Group of the U. S. Army. Stretching down one side of the field, which is one mile wide and two miles long, you'll see a long row of hangars, mess halls, barracks and quarters

Aero Digest, N. Y.

Clarence Chamberlin wants to meet every contestant.

for the officers. In the big open expanse, you'll send up your twin pushers in the official flights for the National Aeronautic Association's Mulvihill trophy.

When you're not actually competing, you'll have a chance to meet Major Thomas G. Lanphier, commander of the First Pursuit Group. In Major Lanphier, you'll meet the man who was commanding officer at Issoudon, the largest training camp for American aviators in France, during the war; who is renowned for his ability to lead fliers; who led the first transcontinental Army pursuit flight; who established a record by conducting his formation from Detroit to San Antonio, Texas—1300 miles in eleven daylight hours!

You'll meet Lieutenant Colonel Charles H. Danforth commandant, through whose courtesy you are flying your model ships at Selfridge Field.

Officers of the squadron, all of them skilled air fighters, will show you their ships—the Curtiss Army Hawk. This businesslike, khaki-colored plane has a flying speed of 170 miles an hour. It's sturdy—a pilot can pull it out of a dive so abruptly that he'll lose consciousness, and the ship won't crack up. Two machine guns are mounted up in front, synchronized to shoot between the blades of the propeller. You'll thrill at this intimate contact with skilled fliers and a great ship.

On Friday, the finalists in both the indoor and outdoor contests will be picked. When it's all over, you'll hustle back to the Statler to clean up for a big banquet. Commander Richard Byrd, your honorary president, is expected to be there to meet you. Clarence Chamberlin, vice-president of the A. M. L. A., whose flight from New York to Eisleben, Germany, set a world's non-stop record, will be on hand. (Turn to the picture of him, elsewhere in this issue.)

"You bet I'll be there," Chamberlin said, when he was invited to come. "I want to meet every one of the airplane model builders personally."

You'll meet Griffith Ogden Ellis, editor of THE AMERICAN BOY and general chairman of the national contest. You'll have a chance to talk to Merrill Hamburg, secretary of the A. M. L. A., whose construction articles you have followed during the past eight months. You'll meet William B. Stout, your president, designer of the great Ford Trimotor, all-metal plane; Mr. Frank Tichenor, publisher of the *Aero Digest* and donor of the trip to Los Angeles for the scale model winner; George F. McLaughlin, technical editor of the *Aero Digest;* Eddie Stinson, builder of the Stinson plane, whose record of hours in the air exceeds that of most living fliers; Edward J. Hill and Arthur G. Schlosser, winners of the 1927 James Gordon Bennett Balloon Race.

You'll meet, also, Thomson Burtis, famous for his air stories in THE AMERICAN BOY and many other national magazines—stories that grew out of his years as an Army flier. In all probability, General Fechet, chief of the U. S. Army Air Service, will be there to shake hands with you. Porter Adams, president of the National Aeronautic Association, will be present. So will Eddie Rickenbacker, conqueror of twenty-six German planes, and America's greatest ace.

But you'll meet not only great leaders in aviation Harry Heilman will be at the banquet. Harry Heilman, outfielder of the Detroit Tigers, who won the batting championship of the American League in 1927 by making seven hits in nine times at bat in the two last games of the season and thereby boosting his average from 390 to 398! This remarkable achievement gave Heilman his fourth batting championship—thus equalling Lajoie's record for right-handed batters. You'll get a double kick out of meeting the stalwart outfielder, because you'll have read, by that time, the story in the June AMERICAN BOY telling just how Heilman cracked out those seven hits last October!

After the banquet, you'll hit the hay. You'll need sleep, because Saturday will be a red-letter day in your life.

In the morning, you'll be transported out to the Ford Airport in busses. On this trip you'll pass Navin Field, home of the Detroit Tigers. You'll pass the huge plant where Cadillac motor cars are manufactured. You'll pass through the new city that is springing up around River Rouge where thousands of new Ford cars are being built every day. As you draw near Dearborn, you'll get a glimpse of Henry Ford's home, half hid by trees far back in his estate that stretches along the right of the road. The first inkling that you're nearing the airport will be a tall mooring mast in the distance, towering above roadside trees. This is the airport mooring mast, the steel structure equipped with an elevator, to which the great dirigible, *Los Angeles*, tied up a year ago last fall.

At the airport, you'll have a chance, first thing, to go through the factory that turns out the Ford all-metal, fourteen-passenger planes. In the concrete hangar next to the plant you'll see the great Fokker monoplane, *Josephine Ford*, in which Commander Byrd flew over the North Pole. Farther down the line you'll see the terminal of the Stout Detroit-to-Cleveland airways where passengers buy their tickets entitling them to seats on the twice-daily sky ships to the Ohio city.

After you've filled your eyes with the sights and sounds of this bustling mid-west center of air development, you'll witness a history-making event—the take-off of the National Reliability Tour. You'll see the most notable commercial planes of the country—the Stinson cabin monoplane, the Buhl Airsedan, Curtiss Oriole, Waco two-place biplane, Ryan Brougham, Pitcairn biplane, Alexander Eaglerock, and many others. Famous pilots—Walter Beach, Eddie Stinson, Casey Jones, and perhaps Clarence Chamberlin—will fly these ships on a 6,000 mile tour. They'll carry specified loads, and they'll make many stops on a definite schedule—all to test their reliability on a long, hard grind. The plane that adheres most rigidly to the schedule and shows itself most adept at taking off and landing wins the Edsel B. Ford trophy and substantial prize money.

After the planes of the Reliability Tour, taking off two minutes apart, have disappeared into the sky, and before the start of the James Gordon Bennett Balloon Race, the finalists in the Mulvihill

(*Continued on page 58*)

Come to the Big National Contest (*Continued from page 26*)

contest will fly their twin pushers to determine the national outdoor champion.

At twelve, you'll be guests of Detroit hosts at a luncheon.

At four o'clock you'll see the start of the James Gordon Bennett race. At five minute intervals, the great gas bags will rise into the air, slowly and silently, bearing their two pilots, suspended in baskets, on journeys whose length and direction will be determined by the wind. Balloons from Germany, France, and other countries will be entered. Some of them may land as far away as Florida, or Texas, or a thousand miles into Canada. The balloon that comes to earth the farthest from the starting point will win.

One of the entries will be piloted by Hill and Schlosser, the men you will have met at the Friday banquet, who will be out to repeat their victory of last year.

From the Ford Airport you'll be taken back to the hotel for a light dinner. Don't eat too much, because free eats are coming later. At eight, you'll go to the Olympia to see—and perhaps to take part in—the finals of the Stout Indoor contest. In connection with the contest there'll be a big model plane flying exhibition for the 12,000 spectators who will jam the big indoor stadium.

At midnight you'll be guests at a bang-up banquet. At this time, Griffith Ogden Ellis will formally present the Stout and Mulvihill trophies to the senior national indoor and outdoor champions. He will present these winners checks for $200 signed by Orville Wright, Commander Byrd and himself. The checks will be accompanied by photostatic copies of the checks—the winners will no doubt want to frame these.

At the same time, Mr. Ellis will announce the two entrants under twenty-one, who made the best showing in the Stout and Mulvihill competition, and who will therefore take the trip to Europe as guests of THE AMERICAN BOY.

Three winners will receive scholarships for courses of instruction in the fundamental principles of aviation at the Aviation Institute of U. S. A., at Washington, D. C. Which divisions of the contest will be alloted these scholarships has not yet been determined. They are being offered through the courtesy of Walter Hinton, president of the Institute.

Sunday will be a day of rest—and you'll need it. Gurney and Fred will tell you how to get to your church. They'll give you the directions for riding a double-deck bus to Detroit's new library, and art museum; how to go to Canada which is only ten minutes by ferry from Detroit. This ferry will take you across the Detroit River, which carries more traffic than the Panama Canal. They'll tell you how to go to Belle Isle, the famous island park noted for its zoo, its conservatory, its countless lagoons, its drives and athletic fields. Detroit has 1,800,000 people, and plenty to see.

Monday morning, the two trip winners will buy themselves a new outfit of clothes—they get $150 each—for the jaunt to Europe. The J. L. Hudson Company is donating these outfitting prizes.

At four, with Merrill Hamburg, they'll board the Red Arrow, the crack Pennsylvania flyer, on the first leg of their trip to Europe. With their winning planes and their luggage stowed under Pullman seats, they'll go eastward, through Ohio, up over the mountain country of Pennsylvania, down past the Mason and Dixon line, through Maryland to Washington, D. C. Here they will get their passports, and will meet President Coolidge.

After that, a day in Philadelphia where the Declaration of Independence was framed and a new nation was born. Then, New York, with its Broadway, its Fifth Avenue, its Babe Ruth, and its towering skyscrapers. A tour of the city, a call on Mayor Walker, and then down to the water's edge, where a giant ocean liner will be waiting.

A week on the ocean, and then the world's largest city—London. After exhibitions and contests with English model aviators the trip to Paris for further exhibitions. Finally, Geneva, in picturesque Switzerland.

The Class B champion in the indoor contest will be invited to go to Camp Charlevoix, Michigan, as guest of the camp. The usual $300 tuition will be paid by the camp. Class B winners in the outdoor and scale model competition will also have opportunity to go to summer camps, tuition free.

The other contestants will leave for home, Sunday and Monday, taking with them not only prizes, trophies and certificates, but vivid memories of two great days crammed with great air events.

The June issue will carry further detailed instructions to entrants, and will print the entry blank you must fill out and mail to THE AMERICAN BOY. In the meantime, to prepare yourself for the meet read the following rules for the indoor, outdoor and scale model contests. And be sure to read the article in this issue: "Get Your Contest Models in Shape!"

RULES FOR THE STOUT INDOOR CONTEST

Sanctioned by the National Aeronautic Association Under Rules of the Federation Aeronautique Internationale.

The William B. Stout trophy shall be competed for annually by members of the Airplane Model League of America, or other nationally recognized model aero clubs using hand-launched model airplanes, driven by rubber strand motors. The trophy shall be awarded each year to the club, body or chapter represented by the entrant who builds and flies the winning model, and this body shall be entitled to the possession of the trophy until one month prior to the next contest, at which time the trophy shall be returned to the contest committee of the A. M. L. A. Suitable bond or guarantee for its proper care and return shall be required from each and every person or organization into whose possession the trophy shall be delivered.

The trophy will become the permanent possession of any club, body, or chapter that wins it three times.

Conditions of the contest.

1. No restrictions on the design of the model except that it shall have a distance between the propeller bearing and the motor hook, fastened to the opposite end of the motor stick, not to exceed fifteen inches.

All models must be hand-launched, and the only motive power be derived from the use of rubber strands.

2. The contest will be for duration. A contestant will be allowed a total of three official flights. He will be accredited with the greatest elapsed time made in any one of his three flights.

3. A contestant will be allowed a maximum of three models, and he may use any or all to complete his official three flights.

4. No contestant shall launch his model before receiving the launch-signal from the official starter. Any contestant doing so will be disqualified. All contestants must have their models ready for examination by the officials fifteen minutes before the starting time of the contest.

Each contestant will draw a number, giving his place in rotation. He will be allowed two minutes within which to launch his model. Should he fail to launch his model in the time allowed he must withhold that official trial until his next turn in line and a delayed flight will be charged against him.

5. Any flight under fifteen seconds and every failure to fly in turn shall be considered a delayed flight. Three delayed flights will be considered an official flight.

6. The finish time will be taken when the model strikes or lands on any object preventing further flight.

7. The winner of first place shall be the owner and builder of the model which has remained in flight for the longest time; and of second place, the second longest elapsed time, etc., providing the contestant hasn't been disqualified. No individual will be allowed more than one cash prize; each contestant will be allowed only the prize to which his best flight entitles him.

8. No contestant may take part in this contest unless he is a member of the Airplane Model League of America or some nationally recognized model aero club using hand-launched model airplanes, driven by rubber strand motors. He must also be the owner and builder of the models submitted. However, the design of the model may be obtained from other sources than his own. He shall be the builder of the entire model with the exception of the thrust bearing and thrust washers which may be purchased from other sources. (Note: Users of A. M. L. A. kits are eligible.)

9. Any contestant breaking the rules of the race, or subsequent ones which may be sent out in writing, shall upon the recommendation of the officials, be disqualified. Models broken upon landing will not be disqualified.

10. No protests shall be considered unless presented to the contest committee in writing within twenty-four hours after the finish of the race.

11. Minimum number of contestants eight. Maximum number of contestants twenty-five. (This applies only to the finals.)

RULES FOR THE MULVIHILL OUTDOOR CONTEST

Sanctioned by the National Aeronautic Association Under Rules of the Federation Aeronautique Internationale.

(a) The trophy shall be perpetual and competed for annually by members of the Airplane Model League of America, or other model aero clubs recognized by the National Aeronautic Association, using hand-launched model airplanes, driven by rubber strand motors.

(b) The trophy shall be awarded each year to the club, body, or chapter represented by the entrant of the winning model, and this body shall be entitled to the possession of the trophy until one month prior to the next succeeding contest, at which time the trophy shall be returned to the National Aeronautic Association; suitable bond for its proper care and return shall be required by the donee (the N. A. A.), from each and every person or organization into whose possession the trophy shall at any time be delivered.

Conditions of Contest.

No restrictions on the design of the model except that it shall have a wing span not to exceed 40 inches. All models must be hand launched and the only motive power will be that derived from the use of rubber bands.

Character of Contest.

The contest shall be for duration. A contestant will be allowed a total of three official flights. He will be accredited with the greatest elapsed time made in any one of his three flights.

Number of Entries Per Contestant.

A contestant will be allowed a maximum of three models, and he may use any or all to complete his official three flights.

Method of Starting.

No contestant shall launch his model before receiving the launching-signal from the official starter. Any contestant doing so will be disqualified.

All contestants must have their models ready for examination by the judges by 9:00 a. m. Contests will start at 9:30 a. m. Judges shall select the place of starting previous to contest. Each contestant will draw a number giving his place in rotation of starting. The same rotation will follow until each contestant has completed his three official flights. The time of starting of each contestant will be posted ten minutes in advance.

He will be allowed five minutes within which to launch his model. Should he fail to launch his model within the time allowed, he shall be charged with a delayed flight and he must withhold that official trial until his next turn in line. Any flight under ten seconds will not be official and will count as a delayed flight. Three delayed flights shall count as an official flight.

Finish.

The finishing time will be taken when the model first touches the ground after being launched or when it passes out of sight of officials.

Winners.

The winner of first place shall be the owner and builder of the model which has remained in flight for the longest elapsed time, and of second place the second longest elapsed time, etc., providing the contestant has not been disqualified. No individual will be allowed more than one cash prize. To distribute the prizes more evenly, each contestant will be allowed only the prize to which his best flight entitles him.

Qualifications.

No contestant may take part in the contest for this trophy unless he is a member of the Airplane Model League of America or other model aero club recognized by the N. A. A. and in good standing. He must also be the owner and builder of the model submitted. However, the design for the model may be obtained from other sources than his own. He shall be the builder of the entire model with the following exceptions: Propellers, motor bearings and propeller shaft; also such other small metal fittings as may be used in the construction of the model may be purchased from outside sources.

Disqualifications.

Any contestant breaking the rules of the race, or subsequent ones which may be sent out in writing, shall, upon recommendation of the judges, be disqualified. Models broken upon landing will not be disqualified.

Protests.

No protest shall be considered unless presented in writing to the Contest Committee within twenty-four hours after the finish of the race. (F. A. I. Rules, 78, 79, 80.)

RULES FOR THE SCALE MODEL CONTEST

(a) The trophy shall be competed for annually by members of the Airplane Model League of America or other nationally recognized model airplane clubs building exact scale models.

Conditions of Contest.

(I) There will be no restrictions as to the design of the ship except that it must be an exact replica of a man-carrying airplane and have an exact wing span, including ailerons, of **twenty-four inches.**

The models do not have to fly, nor need any parts such as propellers, wheels, etc., be movable. Neither is it necessary to use the same material in construction as employed on the large ship.

(II) The contest will be for workmanship, originality in obtaining the desired resemblance to the man-carrying ship, the exactness to which the model is scaled and any other points which are, in the opinion of the judges, important in such a contest.

(III) Each contestant will be allowed to submit one model and unless the model is made from drawings previously checked by the Contest Committee of the A. M. L. A., it must be accompanied by a drawing giving all necessary dimensions, airfoil sections and such other details as may be considered necessary by the judges in order to construct a model. This drawing must be one supplied by the manufacturer of the airplane, after which the plane was modeled, or be accompanied by a letter from the company building the plane, stating that the manufacturer or his representative has checked the drawing and found it to be correct.

(IV) All planes and drawings must be in the hands of the Contest Committee at least two weeks before the date of the contest.

(V) The winner of first place shall be the owner and builder of the model which in the judgment of the officials is the best example of workmanship as defined by the rules, and of second place the next best example of workmanship, etc., providing the contestant has not been disqualified. No individual will be allowed more than one cash prize; each contestant will be allowed only the cash prize to which his place entitles him.

(VI) No contestant may take part in this contest unless he is a member of the A. M. L. A. or some other nationally recognized model airplane club. He must be the owner and builder of the entire model submitted.

(VII) Any contestant breaking the rules of the contest or subsequent ones which may be sent out in writing, shall upon the recommendations of the officials be disqualified.

(VIII) No protests shall be considered unless presented to the Contest Committee in writing within twenty-four hours after the finish of the contest.

(IX) Minimum number of contestants eight.

May, 1928

An Airport for Boys

LOS ANGELES has a junior airport! Here, daily, the Lindberghs, Byrds, and Chamberlins of Southern California descend with their balsa and bamboo craft to experiment with design, repair, and try for new records in the air.

This squadron, from the near-by city of Clearwater, brought hangars along to protect those graceful monoplanes during a recent flying meet.

The airport is a city project, and was established by George Hjelte and John Henderson of the Los Angeles Dept. of Playground and Recreation.

Model Plane Builders

(*Continued from page 40*) April, 1928

Many League members who have followed THE AMERICAN BOY articles from the beginning have already won one or two legs on a Chamberlin picture. Here are some of the builders who have been awarded honor certificates during the past month:

Baby R. O. G.: D. Kahn, 106 Flower Street, Walnut Lake, Californin; Lawrence E. Hankammer, 3314 University Avenue, Des Moines, Iowa; William Davis, 412 Wall Street, Jeffersonville, Indiana; Jack Berman, 3 Stanwood Terrace, Boston, Massachusetts; Corwin Robert Cropper, 229 South Broadway, Lebanon, Ohio.

Indoor Pusher: Melvin Blackburn, Harve, Montana; Arthur Johnson, 116 First Street, Hawthorne, New Jersey; Thomas Reilly, 223 Cypress Avenue, Bronx, New York; Robert Drawchowski, 115 S. Roberts Road, Dunkirk, New York; Edward Foresch, 6715 Conrad Avenue, Cleveland, Ohio.

Indoor Tractor: George Lawrence, 1211 Sixth Avenue, Marion, Iowa.

Twin Pusher: Way Grey, 481 Hamilton, Long Island City, New York; John Bird, 1517 Fort Street, East, Detroit, Michigan.

Start now to get in the running with these builders. There's plenty of time—and there are plenty of pictures to win. Take the application reproduced herewith—and your model plane—to your manual training teacher, or any other competent adult. Fly the model in his presence while he times the flight with a stop watch. If you exceed the minimum time required, have your witness fill out the application and mail it, with ten cents to cover the cost of sending you your honor certificate, to the Honor Certificate Department, A. M. L. A., American Building, Second Boulevard at Lafayette, Detroit, Michigan.

As soon as you have won a certificate with one type of model, go after another. The minute you've won four of them, the League will send you the autographed picture and signed membership card. (If you want back copies of THE AMERICAN BOY containing airplane model plans, send 20 cents for each copy you wish to the Circulation Department, AMERICAN BOY Magazine, 550 Lafayette Boulevard, Detroit, Michigan. Remember, the R. O. G. appeared in October, the Indoor Pusher in November, the Indoor Tractor in December, and the Outdoor Twin Pusher in January.)

Honor Certificate

AIRPLANE MODEL LEAGUE OF AMERICA

This Will Certify that John Dawson, who resides at 1102 Oakton, Evanston, Ill., has successfully constructed a model airplane of the Baby R. O. G. type, which made a sustained flight of 35 seconds, under the observation of H. Whale Evanston, on December 13, 1927.

(Records must be established in accredited contests to be recognized as official by the N. A. A., but the A. M. L. A. is glad to acknowledge, with this certificate, the proficiency of the member named above.)

January 9, 1928.

Honorary President

President

Vice-President

Secretary

Airplane Model League of America, American Building, Second Boulevard at Lafayette, Detroit, Michigan. Sponsored by THE AMERICAN BOY Magazine.

Model Plane Builders!

Chamberlin's Picture, Bearing His Signature, Goes to Winners of Four Honor Certificates

WIN AN autographed picture of Clarence Chamberlin, famous New York-to-Germany flier. A picture bearing Chamberlin's own signature!

How? By winning four honor certificates in the Airplane Model League of America. Win your first honor certificate by building a Baby R. O. G. (described in the October number) that will fly over 30 seconds; win your second with a pusher that will stay in the air 65 seconds (the pusher was described in November); win your third with an endurance tractor (December issue) that will do 100 seconds; and your fourth with an outdoor twin pusher (January) that will do 120.

When you've received these four honor certificates, you'll get not only Chamberlin's autographed picture, but a membership card in the League bearing the *actual* signatures of Commander Richard E. Byrd, honorary president; William B. Stout, president; and Merrill Hamburg, secretary. Their autographs! Treasures worth working for—that you'll want to keep always.

Clarence Chamberlin, vice-president of the A. M. L. A., proved himself to be one of the great pilots of the world, when he flew a Bellanca monoplane from New York to Eisleben, Germany, last summer and thereby set the world's non-stop distance record of 3,923 miles. He's a firm believer in model plane building as preliminary training for a career in aviation.

When the managing editor of THE AMERICAN BOY called on Chamberlin, in New York, recently, he asked him if he would autograph 25 pictures for the League.

"I'll be glad to," replied Chamberlin. "The work of the League will help tremendously to advance aviation in this country. I want to help all I can!"

(*Continued on page 49*)

Win this picture—autographed by Chamberlin.

Honor Certificate Department, ... 19...
Airplane Model League of America
American Building, Second Blvd. at Lafayette
Detroit, Mich.
Gentlemen:

Enclosed is ten cents to cover cost of issuing and mailing an honor certificate to ..... of
(Name of A. M. L. A. Member)
..... (Street) ..... (City) ..... (State)
who in my presence, on..... 19..... flew a model airplane of the ..... type a total of ..... seconds, sustained flight. To my knowledge this plane was built by himself.

.....(Flight Witness)

Remarks .....

Instructions to Flight Witnesses: Any adult may be a flight judge. First satisfy yourself that the A. M. L. A. member actually built the plane he proposes to fly. Then take out your watch, direct him to launch his plane from any height under six feet, and compute his "duration." "Duration" begins when the plane leaves his hand—it ends when the plane lands on the ground or floor. If the plane (determine its type in advance) exceeds the following minimum durations it is entitled to a certificate and this coupon should be filled out: Baby R. O. G., 30 seconds; Indoor Pusher, 65 seconds; Indoor Tractor, 100 seconds; Outdoor Pusher, 120 seconds. Flights of the first three models must take place indoors—the larger and higher the room, the better. The Outdoor Pusher must be flown outdoors.

Have your flight witness fill out this application and send it in.

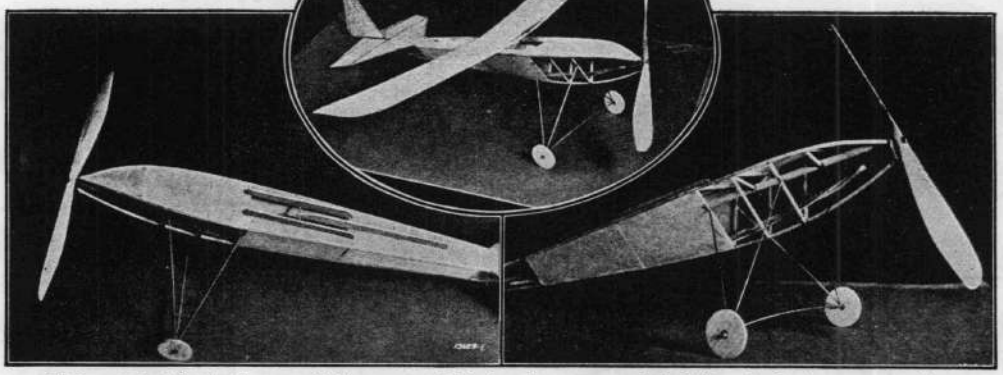
Reprinted from the May, 1928, issue of THE AMERICAN BOY *Magazine, Detroit, Michigan*

It Looks and Flies Like a Real Ship

The Indoor Commercial Model is a Unique Job of Plane Building

By Merrill Hamburg

Secretary of the Airplane Model League of America



Notice, at the left, the three parallel beams to which the wings are attached. Right—the fuselage construction.

THE indoor commercial model is the culmination of a year of airplane model building. It has—

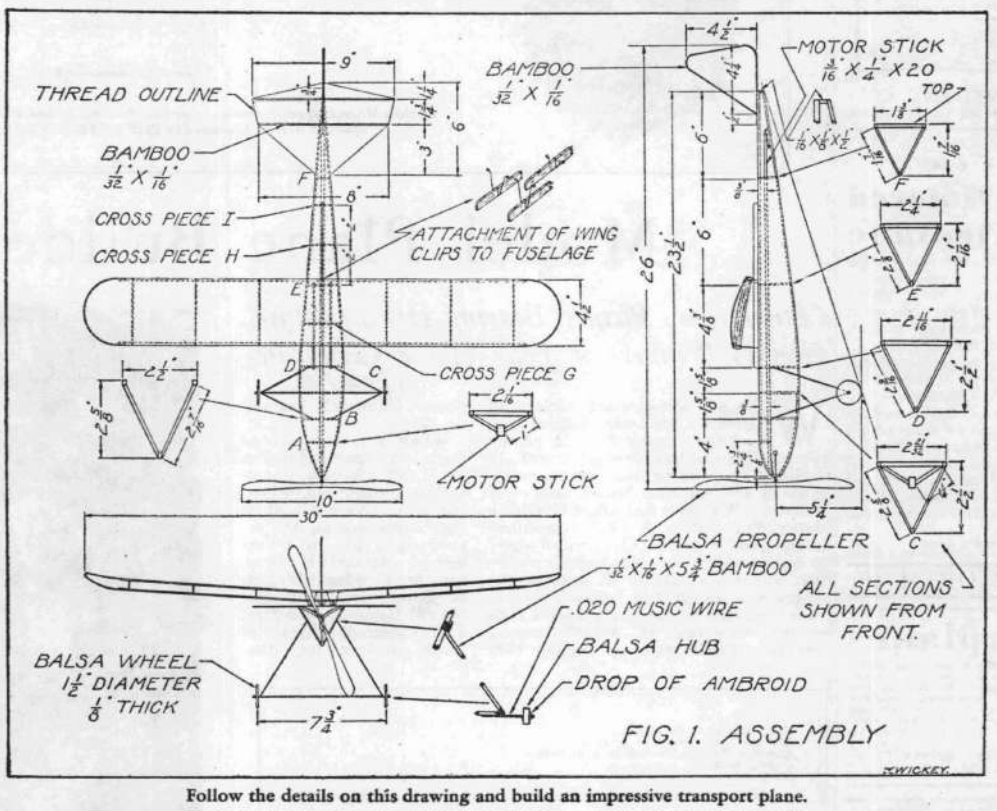
A graceful wing with a 30-inch span.

A built-up, enclosed fuselage, running from propeller to rudder, just like a man-carrying ship.

A powerful, six-strand rubber motor.

You'll find the commercial plane entirely different from either the "flying stick" kind—in which the fuselage is a single stick of wood, as in the Baby R. O. G.—or scale models. It differs from the flying sticks because it looks more like a real ship. It's different from scale models because it will fly. And how it will fly! Perhaps not as long as any of your other indoor types, but with a steadiness and smooth grace that will make you think immediately of an immense, tri-motor ship.

Many readers have asked why a scale model will not fly. You can understand this, readily enough, when you realize that the scale model is an exact replica of a man-carrying plane. But the engine in the large plane brings the center of gravity well forward, and to balance the ship, the wings must also be set forward. The scale model builder usually resorts to a dummy engine, which is much lighter than a real engine, scaled down, would be. This results in throwing the whole model out of balance, and either the wings must be moved back — which would take it out of the scale model class —or enough weight added at the front to balance the ship. But when this weight is added, the scale model is too heavy to fly.



Follow the details on this drawing and build an impressive transport plane.

The commercial model, described in this article, strikes a happy medium. It looks like a big ship—and it flies. Furthermore, it has several improvements that make it superior to the average commercial ship. Probably the most important of these is the method used to support the motor stick. This stick extends through the center of the fuselage and carries the strain of the rubber motor. It is shown very clearly in the drawings and photographs. Notice that it is supported in only three places, two at the front, and one at the rear. Sections A and C, Fig. 1, show the two front connections and Fig. 5 the rear spring support.

Whenever a rubber motor is wound, ready for flying, there is a considerable force tending to twist the motor stick in the opposite direction to that in which the propeller turns. This force, known as torque, is sufficient in a light model to twist the whole fuselage so far that it's impossible to get flight. In order to prevent this, most model builders design their fuselage structure heavy enough to withstand the strain, but this adds a great deal of unnecessary weight. In this model, the motor stick—supported at the rear by a wire spring—absorbs the twisting force without affecting the fuselage.

Another improvement is the method used to attach the wing. The photograph of the ship minus the wing shows the three supporting beams to which the wings are attached with wing clips. These allow the wing to be quickly adjusted forward and back, or to be removed and packed in a box. The three supporting beams must be exactly parallel, or the wing clips will not fit over them at different positions.

A kit containing all the necessary wood, bamboo, paper, glue, and completed metal parts, for this model, may be obtained from the Airplane Model League of America. The announcement on page 26 tells you how to get the kit.

If you prefer to get your own materials, here's what you'll need:

One balsa strip 3-16 by 1-4 by 20 inches, for motor stick.

Six balsa strips 1-16 by 1-8 by 24 inches, for fuselage.

One piece of flat balsa 1-8 by 1 3-4 by 6 inches, for wheels.

One balsa block 7-8 by 1 1-4 by 10 inches, for propellers.

One balsa spar 1-16 by 3-8 by 26 inches for wing.

Three bamboo strips 1-16 by 1-4 by 15 inches for ribs, wing tips, etc.

One ounce bottle of banana oil.

One two-ounce can of ambroid.

Two sheets of Japanese tissue 21 by 31 inches.

Ten feet of 1-8-32 rubber thread for motor.

Six inches of .015 music wire.

Twelve inches of .020 music wire.

Twelve inches of .035 music wire.

Before beginning your construction, study the drawings carefully. Be sure you understand exactly where each part belongs and how it is constructed. You'll save both time and material.

BEGIN on the fuselage. This is triangular in shape—the strongest cross section that could possibly be used—and is perfectly streamlined the entire length. Fig. 1 shows its construction—top view at the left and side view at the right—with the full-sized cross section drawings at one side.

Select two of the 3-32 by 1-8 by 24 inch beams and ambroid two of their ends together to form the top of the fuselage. The glued ends will be the rear point of the fuselage. Six inches from this end, glue a 1-16 by 1-8 by 1 3-16 inch crosspiece (see section F.) The section drawings, in each case, show the distance across the fuselage including the thickness of the fuselage beams. Section F is 1 3-8 inch across the top so that the crosspiece will equal 1 3-8 inches minus twice the thickness of the beam—or 3-16 inch. Therefore, the crosspiece of Section F equals 1 3-8 minus 3-16 or 1 3-16 inches.

Six inches farther forward, glue a 2 1-16 inch crosspiece, which—with the width of the two beams—gives you the 2 1-4 inch width of section E. Just 4 3-8 inches farther forward, glue the crosspiece of D.

When the glue is thoroughly dry, steam and bend the two spread beams so that they come together at the front. Be sure to steam them evenly. Then bind them together with silk thread.

Now turn the frame upside down, lay it flat on the table and place a heavy weight on top of it. Then bend up the nose, which is soaked in steam and therefore pliable, and place a 5-8 inch block under it. Leave it until the wood is thoroughly dry.

While the nose is drying, place in position the two other crosspieces, the first 1 7-8 inches long and the other 2 15-32 inches long. The 1 7-8 inch piece is 2 3-4 inches from the nose, and the other four inches from the

same point. These pieces should not be ambroided in place until the beams are dry—they are merely placed in position to give them the proper curve to the frame while it's drying. Later ambroid all joints and remove the thread.

The crosspiece G is placed halfway between sections D and E and is approximately 1 3-8 inches long. If your crosspieces vary slightly in dimension from the drawing, don't worry. Just cut them to fit the shape of your fuselage. Two more crosspieces, H and I, are ambroided 2 inches apart, between E and F. This completes the top frame of the fuselage.

Your motor stick comes next. Select a piece of firm, straight-grained balsa, and sand it to 3-16 by 1-4 by 20 inches. Fig. 3 shows you how to point the front end. The front bearing is made from a small 1-16 inch nail or part of a large cotter pin, hammered and bent to the shape of Fig. 3. The hole for the propeller shaft is .035 inch in diameter, and is slotted on one side by careful filing. Notice, in Fig. 3, that the hole should be 1-4 inch below the bottom of the motor stick when it's glued in place. Be sure you don't file this slot as wide as the hole or the propeller shaft will keep slipping out of place, and the propeller won't turn. The purpose of this slot is to allow you to remove the propeller at will in order to change the rubber. If you didn't have the slot, you wouldn't be able to change rubber without breaking open the tissue cover of the fuselage!

Your propeller shaft is shown in Fig. 4. Notice that it's flattened in the middle so that it can slip into and out of the slot with ease.

After the front bearing is ambroided in place as shown in Fig. 3, bend your rear hook according to Fig. 3, and ambroid it to the opposite end of the motor stick. Remember that both of these parts are furnished, ready to be assembled, in the kit.

NOW you're ready to assemble the motor stick to the top part of the fuselage. This is done by adding the four small braces that attach the motor stick to the side beams in sections A and C, Fig. 1. These pieces should be mitered—cut off at a slant—so that they'll fit into position. They must hold the motor stick just 3-8 inch below the top of the fuselage. See the side view of assembly drawing Fig. 1, and the detailed drawing of the nose, Fig. 2. Notice that the bearing extends 1-8 inch out beyond the fuselage.

The next step is to assemble the lower beam that forms the bottom edge of the triangular fuselage. Steam the front end of this for about 7 inches from the end, so that it may be bent upward. In order to get just the right bend, draw the outline of the curve on a board and drive small brads in on both sides of the drawing. Then you can place your beam between the brads so that in drying it will hold the exact curve.

Another method is to ambroid the rear end of the lower beam, by means of the small 1-16 by 1-8 by 1-2 inch balsa upright, to the top part of the fuselage and then to complete the triangular sections, D, E and F, allowing them to dry thoroughly before steaming the front end. When these sections are finished and the ambroid is set, the front end may be steamed and the piece bent and held in place by thread while drying. When this piece is dry, you may complete sections B and C and ambroid in place the two small 1-32 by 1-16 by 3-4 inch bamboo braces on the nose (Fig. 2). Notice the balsa wedges or spacers (drawing between Figs. 2 and 4) ambroided in place under these pieces to keep them parallel and to allow enough room for the rubber motor to be taken out.

The small spring support connecting the bottom beam and the motor stick may now be ambroided in position. This is bent from .015 music wire as shown in Fig. 5.

The tail group, shown in Fig. 1, comes next. The elevators and horizontal stabilizer are one piece. Ambroid two bamboo crosspieces, 1-32 by 1-16 inch across the *top* of the fuselage as shown in the drawing. Notice that the rear piece is 9 and the other 8 inches long. The 9 inch one is set 3-4 inch from the end of the fuselage, and the other 2 1-2 inches from the end.

The shape of the bamboo fin is shown in the side view, Fig. 1. To construct it, split—do not attempt to whittle—a piece of bamboo 1-16 inch square from your 15 inch piece. When this is carefully trued up and sanded, bend it as shown. Bamboo, as you know, is very pliable when hot, and can be bent to any desired shape over a candle or alcohol lamp. Experienced model builders will not have any difficulty here at all, and beginners can make an excellent job with very little practice. Bamboo can also be bent around a hot iron or steel rod. Some boys find it easier to obtain the proper shape by first making a drawing of their fin on paper and bending the bamboo to correspond to their outline. When the frame is bent to shape, it is split to form two fins each 1-32 inch thick.

In attaching the fin to the tail groups, ambroid the base to the two crosspieces. Notice how the base extends 1-2 inch beyond the front edge of the frame of the fin in order to rest on the 8 inch crosspiece. The fin should sit up erect, but it may be pivoted around at a small angle to the thrust line or motor stick, to steer the ship in a smaller circle than it would normally fly in.

As soon as the ambroid on the fin is dry, stretch your thread outline around the frame of the stabilizer as shown in the drawing. You've all made kites and used a string to complete the outline around the frame for holding the paper. The thread outline is used in the same manner on this ship. Notice that the end of the thread is tied to the fuselage beams, 3 inches in front of the 8 inch crosspiece, and is stretched around the ends of both crosspieces and back to the base of the fin, 1-4 inch beyond the end of the fuselage frame. If you will carefully study the drawings of the top and side view of the ship you'll not have any trouble with this operation.

THE landing gear is an easy job. The four struts, shown in Fig. 1, front and side views, are 1-32 by 1-16 inch bamboo, 5 3-4 inches long. Bend one end to fit the side braces of the fuselage. The other ends are joined at the axle which is a piece of bamboo 1-32 by 1-16 by 7 1-2 inches. The wheels, 1 1-2 inches in diameter, are cut from 1-8 inch flat balsa. These wheels turn on small axle bearings formed from .020 music wire, held in place by ambroid, to the under side of the axle. Small hubs are formed of balsa to prevent the wheels from coming off. These hubs are glued to the axle bearings after the wheels are in place.

The wing used on this model is the flat or single-surface type. A built-up wing may be substituted, but it is extremely doubtful if the added lift, gained by the double surface wing, will equal its added weight and drag.

Study the wing drawing, Fig. 6. Bend your two spars in one piece of balsa 1-8 by 3-16 by 26 inches long, by holding the center over steam. When the piece is dry split it lengthwise down the center to form two spars, each identical in shape and size. In order not to spoil the spars in splitting, guide your knife with a metal-edged ruler. Sand each to 1-8 inch wide and cut grooves on their top surfaces for the ribs (see Fig. 6).

Your wing tips are bent from one piece of bamboo 1-16 by 1-16 by 10 inches. You will find this longer than necessary, but it's hard to bend bamboo so that it will come out just right, and therefore you'll want some surplus length to trim off. Some builders bend their tips from a hot tin can of the right diameter. When you have obtained the desired shape, split the piece to form two tips 1-32 inch thick and 1-16 inch wide. These are fitted into small grooves cut out of the ends of the spars, so that the tip will form a smooth surface with the spars.

The 7 bamboo ribs, finished to 1-32 by 1-16 by 4 1-2 inches, are ambroided into the slots or grooves cut in the spars, so that they will lay flat with the top of the surface of the wing. Cover the wing, on the top side only, with Japanese Imperial tissue. If the paper is wrinkled, iron it and allow it to stand several hours to regain room temperature and moisture. Then cut out a piece slightly larger than the wing, paint the center rib with banana oil, and place the paper in position upon it. Then work from the center out, painting a section at a time and stretching the paper to remove wrinkles. Finally, trim the paper and smooth down the edges with another coat of banana oil. The three wing clips are clearly shown in Fig. 7. The large, or front ones, are 1-2 inch higher than the single one in the rear. This gives the wing the necessary angle of incidence—front to rear slant. Glue the two high clips on the front spar at equal distances from the center of the spar, so that the wing will not be longer on one side than the other. Glue the low clip on the rear spar, at the center.

When the wing clips are set, the three balsa pieces on the fuselage to which they clip, may be glued in place on top of the fuselage. The first two are 3-32 by 1-4 by 5 3-4 inches and the rear, or center one, is 3-32 by 1-4 by 6 3-4 inches long. Remember that these must be parallel and fit the clips tightly along their entire length or the wing will come off in flight. (The photographs and Fig. 1 show the position of the pieces.) Should they become worn with use, a long rubber band passed under the fuselage and over the wing and back under the fuselage will help to hold the wing in place.

COVERING the fuselage with tissue is a long job, but it isn't hard. Just take care, in cutting the paper to fit the various parts, to make neat joints. The tail surface is covered on the bottom side only, and the fin or rudder can be covered on either side. The section of the fuselage between F and the rear end is not covered, to allow you to get at the rear hook for winding.

Carve the propeller from a balsa block 7-8 by 1 1-2 by 10 inches. Before you begin, study the five stages shown in Fig. 9. Notice how the diagonals are drawn on both 1 1-4 inch faces and on the ends. The center hole is pierced with a pin or can be drilled with a small drill at the intersection of these top and bottom lines. B shows the surplus wood cut away from the diagonals, with 1-8 inch left at the center section or hub.

In C, notice how the front side of each blade is carved. This side isn't flat, but is hollowed out slightly—cambered—with sandpaper. D shows the blade finished except for rounding the tips. The hub has been cut and sanded until it is barely 3-32 inch thick, while the blades are less than 1-16 inch in the middle and barely 1-32 inch at the tips and edges. Notice that the widest part of the blade is about two-thirds of the distance from the hub, as this is the most efficient part of the propeller. A part of the trailing edge near the center has been cut away to save weight, since the center part is inefficient.

Insert the propeller shaft through the hub, as in E, Fig. 9, bend the end into a square U and push the U into the hub. A drop of glue on the top and bottom will prevent the shaft from pulling loose, or the bearings from wearing away the center of the hub. Two small hard brass washers are slipped over the hook to cut down the friction between propeller and bearing when the propeller is turning.

Your motor is a strip of 1-8-32 rubber thread, ten feet long, with the ends tied together in a square knot to form a long band. Fold this to make six strands. Drop one end into the hole in the nose of the fuselage and fasten it to the rear hook by means of the S hook. Hook the other end to the propeller shaft, and then slip it into the slot in the bearing. That operation finished, your ship is ready for flight.

And now the fun starts. Before you wind up the motor, glide the ship to the floor, and if it descends too sharply, set the wing forward a trifle. If it slants down, then tries to climb, and stalls, set the wing back. When you've finally adjusted your wing so that the ship glides to an easy landing, wind up the propeller. (You can wind it by hand, but an eggbeater winder, such as the one described in the January AMERICAN BOY, will make the job easy.) For your first flight, give the motor only 150 turns. Later, you can give it as high as 300 turns.

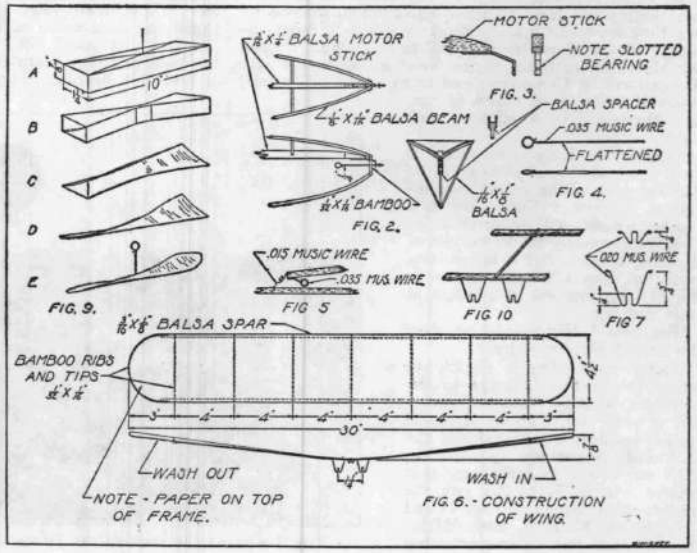
With a gentle forward push, from the height of your shoulder, launch your ship. Watch it closely. There's little chance, if you've followed directions with reasonable care, that you won't get a smooth, long flight. Remember, that for a commercial ship, a 20 second flight is excellent, and anything longer is noteworthy. You don't get your thrill, in this model, from its duration, but from its steadiness.

The Indoor Commercial Kit Costs Only $1.75

THE indoor commercial ship is here! The big, steady craft with an enclosed fuselage that looks so much like a transatlantic airplane! The kit supplied by the Airplane Model League of America, costing only $1.75, contains everything you need to construct one commercial plane, down to the nicely machined thrust bearing. This kit will save you hours of labor. It contains:

One 3-16 by 1-4 by 20 inch balsa motor stick	$ .05
Six 1-16 by 1-8 by 24 inch balsa strips for fuselage	.24
One 1-8 by 1 3-4 by 6 inch piece flat balsa for wheels	.05
One 7-8 by 1 1-2 by 10 inch balsa block for propellers	.08
Two 1-8 by 3-8 by 26 inch balsa spar for wing	.10
Three 1-16 by 1-4 by 15 inch bamboo strips for bamboo parts	.09
One ounce bottle banana oil	.15
One two-ounce can ambroid	.30
Two sheets Japanese tissue 21 by 31	.20
One propeller shaft, flattened	.10
One slotted thrust bearing	.10
Two hard brass washers	.02
One rear hook	.06
One spring support anchor	.06
3 inches of wire for axles	.02
Ten feet of 1-8-32 rubber	.15
3 wing clips	.18

To get the kit, send $1.75 in cash, money order, or check, to Merrill Hamburg, secretary of the A. M. L. A., American Building, Second Boulevard at Lafayette, Detroit, Michigan. If you want certain parts only, send the total price of the parts you wish, plus 15 cents to cover the cost of mailing. If you order only wire parts, send just five cents for mailing.



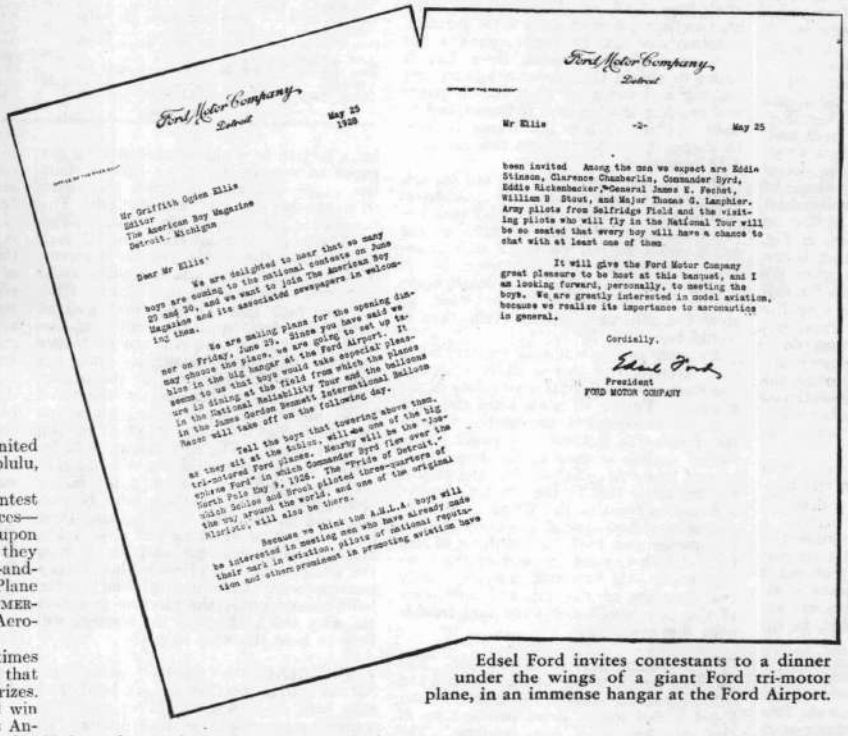
Construction figures 2 to 10

Reprinted from the June, 1928, Issue of THE AMERICAN BOY Magazine, Detroit, Mich.

Get Set for the Hop-off, Model Pilots!

The National Model Airplane Meet Is Only a Month Away

Edsel Ford.



Ford Motor Company
Detroit

May 25
1928

Mr Griffith Ogden Ellis
Editor
The American Boy Magazine
Detroit, Michigan

Dear Mr Ellis:

We are delighted to hear that so many boys are coming to the national contests on June 29 and 30, and we want to join The American Boy Magazine and its associated newspapers in welcoming them.

We are mailing plans for the opening dinner on Friday, June 29. Since you have said we may choose the big hangar at the Ford Airport. It seems to us that the boys would take especial pleasure in dining at the field from which the planes in the National Reliability Tour and the planes in the James Gordon Bennett International Balloon Race will take off on the following day.

Tell the boys that towering above them, as they sit at the tables, will be one of the big tri-motored Ford planes. Nearby will be the "Josephine Ford" in which Commander Byrd flies over the North Pole May 9, 1926. The "pride of Detroit," which Smiles and Brock piloted three-quarters of the way around the world, and one of the original Bleriots, will also be there.

Because we think the A.M.L.A. boys will be interested in meeting men who have already made their mark in aviation, pilots of national reputation and others prominent in promoting aviation have been invited. Among the men we expect are Eddie Stinson, Clarence Chamberlin, Commander Byrd, Eddie Rickenbacker, General James E. Fechet, William B. Stout, and Major Thomas G. Lamphier. Army pilots from Selfridge Field and the visiting pilots who will fly in the National Tour will be so seated that every boy will have a chance to chat with at least one of them.

It will give the Ford Motor Company great pleasure to be host at this banquet, and I am looking forward, personally, to meeting the boys. We are greatly interested in model aviation, because we realize its importance to aeronautics in general.

Cordially,

Edsel Ford
President
FORD MOTOR COMPANY

Mr Ellis -2- May 25

Edsel Ford invites contestants to a dinner under the wings of a giant Ford tri-motor plane, in an immense hangar at the Ford Airport.

A MIGHTY squadron is on the way.

From every part of the United States, from Canada, from Honolulu, they're coming.

On June 28, a day before the big contest officially opens, these model plane aces—champions in their own cities—will dive upon Detroit a thousand strong. At Detroit they will enter their rubber motored, balsa-and-bamboo ships in the National Model Plane Flying Meet to be conducted by THE AMERICAN BOY magazine for the National Aeronautic Association.

Great spoils, strong competition, big times are awaiting them. Out of the thousands that come, more than two hundred will win prizes. Two will win trips to Europe! One will win a trip to the National Air Races at Los Angeles! Scores will capture part of the $3,000 in cash. Others will carry away free trips to summer camps, free tuition in home study aviation courses, innumerable medals and certificates!

Every entrant, whether he wins a prize or not, will witness the take-off of the famous James Gordon Bennett International Balloon Race and the National Air Tour; he'll visit Selfridge Field, eat mess in Army dining halls as guests of the famous fliers of the First Pursuit Group and Colonel Charles H. Danforth, commandant of the field; he'll go through an airplane factory. If *you* come:

On Friday night, you'll sit down to a banquet table as the guest of Edsel B. Ford and the Ford Motor Company, in an immense hangar at the Ford Airport. The spreading wings of a huge Ford trimotor plane similar to the one in which Commander Richard E. Byrd will fly over the South Pole will be hovering over you, and off to one side the time-battered form of one of the original Bleriots. A plane just like this one, back in 1909, first hopped the English Channel. At the banquet you'll have a chance to meet, personally, your host, Edsel B. Ford, who is greatly interested in model aviation; you'll meet Clarence Chamberlin, famous for his New York to Germany flight; William B. Stout, designer of the Ford trimotor, all-metal plane; William P. MacCracken, head of the aviation division of the Department of Commerce, and many other air leaders! You'll be sitting in tables of ten, and there will be a pilot at *each table*.

Outside the hangar, as you eat, mail and commercial planes will be landing and taking off at the immense airport. Pilots in their leather helmets will be strolling by. You'll be squarely in the middle of a center of air activity, fraternizing with the men who are responsible for the development of aviation in this country.

Big times! History-making days for model plane builders!

Every model fan is eligible to enter provided he belongs to the Airplane Model League of America or some other group of model plane builders recognized by the National Aeronautic Association. The safest way to make sure that you're eligible is to fill out the membership coupon on page 48 and join the A. M. L. A. now. Membership costs just a two-cent stamp and entitles you to valuable privileges.

The cost of attending the meet is low—just the round-trip railroad and Pullman fare plus about $20—or less—for expenses in Detroit. Any indoor or outdoor plane, powered with a rubber motor, that will stay in the air two minutes has a good chance of winning a prize.

Your first step, if you are planning to come to Detroit, is to read up on the rules in the April AMERICAN BOY. Familiarize yourself with the three main divisions of the contest, the rules governing them, and the list of prizes offered in each. If you've mislaid your April issue, you may get a reprint containing full contest rules and general information by writing to the A. M. L. A., American Boy Building, Second Boulevard at Lafayette, Detroit. Be sure to enclose a two-cent stamp for return postage.

Your next step is to arrange to get your expenses paid. If a newspaper in your city is co-operating with the A. M. L. A. by staging a local contest, you may enter that, and thus compete for the chance to come to Detroit. If there is no local contest, fly your plane for an adult—perhaps your manual training teacher, scout leader, the secretary of your local air board or chamber of commerce—and interest him. Show him the April and June issues of THE AMERICAN BOY. Tell him, frankly, that you'd like to represent your city at this national meeting of airplane model builders. You'll win a favorable hearing. There's nothing so convincing to a group of adults as the smooth flying qualities of an indoor endurance tractor or an outdoor twin pusher! If you have qualified for an honor certificate, show them that.

Your final step—after you've found an organization to sponsor you and pay part or all of your expenses—is to send for entry blanks, (see Page 67, this issue), and send them to the Director of the Airplane Model Meet, American Boy Building, 550 West Lafayette Blvd., Detroit.

You may enter the scale model contest without coming to Detroit. Since scale models are not flown, but are judged purely on neatness of workmanship and their similarity to the man-carrying ship after which they're patterned, they can be fairly judged without the builder's presence.

All you have to do is to box your model carefully, and send it, *express prepaid*, to the *Scale Model Contest Director, Convention Hall, Detroit*. Be sure to include your complete return address both on the outside of the box and on a slip of paper attached to the plane. Ship your boy to reach Convention Hall by June 20. At the same time, fill out the scale model entry blank (the announcement on Page 67 tells you how to get it) and mail it with a dollar to the same address—the Scale Model Contest Director, Convention Hall, Detroit. The dollar is to cover the expenses connected with the handling of your ship. While the directors of the contest cannot guarantee that your model will come back to you entirely undamaged, they will take special care in the packing to assure its safe, return. Your dollar will cover this and other handling expenses. Be sure to enclose it, cash or check, in the letter containing your entry blank. . . . Your plane will be returned to you, express collect, soon after the contest is over.

While scale model builders need not accompany their planes to Detroit, you may come if you wish. In that case you may bring your planes with you. But be sure, just the same, to send your entry blank with the dollar enclosed to Convention Hall by June 20! The directors must know in advance how many entries there'll be.

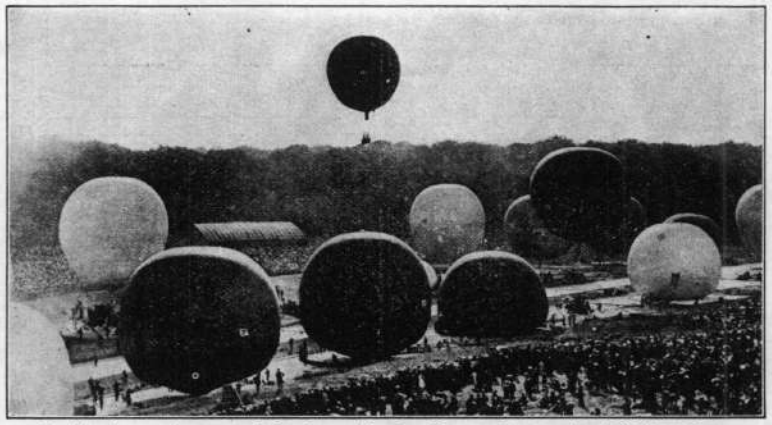
Keep in mind these cautions in connection with the scale model meet. Box your plane stoutly because the same box will be used to ship it back to you. Be sure to send your plane *all assembled*—don't trust anyone else to assemble it for you after it gets here. Don't fail to have your name and return address plainly painted on the outside of the box.

THE AMERICAN BOY and associated newspapers have described the construction of the Curtiss Army Hawk, the Ford Trimotor transport and the *Spirit of St. Louis* scale models. If you are sending to the contest scale models of other ships, you must send with them detailed manufacturer's drawings to enable the judges to make their decisions.

If you're entering either the indoor or outdoor flying contests, obtain the proper blank and send it in by June 20.

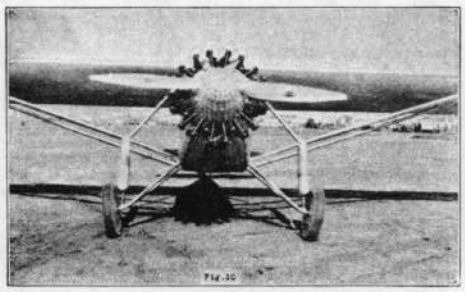
During the two days of the contest, there will be meetings of the members of the A. M. L. A. at which officers will be elected and plans laid for the coming year. Every member of the A. M. L. A. who attends will be considered a delegate from his city and will have a vote in the election of officers.

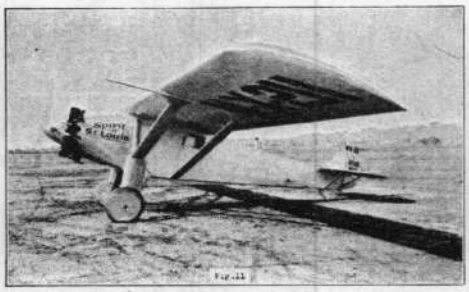
The League has arranged for delegates to obtain round trip passage at fare and a half on all railroads in *(Continued on page 3)*



You'll witness the start of the James Gordon Bennett International Balloon Race.

Build a 24-inch "Spirit of St. Louis"





Here's Lindbergh's plane, the front view showing the landing gear, and the side view showing the markings.

By Merrill Hamburg

Secretary of the Airplane Model League of America

ON the morning of May 20, a year ago, at exactly 7:52 o'clock, Charles Lindbergh, air mail pilot, took off from Roosevelt Field, Long Island. Thirty-three hours later, he landed at Le Bourget, outside of Paris.

On the way, he battled sleet, periodic storms, and immense banks of fog too high to fly over and too large to fly around. At times he was flying ten feet above angry whitecaps whipped up by a northwest wind. At other times, he was up 10,000 feet.

His plane, *Spirit of St. Louis*, weathered the trip without missing a beat and landed at Paris in good condition. But when the welcoming crowd pressed in upon the pilot to carry him triumphantly to Ambassador Herrick, the ship was in greater danger of destruction than it had been at any time during the hazardous trip. Parts of the plane began to crack from the pressure of the mob, before a group of soldiers and police encircled it and hauled it to safety.

Luckily, the graceful silver ship lived through the ordeal with only slight damages and was returned to this country to bear the human half of "We" on tours of the United States and Central America.

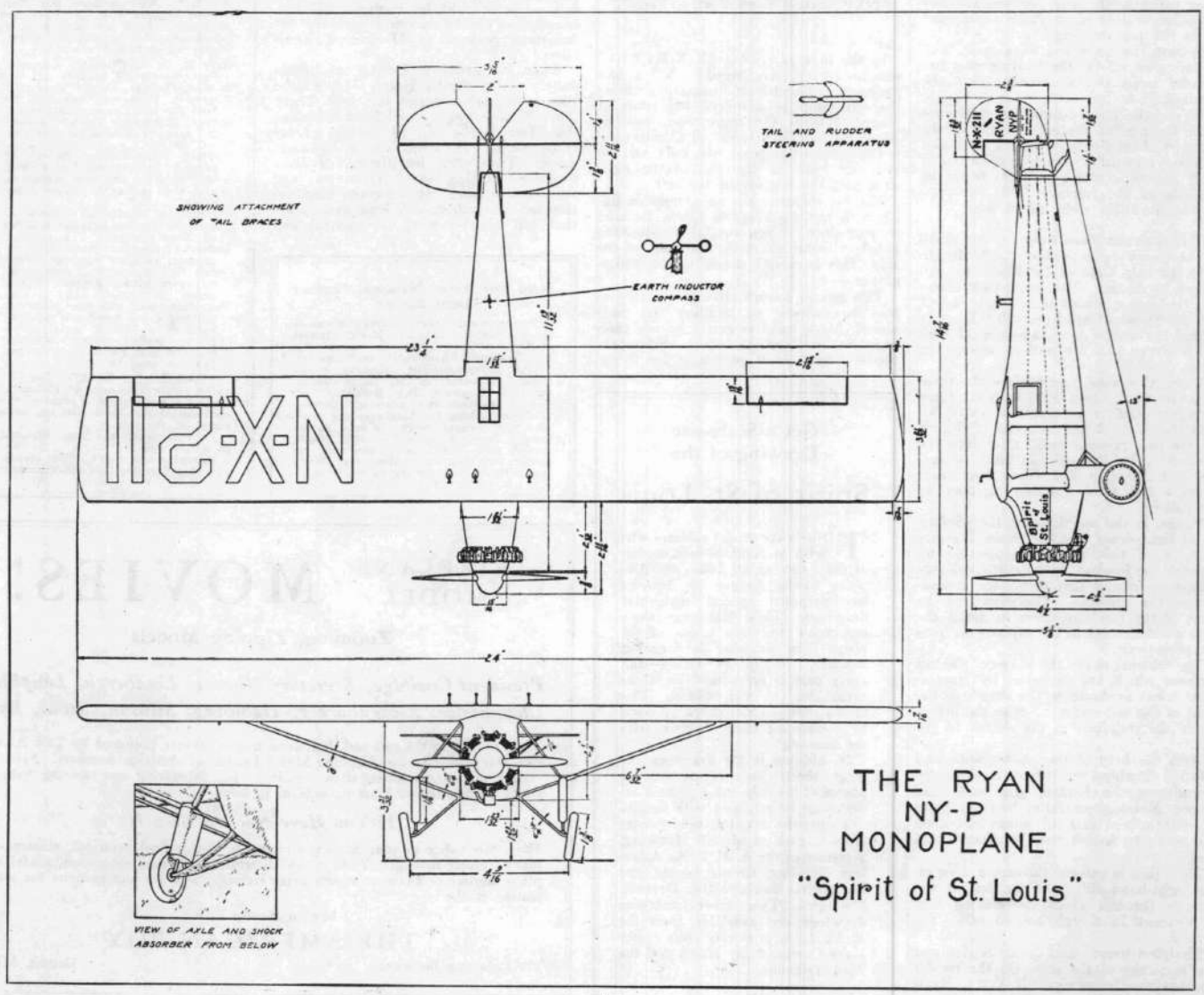
During the past year, the mechanical half of "We" has been duplicated by thousands of boys in their airplane model workshops. Many of the models have borne a close resemblance to the big ship. The only similarity achieved by others has been in the now famous identification mark "N-X-211." It is safe to say that none of the models has reproduced the *Spirit of St. Louis* exactly to scale.

Now, through the courtesy of B. F. Mahoney, president of the Ryan Airlines, and Donald A. Hall, its chief engineer, THE AMERICAN BOY presents to model plane builders a scale model that duplicates exactly in detail and proportion the *Spirit of St. Louis*.

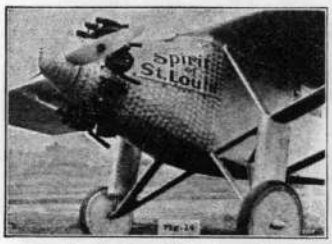
The drawings in this article are scaled down to 24 inches from drawings of the large plane furnished by the manufacturers. All dimensions are given in inches. From these drawings, and the accompanying photographs a builder with ingenuity can construct an exact duplicate of the famous New York to Paris ship.

As a further help, you may obtain from the Airplane Model League of America scale-size drawings of the plane. You may use any part of this large drawing as a template, or pattern, in the construction of your model. It gives you the exact wing section —cross section of the wing. In addition, it carries photographs and a printed explanation of a number of details. To get this drawing, send 20 cents to A. M. L. A. headquarters, American Building, Second Boulevard at Lafayette, Detroit, Michigan. Be sure to ask for the scale size drawings of the *Spirit of St. Louis*.

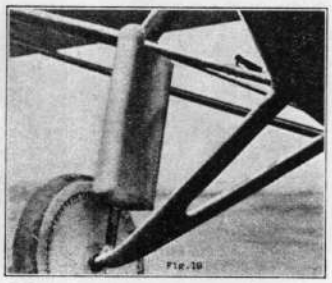
When Charles Lindbergh set out to find an airplane to which he'd entrust his life, he specified that it should be a monoplane powered with a single Wright J-5-C engine; that it should be able to take off, with plenty of power reserve, when loaded with 400 gallons of gasoline; and that the pilot should be located in rear of all tanks for safety in a forced landing.



Build a 24-inch "Spirit of St. Louis"



Duplicate the polished metal nose.



Note the smooth, streamlined struts.

"NYP" means "New York to Paris!"

These specifications involved such radical changes in design that the Ryan Airlines, to whom Lindbergh went, decided to design a new plane rather than use the standard Ryan M-2. That's why it may safely be said that there is only one *Spirit of St. Louis.*

Colonel Lindbergh's ship has a fuselage that's two feet longer than the standard M-2. It is constructed of steel tubing and is covered with fabric.

The wing span is 10 feet greater. The wing ribs are placed more closely together—they measure 11 inches from center to center. The ailerons are smaller and farther in from the wing tips. The wing section is the Clark Y—the same section as that used on the Army Hawk—and the wing tips are shaped just like the upper curve on the wing section. This becomes more clear when you examine the tip in the top drawing.

To suit the increased wing span, and for increased safety, the landing gear has a wider tread and is stronger than the standard M-2.

But far the most astonishing difference is the location of the pilot's cabin in the rear part of the fuselage, behind the tanks, with no forward visibility except by a small periscope which projects from the left side of the fuselage. This periscope may be drawn in when not in use.

THE drawings show every detail that's necessary to reproduce faithfully to scale the ship Colonel Lindbergh himself helped to design. The front view shows you the motor, which is a Wright J-5-C, and the Standard Steel propeller. Directly behind the engine is a 25-gallon oil tank which serves as a fire wall to protect the pilot.

Above this wing, you can see the three caps for the gasoline tanks with the three air vents sticking up from the caps. Behind the oil tank and in front of the pilot are two gasoline tanks built into the fuselage. The forward one holds 88 gallons and the other, 210. Three wing tanks increase the total gasoline capacity to 450 gallons.

Notice, in the top drawing, the window to let light down into the cabin. Directly in back of this window, projecting up through the fuselage, is the earth inductor compass windmill that drives the generator for the compass. The sketch to the right of the fuselage shows in detail the cups which revolve in the slip stream from the propeller.

The drawing shows the shape of the tail surfaces which are operated by streamlined horns as shown in the sketch to the right of the tail surface. Notice the braces under the stabilizer in the sketch to the left.

With the help of the photographs and detailed drawings, you'll have no difficulty reproducing the landing gear and wing braces. Notice, especially, how all parts are streamlined and all joints smoothed out so as to reduce wind resistance and drag.

The cabin is entered through a door on the right-hand side. At the left is the window through which the smiling face of Colonel Lindbergh has so often appeared.

The photographs and drawings give you the markings of the ship. On the rudder appears the following: "N-X-211. Ryan NYP. Mfg. by Ryan Airlines, San Diego, Calif."

In the famous symbol "N-X-211," "N" signifies "U. S. Registered." "X," a Department of Commerce designation, means that the ship is a special experimental plane. "211" is the registration number issued by the Department of Commerce.

This symbol appears not only on the tail, but both on the top of the right wing and the bottom of the left.

The entire plane has an aluminum finish with the markings in black. Be sure to reproduce, if you can, the distinctive polished metal effect at the nose of the ship. This is clearly shown in the photographs.

This article doesn't attempt to tell you how to proceed in building the scale model. Most builders prefer to use their own method and materials. Since the model is not built primarily for flying, weight is not a factor. The important part of the job is to reproduce the exterior of the ship as exactly as possible.

If you wish, you may carve the fuselage from a solid block of white pine or balsa. Some builders will construct a framework similar to the framework of the man-carrying ship. Use your own tools and plan your own procedure. The job won't be difficult if you follow the drawings and the photographs closely.

Some builders will try to construct this scale model to fly. If they do, they'll find it an easier job than the Ford Tri-motor or Curtiss *Hawk,* because the wing on the *Spirit of St. Louis* is farther back to balance the extra gasoline tanks. If you build the plane as lightly as possible of balsa, power it strongly, and add weight to the front of the ship, it's entirely possible to get it to fly.

But whether you achieve a flying model or not, you may enter the *Spirit of St. Louis* in the scale model division of the National Airplane Model Meet to be conducted by THE AMERICAN BOY in Detroit, June 29 and 30. Entry blanks for the contest may be found in this issue. Prizes for the scale model contest include a trip to the National Air Races, to be held in Los Angeles this fall, trophies, $1,000 in cash, and scores of medals and certificates.

Get a Scale-size Drawing of the

Spirit of St. Louis

TO help the model aviators who wish to build 24-inch models of the *Spirit of St. Louis,* the Airplane Model League of America has prepared special scale-size drawings. These drawings show top, front and side views of the plane. The drawing is large—it measures 30 by 36 inches—and every part is reproduced on it the actual size you will build it. This means that you can check all parts by comparing them directly with the drawing!

In addition to the drawings, the large sheets have a number of photos of the ship and a printed explanation to help you with details.

To get the drawing, send twenty cents in cash to Merrill Hamburg, Secretary of the A. M. L. A., American Building, Corner Second and Lafayette Boulevards, Detroit, Michigan. Two other scale-size drawings are available from the A. M. L. A. at twenty cents apiece—the Curtiss Army Hawk and the Ford Trimotor.

Get Set for the Hop-off, Model Pilots!

(Continued from page 1)

the United States. You must have a certificate, (*not* a receipt), obtained at the time you buy your ticket to Detroit. Full details of the reduced fare privilege will be sent you when you write for your entry blanks.

Try to arrive in Detroit not later than Thursday morning, June 28. You can make good use of an extra day, to adjust your models and tune them up for those championship flights. Also, indoor and outdoor preliminaries, for early arrivals, may be held on Thursday. There'll be interesting events scheduled for Thursday afternoon—among them the showing of a motion picture that reduces the travel of a bullet to slow motion! With this picture, there'll be an extremely interesting talk on aeronautics by Professor Klemin, secretary of the Aeronautic Division of the American Society of Mechanical Engineers.

When you arrive in Detroit, go immediately to the Statler Hotel. This will be your headquarters during the meet. There you will meet Gurney and Fred Williams, the "Two Boobs Abroad" whose adventures you have been following in the magazine. (There's an installment of their escapades in this issue.) These two will register you, give you complete information on the contest, and issue you passes that will admit you to the exciting and extremely worthwhile events with which your two great days in Detroit will be jammed.

Send For Your National Contest Entry Blanks

You may enter three separate divisions in the National Airplane Model Contest at Detroit, June 29-30—the indoor flying, outdoor flying, and scale model. Write, today, to the Airplane Model Contest Director, A. M. L. A. Headquarters, American Boy Building, Second Boulevard at Lafayette, Detroit, Michigan, asking for blanks in the divisions you wish to enter. Be sure to enclose a two-cent stamp for reply. You'll receive your blanks by return mail, together with full instructions for obtaining reduced fares on the railroad.

Build These Model Planes

A.M.L.A. Supplies Kits at Cost

During the past nine months, THE AMERICAN BOY has described the construction of nine types of model airplanes—six flying and three scale models. Kits for each of the six flying types and scale drawings for the three scale models are available from the Airplane Model League of America at the following cost prices. To get them, send the proper amount, in cash, check, or money order, to Merrill Hamburg, Secretary of the A. M. L. A., American Boy Building, Second Boulevard at Lafayette, Detroit, Michigan. Each kit contains complete instructions for building the plane, plus all needed parts and materials.

Baby R. O. G. (Rise Off Ground). Record over 80 seconds ..... $ .65

Indoor Pusher. Record over 200 seconds. Flies with propeller *behind* the wing, pushing the ship.. .65

Indoor Endurance Tractor. Record 207 seconds. This is the best contest model ..... .75

Outdoor Twin Pusher. Record 10 minutes 14 seconds. Has 35-inch built-up wing and two propellers, with same section as Curtiss Army Hawk 3.00

Hydroplane. Record 2 minutes 52 seconds. Has two propellers. Rides on three pontoons. 2.50

Indoor Commercial plane. Has triangular, enclosed fuselage. Looks and flies like a big, commercial transport plane. Record 50 seconds 1.75

The following scale-size drawings showing every detail you need for building a 24-inch scale model, (these models closely resemble man-carrying ships, but do not fly) are available at ..... .20

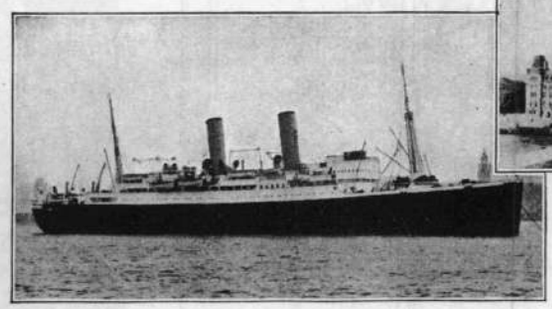
"Spirit of St. Louis." The *first* accurate scale drawings of Colonel Lindbergh's famous plane. Furnished through courtesy of the Ryan Airlines, manufacturers of the ship.

Ford Trimotor, the huge, all-metal, 14-passenger ship.

Curtiss Army Hawk. The speedy pursuit ship that flies 170 miles an hour.

Montreal—Then Europe!

America's Airplane Model Envoys Will Fly Their Ships for High Canadian Officials—What A.M.L.A. Members Are Doing—Build an Indoor Seaplane



The winners will fly their planes at the Parliament Building in Ottawa. Then to Liverpool on the *Montcalm*.

THE eyes of all airplane model builders are turned, these days, on Detroit. In that city, on June 29 and 30, national indoor, outdoor, and scale model champions will be decided at the First National Airplane Model League of America meet.

And on June 30, will be selected the two entrants, under 21 years old, who, by placing highest in the indoor and outdoor contests, win the right to go to Europe as guests of THE AMERICAN BOY, to exhibit their ships in London, Paris, and Geneva.

Full details of the contest have already been carried in the April and June issues. Watch Detroit for news of 1928 champions!

"Every entrant must bring to the contest a copy of his birth certificate," says Griffith Ogden Ellis, general manager of the contest. "He'll need it for his passports if he is selected to go to Europe. He may obtain a copy from the county clerk of the county in which he was born."

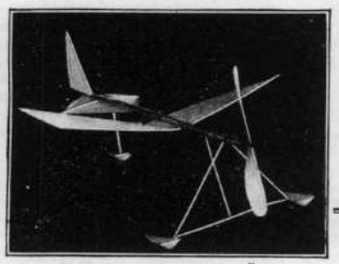
Perhaps you will be one of the two lucky builders who will represent 200,000 members of the Airplane Model League of America in Europe. In that event, Monday night, July 2, you'll stow your luggage under a comfortable seat in a Canadian Pacific sleeper. With you will be Merrill Hamburg, secretary of the Airplane Model League of America, and the other winner.

Tuesday morning, you'll wake up in Toronto, but you won't stay there long. You'll cross Lake Ontario for a day at Niagara Falls where you'll ride the *Maid of the Mist*, go behind the rushing falls into the Cave of the Winds, and cross high above the rapids on the suspension bridge.

Tuesday night, you'll go back to the King Edward Hotel in Toronto for a good rest in preparation for a busy day.

Wednesday, July 4—an official welcome by the Mayor and city officials in the Mayor's office; a visit to the homes of the Lieutenant Governor and Prime Minister of Ontario where you will fly your planes; a luncheon as guests of civic bodies; a sight-seeing trip over the city; a banquet; and a Canadian Pacific train for Ottawa, capital of the Dominion of Canada, late at night!

In Ottawa, there'll be exhibitions for the Mayor, for the Governor-General at his beautiful home, and for the Prime Minister at the imposing Parliament building. Then an official luncheon, meetings, sight-seeing and a short jaunt that lands you in Montreal, the port of Canada, at seven-thirty.



This seaplane will rise from a pool or a water trough.

Friday morning, you'll have a short two hours for sight-seeing through the historic city before you board the Canadian Pacific Steamship Company's liner, *Montcalm*.

With Canada's wholehearted *bon voyage* ringing in your ears, you'll steam down the St. Lawrence at eleven, stop at the turreted city of Quebec and then go down the widening river to the sea. It was at Quebec 170 years ago, that the French General Montcalm —after whom your boat was named—and the English general, Wolfe, both fell mortally wounded on the Plains of Abraham.

While the *Montcalm* is your home, you will occupy cabin Number 300, a spacious outside cabin halfway between stem and stern. You'll get deep into the life of the ship—the deck games, concerts and shows—and you'll add to the fun by introducing to the passengers the smooth flying qualities of your models.

AFTER a week on the ocean, Liverpool, and all the thrills of England and the continent, just beyond.

That's the program for the two lucky winners. For the others, a share in the $3,000 in cash prizes, the trophies, medals, free trips to summer camps, to the National Air Races at Los Angeles, and free home study aviation courses.

Many summer camps, this year, are planning to include in their program the building and flying of airplane models. A number of them have appointed experts to conduct the work, and have written to the A. M. L. A. to get plans for indoor, outdoor and scale models, as well as necessary materials such as balsa, Japanese tissue, rubber, bamboo, banana oil, and cement. If you're going to a camp this summer, and your director isn't planning to include airplane model building, why don't you suggest it? Perhaps he simply hasn't thought of it. Tell him to write for information as to how the A. M. L. A. may help him, to Merrill Hamburg, Secretary of the A. M. L. A., American Boy Building, Second Boulevard at Lafayette, Detroit.

"Our camp's going to build models," writes one member, "and we're going to put most of our time on the hydro described in the March AMERICAN BOY. We've got a peach of a lake for it to take off from."

By next fall, experts predict, there will be more than a half million boys building and flying model planes. Already, the A. M. L. A. has 200,000 members, most of them high school students. One of the newest members, however, is Marine Engineer A. L. Jackson, of the Great Lakes steamer, *Peter Reiss*.

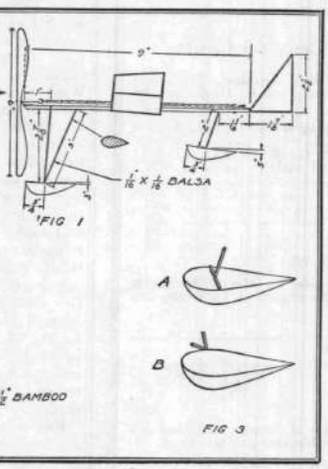
"Ever since early boyhood," writes Mr. Jackson, "I have cherished the secret ambition to build a model airplane that would actually fly under its own power."

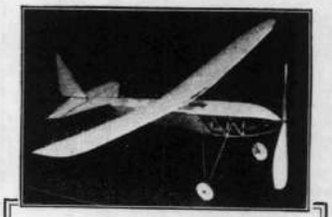
Now, at last, he's going to realize his dream. He's bought a Baby R. O. G. kit and joined the League. And this summer, while he's sitting down alongside the powerful engine that drives his steamer from Duluth to Buffalo, he'll be bending bamboo and covering wings with Japanese tissue.

Speaking of bamboo, reminds us that one of the jobs of the A. M. L. A. is to act as a clearing house for the inventions and ingenious construction methods devised by its members. One of the best suggestions we have heard in a long time has to do with bending bamboo for the rudder. It comes from George Miller, of Cleveland, Ohio.

"Make a drawing of the rudder on a board," writes Miller. "At the three places where the rudder curves, nail corks to the board on the inside of the curve."

The idea is to soak your rudder in boiling water and bend it around the three corks. But to keep the strip of bamboo in place, you drive (*Continued on page 46*)





Keep Step With the Progress of Model Aviation!

An Elmira, New York, boy has flown an outdoor twin pusher over fourteen minutes! A Detroit boy has successfully designed a trimotored indoor plane! Another has fitted pontoons to his Baby R.O.G. Every day brings word of fascinating new developments in the science of building and flying model planes.

Keep step with this progress in THE AMERICAN BOY. In this issue you'll learn how to revise your Baby R. O. G. to take off water. Later this summer, in a regular A. M. L. A. department, you'll be introduced to new experiments, new flying tricks to try on your present ships.

In the fall you'll start on a completely new series of construction articles by Merrill Hamburg, secretary of the Airplane Model League of America. They'll describe new scale models, indoor and outdoor planes capable of greater indurance records!

GREAT TIMES AHEAD FOR THE MODEL PILOT!

in nails along the outline of the rudder. Then you simply leave the bamboo there until it cools.

"When you lift it out," asserts Miller, "you have a rudder frame that is curved just right and isn't the least bit crooked."

Good idea, Miller! Many thanks from the hundreds of us who have difficulty bending the tricky strips!

Scores of A. M. L. A. members are sending in fifty cents to obtain the official gold plated wing insignia.

Which reminds us that you may now obtain a beautifully printed two-color charter, officially signed and sealed, if you send to League headquarters the names

Build a Baby R. O. W.

ONE of the most interesting experiments you can try on your R. O. G. is to convert it into an R. O. W. (Rise Off Water.)

The accompanying plans tell you how to construct a successful indoor seaplane either by adapting your R. O. G. or by building a new ship. The drawing differs materially from that of the R. O. G. It shows a square wing tip and a triangular rudder—especially helpful for the fellows who have trouble bending bamboo.

When You Build NEXT YEAR'S MODELS

you'll want expert instruction. You can have it if your club adviser or manual training teacher attends the Summer Short Course to be conducted by THE AMERICAN BOY and the Airplane Model League of America in Detroit, Monday, August 27, to Saturday, September 1. Merrill Hamburg, League secretary, will be in charge; William B. Stout, Eddie Rickenbacker and other aviation leaders will assist. The only cost will be for materials used, and living costs. Tell your teacher to write to the Short Course Director, THE AMERICAN BOY, 550 Lafayette Boulevard, Detroit, Mich. Under expert supervision—

You'll Have a Whale of a Chance at Winning Local Honors!

The materials you'll need are listed on this page. They're all included in the R. O. W. kit that you may buy at cost.

Before you start work, study the drawings and photographs. Notice that the leading edge of the left wing is warped up and the leading edge of the right wing warped down. This is called washin and washout. It overcomes the torque—or twisting power—of the propeller in a manner more fully described in the April issue of THE AMERICAN BOY.

Note, too, that the leading edge of the wing is longer than the trailing edge. Such a wing is said to have positive rake. When the trailing edge is longer, the wing is said to have negative rake. The positive rake tip is the most efficient.

You may use either your R. O. G. wing, or build the type shown in the drawing. The span is 12 inches, the chord, 2 inches.

The motor stick in the drawing is one inch longer than the Baby R. O. G. The tail surface, which is 3½ inches long and 4 inches wide, is constructed just as was that of the R. O. G. except that the crosspiece may be made of 1-16-inch square balsa, 4 inches long—instead of bamboo—to save weight. The distance from the crosspiece to the rear point of the tail surface is 1¼ inches.

All surfaces on the R. O. W. must be waterproofed. Three coats of banana oil will do the trick nicely.

In order to give the R. O. W. sufficient power to rise off the water, you must use a larger rubber than that of the Baby R. O. G. The motor furnished in the R. O. W. kit is ⅛-inch flat and 18 inches long. That's strong enough.

Your R. O. W. propeller is 6 inches long instead of 5 as in the R. O. G. The stronger rubber permits you to use a larger prop.

The chief difference between the two ships is in the landing gear. The R. O. W. has three floats, constructed of a bamboo frame, covered with tissue and connected to the fuselage with 1-16 by 1-16 balsa struts.

Fig. 2 gives you the exact size and shape of the bamboo frame. You already know how to bend bamboo to a drawing and glue the joints with ambroid. If you don't, the R. O. G. instructions in the kit will explain.

Assembling the gear is easy routine. The front and side views of Fig. 1 show it plainly. Fig. 3, A, shows in detail how the rear pontoon is connected.

It's necessary to set all floats at an angle to the fuselage. The front floats have an angle of about 3 degrees and the rear one, 5 degrees. Notice, in Fig. 1, that the support of the rear float is shorter than the front, so that when the plane is resting on the water the nose points upward.

When your ship is completely assembled, go down to your high school pool. Take care when you set it in the water that you do not submerge the pontoons—it's an easy trick to do, and doesn't help the pontoons any. If the pool isn't available, a shallow wooden box several feet long and a few inches deep will give you enough water for a take-off. Don't fly the ship outdoors except on calm days.

It will be well to fly the plane, hand-launched, several times, until the wing is set exactly right.

Once you've completed a 12-inch model that will circle around the room, dripping water from its pontoons, you'll feel like a full-fledged naval aviator!

Building an R. O. W. is the first of many experiments in model aviation that you'll find each month in the regular A. M. L. A. department of the magazine. In addition to the construction hints and drawings, the department will quote interesting letters from members over the country. If you have a plane of new design, a special process, or a ship that will perform exceptionally, tell us about it. Write to A. M. L. A. Editor, AMERICAN BOY Magazine, 550 W. Lafayette Boulevard, Detroit, Mich.

Get the Indoor Seaplane Kit—It Costs Only 65 Cents

HERE'S what the kit for the Baby R. O. W. (Rise Off Water) contains. The prices of the individual parts are listed in case you want to convert your R. O. G. into an R. O. W. and therefore want only part of the kit.

2 balsa motor sticks 1-8 by 1-8 by 9 inches (one inch longer than the R. O. G.)	$ .05		
2 balsa wing spars 3-32 by 5-16 by 12 inches	.05		
2 propeller blocks 1-2 by 5-8 by 6 inches (one inch longer than the R. O. G.)	.06		
1 strip of balsa 1-16 by 1 by 6 inches for landing gear and tail surfaces	.05		
1 piece bamboo 1-8 by 1-4 by 12 inches	.02		
1 sheet Japanese Imperial tissue	$ .03	1 propeller shaft	.05
1 flat rubber motor 1-8 by 18 inches	.02	1 rear hook	.05
1 bottle of ambroid	.10	2 brass washers	.02
1 one-ounce bottle of banana oil	.15	2 wing clips	.10
1 can	.05	1 front bearing	.05

Complete directions for building both the R. O. G. and R. O. W.

To obtain the kit, send 65 cents in cash, check or money order to Merrill Hamburg, secretary of the A. M. L. A., American Boy Building, Second Boulevard at Lafayette, Detroit. If you wish only part of the kit, send the total cost of the parts you wish plus five cents for mailing.

You must, however, belong to the A. M. L. A. to be eligible to buy these materials at cost. To join, just fill out the coupon and send it, with a two-cent stamp, to Merrill Hamburg.

AIRPLANE MODEL LEAGUE OF AMERICA,
American Building
Corner Second and Lafayette Boulevards,
Detroit, Michigan.

_____ 19____

Gentlemen:

Please enroll me in the Airplane Model League of America. Enclosed is a two-cent stamp to cover postage on my membership card and button.

Sincerely,

....
Full Name Street Number

....
Age City

Model Planes are Soaring Down the Corridors of Congress!

WHEN they're not running errands for the dignified, gray-haired gentlemen who make the laws of the land, these four fellows—pages in the United States Senate at Washington—are building and flying airplane models. Charles A. Hearn, Thomas E. Rogers, George Carricks and Schuyler Young—they're all members of the Airplane Model League of America and they're planning on entering their ships in the National Flying Meet, to be conducted by THE AMERICAN BOY in Detroit, June 29 and 30.

Elsewhere in this issue are full final details of the contest. Look for it—and in the meantime, if you're not already a member, fill out the accompanying coupon, and send it with a two-cent stamp, to League headquarters. Membership gives you the privilege of using the League's free question and answer service and of buying model plane supplies at cost, and makes you eligible to enter the big contest.

Join the Airplane Model League of America

March, 1928

Build Flying Models and Win Honor Certificates

THEY'RE rolling in—those applications for honor certificates. Boys all over the country—members of the Airplane Model League of America—who are building the planes being described in THE AMERICAN BOY, are winning recognition from Commander Richard E. Byrd, William B. Stout, and other leaders in aviation for their skill in model aviation.

Here are the first six winners. All of them constructed Baby R. O. G. planes that made flights of over 30 seconds, before competent witnesses:

Harley Rich, 1309 Forest Avenue, Knoxville, Tennessee; Burton Simcox, 805 Walnut Street, Knoxville; Charles D. Warner, Bridge Street, Southville, Massachusetts; Emil Mentel, 3113 East 116th Street, Cleveland, Ohio; Harold Kramer, 926 West Walnut Street, Shamokin, Pennsylvania; and John Dawson, 1102 Oakton, Evanston, Illinois.

Any boy who builds a Baby R. O. G. that flies over 30 seconds, an indoor pusher that will remain in the air 65 seconds; an indoor tractor that will stay up 100 seconds; or an outdoor pusher that will make a flight of 120 seconds, is eligible to receive an honor certificate, beautifully engraved on ripple stock, and bearing the official seal of the A. M. L. A. and the signatures of its officers. Write to Merrill Hamburg, secretary of the A. M. L. A., American Building, Second and Lafayette Boulevards, Detroit, Michigan, and ask him for an honor certificate application. Be sure to enclose a two-cent stamp for your reply.

Every model aviator who wins honor certificates is going to be a formidable contender for flying honors at his local flying meets. And he'll be among the best bets to go to Detroit, next June 29 and 30, to compete in the national official indoor and outdoor flying contests that the National Aeronautic Association has designated THE AMERICAN BOY to conduct.

(Full details of the national contest will be published in an early issue.)

If you have missed building some of the smooth-flying types of planes described in the magazine, you'll want one or more of these past issues: the October number, containing full plans and instructions for the Baby R. O. G., the indoor ship with the 12-inch wingspan that will fly for 50 seconds; the November issue, with plans for the indoor pusher, which flies over two minutes; the December magazine, in which are plans for the indoor tractor, the contest model that has a record of nearly three minutes; and the January issue, containing plans for the outdoor twin pusher that has flown for over 10 minutes! These issues you can get by sending 20 cents, for each, to the circulation department of THE AMERICAN BOY, 550 West Lafayette Boulevard, Detroit, Michigan.

To get the most out of model aviation, join the Airplane Model League of America. Your membership, which costs nothing but a two-cent stamp, makes you eligible to receive those honor certificates, to use the league's free question and answer service on airplane model building and aviation, and to buy parts and materials at cost. Your card and button link you with Commander Richard E. Byrd, William B. Stout, Clarence Chamberlin, and other great leaders in aviation.

Fill out this coupon, and join forces with 60,000 other model aviators, *now*.

Grade in School

Flight Records Are Going Smash!

A. M. L. A. Headquarters Is Busy Issuing Honor Certificates.

MODEL airplane builders are striding forward with seven-league boots! Less than a year ago, just before the Airplane Model League of America was organized, the world's indoor record for length of flight was 173 seconds. This mark was attained with an indoor tractor. The small Baby R. O. G. (Rise Off Ground) had never done better than 55 seconds, and the indoor pusher not much more than 160.

A big ship? Nope. Just a model of the Curtiss Hawk, taken on a tennis court by the Y. M. C. A. Model Flyers' Club, Rock Island, Illinois.

Orville Wright and Charles L. Lawrance, designer of the Wright Whirlwind motor for ocean flying, examining the planes of Philadelphia modelers.

Here's Clarence Chamberlin examining a model of the ship that carried him from New York to Eisl-ben, Germany. Carl Fastje, expert model builder in Chamberlin's home town of Denison, Iowa, built and presented it.

But now that 175,000 members of the A. M. L. A. have been building, experimenting, and holding contests all winter and spring, the old records have sunk lower than a ground hog's basement. One Detroit model builder has flown his indoor tractor 266 seconds, another, 261. A Chicago boy captured the *Chicago Tribune's* A. M. L. A. indoor contest with a flight of 259 seconds. A Springfield, Massachusetts, builder won his contest with 235 seconds.

Wyandotte, Michigan, boys have frequently sent their indoor pushers into the air for more than 220 seconds. As for the stunting little Baby R. O. G. with its 12-inch wing, flights of more than 70 seconds are becoming more and more frequent. At press-time the national meet at Detroit had not been held—it too may bring new and startling performances. Where will the records be next year?

A strong evidence of the good flights made by A. M. L. A. members is the increasing number of honor certificates that are being issued. The League gives honor certificates signed by Commander Richard E. Byrd, honorary president, and other officers, to builders who fly their R. O. G.'s 30 seconds, their indoor pushers 65 seconds, indoor tractors 100 seconds, or their outdoor twin pushers 120. Any one of these performances wins a certificate.

> *Airplane Model Fans!*
>
> *The full story of the national meet, together with pictures and names of the prize winners, will come in the September AMERICAN BOY.*

More than 300 certificates have already been issued, and the following boys have earned all four, thereby winning an autographed picture of Vice-president Clarence Chamberlin:

Kazmier Kluz, Ambridge, Pennsylvania; Robert Atwater, Elmira, New York; Arthur Johnson, Hawthorne, New Jersey; Chester S. Eastep, Williamsburg, Pennsylvania; Harry Cone, Elmira, New York; James Stuart, Mexico, Missouri; Robert Hyde, Elmira.

Robert Hyde's records for the four types of planes are exceptional. He's flown his R.O.G. 73 seconds, his indoor pusher 113, his indoor tractor 135, and his outdoor twin pusher 14 minutes, 10 seconds. The last is an unofficial world's record.

The League has hundreds of honor certificates waiting for members who fly their models the required time before competent witnesses. Send to headquarters, American Boy Building, Second Boulevard at Lafayette, Detroit, for an honor certificate application. Then plug away until you win one. It's a recognition you'll treasure. Be sure, in writing to the League, to enclose a two-cent stamp for return postage.

Perhaps you'll want to build new planes for your honor certificate tryouts. In that case, you'd probably like to order new kits from the League. These kits, containing all the necessary balsa wood, bamboo, rubber, ambroid cement, banana oil, and finished metal parts, as well as complete drawings and instructions, are sold at cost. You can get any of the following by sending cash, check or money order to the A. M. L. A. Supply Department, at the League's address. The kits cost:

Baby R. O. G., 65 cents; indoor pusher, 65 cents; indoor tractor, 75 cents; outdoor twin pusher, $3.00; indoor commercial, $1.75; hydroplane, $2.50.

FROM every part of the United States comes news of the formation of new clubs. Five groups have applied to headquarters for charters within two weeks.

"Thanks to your help," writes Jacob Follmer, secretary of the Wings Club of the A. M. L. A., Little Falls, New York, "we are making dandy progress. Quite a few of the members have built three and four flying models."

When a candidate joins the Y. M. C. A. Model Flyer's Club of Rock Island, Illinois, he becomes a "Cadet," according to Don Hubbart, secretary. When he has built and flown a model, he becomes a "Pilot." This enterprising club, in order to arouse greater interest in model aviation, placed a display of model airplanes in a downtown store window.

A club at Englewood, New Jersey, has organized itself into the Clarycraft Shops, under the leadership of Robert H. Clary, its president, and is building and selling tested models to raise revenue.

Stories of unusual flying experiences are continually coming in to headquarters.

"On a calm day," writes Fredric Lindner, East Longmeadow, Massachusetts, "I took out my best indoor tractor. It flew for 2 minutes 25 seconds and at the 25th second it landed in an elm tree 75 feet high. The wing fell to the ground. I attached the wing to my second best tractor, gave it 1,000 turns and let it go. It flew for two minutes and at that time the motor had run out. I expected it to glide to earth, but instead it gained a higher altitude and glided for five minutes more, until I could see it no longer!"

"I completed my outdoor twin pusher several days ago," John B. Clark informs us, "and took it to a field near town. After much experimenting, we obtained flights of about 150 yards. We were quite satisfied and were starting back for town when my friend suggested that we fly it to the other side of the field, directly into a strong wind. We wound the motors and let the ship go into the wind. It made a large loop and came out of it upside down. It rolled right side up and headed south. At the south end of the field were some telephone wires and I began to see myself ordering a new kit. But at that moment the plane dived slightly, and then, on a long zoom, cleared the wires by 50 feet. It continued to climb and nearly went out of sight. Then it glided to the ground. We found it in the center of a plowed field, undamaged. We hope, now, to get longer flights and are working on an idea to double its duration."

Scores of A. M. L. A. members are venturing into the fields of experiment. Wayne Brown, Andalusia, Alabama, has sent in complete drawings for fitting skis to his outdoor twin pusher. Brown evidently plans on taking his plane north!

NEIL HANSON, Rosedale Park, Michigan, has successfully designed and flown a small biplane that looks remarkably like a Curtiss Hawk.

The League has had many requests from builders who wish to equip their outdoor pushers with landing gear. In response, the research department has produced the gear shown in the drawing with this article. You'll find it sturdy and flexible.

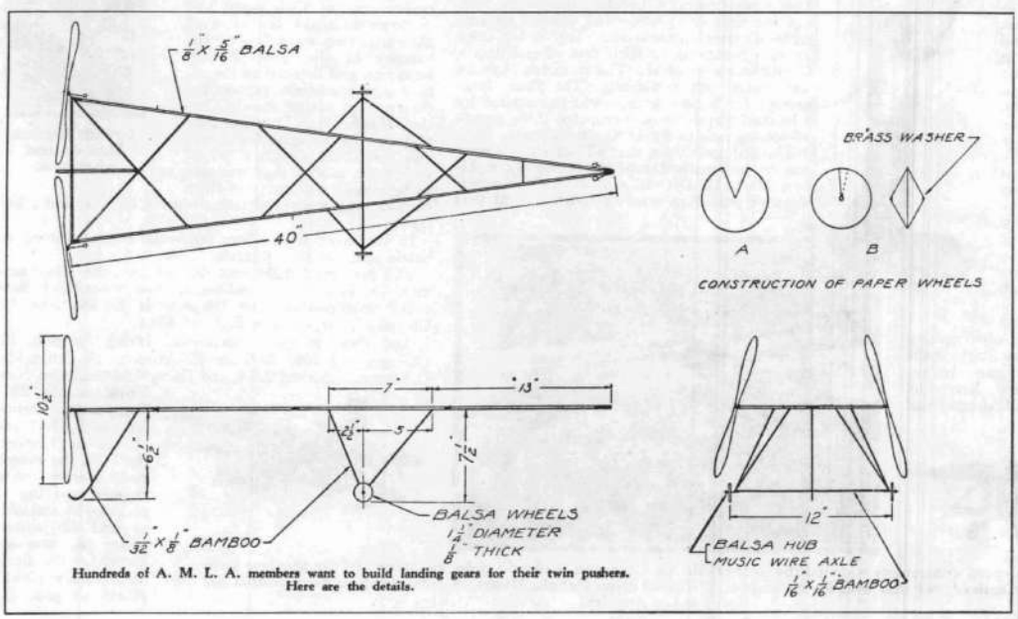
The job of building it is simple. The gear consists simply of 1-32 by 1-8 bamboo braces and small axles of .032 music wire. The wheels, either balsa or paper cone, are held on the axles by tiny balsa hubs that are stuck to the end of the axles with a drop of ambroid.

At the rear end, you'll notice in the drawing, a bamboo skid holds the plane 6 1-2 inches off the ground. To put on this skid, you must add a new bamboo crosspiece to your A frame. This is the one shown in the top view running between the ends of the long beams. From the center of this crosspiece, a brace runs down to the skid, as shown in the side view.

If you don't wish to use balsa wheels, you may substitute the paper cone wheels shown in the upper right-hand corner of the drawing. You simply cut out two circles of heavy drawing paper, remove a segment from each in order to form the cones, and then glue small metal washers to the spots indicated, before gluing the halves together. These washers will keep the wheels running true.

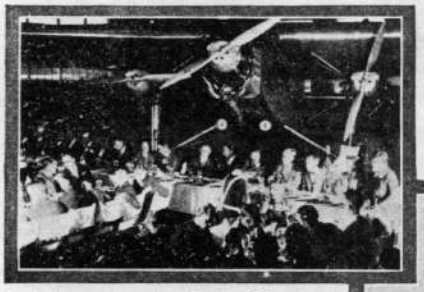
You'll notice when the plane rests on its three points—rear skid and two wheels—that the front end is more than an inch higher than the rear. This increases the angle of attack for the take-off.

It's probable that you will want to build a special A-frame for the outdoor twin pusher that you equip with landing gear.



Hundreds of A. M. L. A. members want to build landing gears for their twin pushers. Here are the details.

Model Aviation Has Its Biggest Day!



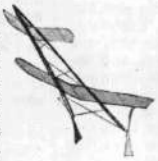
Air background at the Edsel Ford banquet!

From the bridge of the *Montcalm*, in memory of heroic airmen, the champions launched a plane out over the North Atlantic wastes. Right, Thomas C. Hill, Winston-Salem, N.C., outdoor champion who won the trip to Europe!

William B. Stout presents the National Indoor trophy to Abgarian.

THE smoke of model air battles has cleared away, the wreckage of balsa and bamboo has been salvaged, and the model aces of a continent have departed from Detroit, bearing the fruits of their victories and the memories of stiff scraps, joyous banquets and intimate contact with the nation's leading airmen.

The First National Contest of the Airplane Model League of America, held in Detroit, June 28-30, has passed into history—notable history. There were 259 contestants from every part of the United States and Canada—sent by newspapers, civic clubs, parents—to compete for national trophies, $3,000 in cash prizes, trips to Europe, to the National Air Races in Los Angeles, and to summer camps, 198 medals, and certificates. Nearly 200 other contestants, who couldn't come themselves, shipped their planes to Detroit to be judged in the scale model contest.



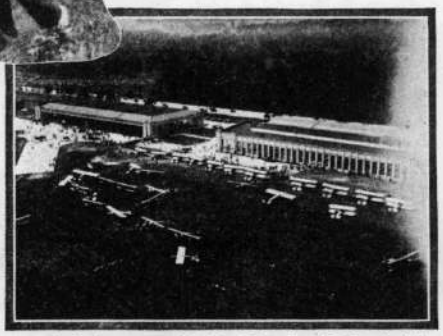
The contest marked the passing of Charles Dybvig, 18 years old, of Ann Arbor, and Jack Loughner, 17, Detroit, as the national indoor and outdoor champions. Aram Abgarian, 15, Detroit, won the Stout indoor trophy with a world's record flight of 353.6 seconds—more than twice as long as the best flight of six months ago.

The national outdoor champion is Joseph J. Lucas, 34, Chicago, who has built model planes for many years. His winning flight was 264 seconds. A third national champion is William L. Dennis, 17, Miami, Florida, whose beautifully-built two-foot replica of the Curtiss Army *Hawk* was judged the best of the 232 scale—non-flying—models entered in the meet.

The two winners of the trip to Europe as guests of THE AMERICAN BOY are Aram Abgarian, indoor flying champion, and Thomas C. Hill, 16, Winston-Salem, North Carolina, the two boys under 21 who placed highest in the indoor and outdoor contests. Hill placed second to Lucas in the outdoor. Nearly 200 of the entrants carried away prizes for their excellent work in the three great divisions of the meet.

The first contestant to arrive in Detroit was Katsuro Miho, who came all the way from Kahului, Hawaii, as the representative of the Honolulu *Star-Bulletin*, and other island organizations. Miho, brown-skinned and laughing, spent just a day in sight-seeing before starting to build a new fleet of planes that eventually landed him bronze medals in both the indoor and outdoor contests.

Entrants started pouring into Detroit Wednesday noon, June 27. The first out-of-town boy to walk up to the registration tables on the Statler ballroom floor was Marvin Fish, Onaway, Michigan. Immediately after him came William E. Atwood, Riverside, California. Then Maurice Reid, Dewey, Oklahoma, and Albert Schwarzkopf, Norfolk, Virginia. From that time on, the Statler lobby, mezzanine, and elevators were crowded with pieces of queer shaped luggage like no other luggage under the sun—long boxes, painted and lettered, wide at one end and narrow at the other. These were the hangars, containing the delicately balanced, beautifully constructed balsa-and-bamboo ships upon which the entrants were pinning their hopes for victory.



At the Ford Airport, contestants watched the memorable Air Olympics. Left and right, two views of the accurate scale model of the Curtiss *Hawk* that won for its builder, William Lofton Dennis, Miami, Florida, a trip to the National Air Races at Los Angeles.

LATE into Wednesday night, early entrants trooped up to the A. M. L. A. supply room on the thirteenth floor, to carry away propeller blocks, spars, and strips of bamboo, with which to build spare parts for their planes.

On Thursday, the rush of registration reached its peak. Endlessly contestants passed by, receiving cards, badges, and the souvenir watch fobs that would admit them to banquets and buses and airports. The seven delegates from Philadelphia strode up in white aviators' helmets. There were seven boys from Cleveland, four from Watertown, New York, four from Akron, and five from Washington, D. C. From San Francisco, Oakland, Chicago, Fort Dodge, Iowa; Macon, Georgia; Independence, Kansas, they came.

Actual competition started on Thursday afternoon, when the Stout Indoor Contest got under way at the great Olympia stadium. There, under the 90-foot-high, steel-supported roof—surrounded by 12,000 seats, empty because spectators were not encouraged to come and disturb air currents—Detroit entrants and early out-of-town arrivals began taking their first official flights. Conditions were ideal. The immense building was warm and non-drafty. The floor, large enough for hockey games, and surrounded by a banked bicycle track, permitted three groups of contestants to fly at the same time.

The first indication that all old records were due to be smashed into bits came when Albert Mott, 17, Detroit, sent up his cambered-elevator pusher in a rafter-dodging flight that didn't reach the floor until the stop watches read 322.5 seconds—more than twice as long as the title-winning flight of 1927!

Mott's flight looked unbeatable until Ernest McCoy, 17, also of Detroit, uncovered his "mystery ship." This ship, which he kept from curious eyes by refusing to take it from its box until his turn to fly, is a tractor of his own design. It has a cambered—curved—wing and a negatively cambered tail. Its first flight was only 37 seconds, but its second reached 323.5, and its third broke all records with 331.1. In spite of McCoy's efforts to prevent others from seeing his ship too closely, by the time he had taken his three flights, many boys had gained a general idea of how it was built. One of them was Aram Abgarian, whose best time, that afternoon, was 287 seconds.

News of the astonishing flights being made at the Olympia quickly reached the Statler Hotel. Other contestants, yet to fly, satisfied up to that moment with their ships in their boxes, suddenly revised their ideas.

They raided the A. M. L. A. workshop for supplies, and that night Statler bedrooms were introduced to a new and strange activity. Balsa shavings, squares of Japanese tissue, and splinters of bamboo littered spreads and carpets, while intent builders sat over candle flames, bending curved bamboo ribs in an effort to duplicate McCoy's cambered wing. Some contestants, due to fly the next morning, worked until nearly breakfast time.

Friday morning it rained. How it rained! The contingent of outdoor contestants, nearly 200 strong, hopeful that the torrents would cease, piled into the convoy of buses and rode the sloshing 23-mile trip to Selfridge Field on the shores of Lake St. Clair. They were unable even to take their twin pushers out of their cases, and in order to make the most of their trip, they went through the hangars of the First Pursuit Squadron and listened to the officers and mechanics explain the construction of the speedy Curtiss *Hawk*, the Loening Amphibian, the Douglas transports, and the D. H.'s. They helped tear down a ship that was due to be rebuilt, and many of them carried away squares of fabric bearing the star and other insignia.

Griffith Ogden Ellis, contest chairman.

In the meantime, indoor contestants were joining in battle again at the Olympia.

The first good flight was that of Lawrence Hankammer, 18, Des Moines, whose ship—a flat-winged, flat-tailed tractor—stayed up 195 seconds. Ed Petruska, 15, Cleveland, turned in a flight of 158.4.

And then, in quick succession, Irving Johnson, 18, Chicago, did 209; William E. Atwood, 18, Riverside, California, achieved 226.4, and Harry Cone, Elmira, New York, made 221. Exceptional flights, but not up to those of the day before. By 5:30, the indoor preliminaries were finished and the 12 seniors—16 and older—and 12 juniors, under 16, were selected for the finals on Saturday night.

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Model Aviation Has Its Biggest Day

(*Continued from page 17*)

No flights were made in the outdoor contest all day, and at 6:30 all contestants and officials rode out to the Ford airport for Edsel Ford's ever-to-be-remembered banquet.

WITH the banquet under way, the concrete-and-steel hangar presented a most colorful sight. Over the long speaker's table at one end of the hangar stretched the polished metal wings of a giant Ford Trimotor transport. At this table were Edsel Ford, William P. MacCracken, assistant secretary of commerce for aeronautics; Eddie Stinson; Eddie Rickenbacker, famed ace; William S. Brock, Detroit-to-Tokio pilot; Edward J. Hill and Arthur G. Schlosser, winners of the 1927 James Gordon Bennett International Balloon Race; Merrill Hamburg, secretary of the A. M. L. A.; Lieutenant Jack Harding, around-the-world flier; William B. Stout, designer of the Ford Trimotor transport and president of the A. M. L. A.; Griffith Ogden Ellis, editor of THE AMERICAN BOY; Glenn Martin, pioneer airplane designer; Carl F. Schory, secretary of the National Aeronautic Association; Major Thomas G. Lanphier, former commander of the First Pursuit Squadron; General J. A. MacBrien, head of the Aviation League of Canada; Lieutenant John A. Macready, famous test pilot; William B. Mayo, chief engineer of the Ford Motor Company; Alvan Macauley, president of the Packard Motor Company and League vice-president; and many others.

Tables seating twenty were spread through the hall, and at each table was a host pilot. At the other end of the hangar, the great Fokker, *Josephine Ford*, in which Commander Byrd flew over the North Pole, reared her weather-beaten form. Beyond her were clustered Ryan Broughams, Stinsons, Wacos, Boeings, and every other type of plane entered in the National Reliability Tour. Three hundred future airplane experts, dining with present-day leaders, surrounded by a fleet of the most up-to-date planes in the world!

As soon as the last course was finished, Mr. Ellis, toastmaster, introduced Mr. MacCracken, the chief speaker.

"Upon you, and the other members of the Airplane Model League of America," Mr. MacCracken said, "depends in a large degree the development of aviation in this country."

When speeches were finished, the diners split into two waves. One wave surged to the speakers' table and demanded autographs from Edsel Ford and every other notable. The other wave rolled into the fleet of planes entered in the Reliability Tour, eddied out into the broad field of the airport, and found its way to the factory where Ford Trimotors are built. Scores of boys piled into buses an hour later, bearing scrap sheets of that light, corrugated, airplane metal, duralumin. Souvenirs of a memorable evening!

That night, at the Statler, there were more midnight labors. Some of them were entirely unofficial. One group of entrants, for instance, contracted to build Baby R. O. G.'s during the night, and to fly them in the morning in a special contest! Others worked on their contest planes. Every moment, between midnight and dawn, entrants were bringing their repaired or newly completed ships down to the ballroom to try them out.

At seven in the morning, under a blue sky and a brilliant sun, the outdoor contestants again embussed for Selfridge Field. Because of a light northeast breeze, the groups of judges took up positions near the entrance to the field. From there, the planes circled and soared to the southwest, across the flat mile-and-a-half stretch toward the woods bordering a small creek.

Because the outdoor winners were scheduled to fly that afternoon at the Ford Airport, and because every boy wanted to see the take-off of the balloons in the Bennett race, the officials did everything in their power to speed up the flights. Six groups of judges were formed and soon the contestants were busy with their mechanics, adjusting their twin pushers, winding them, and launching them into a tricky breeze.

There were the inevitable crack-ups when overwound motors broke, or when ships, caught in adverse air currents, dove sharply into the ground. Then, over the field, ran the news that the plane of Thomas C. Hill, Winston-Salem representative, had traveled the length of the long field and disappeared over the woods, still going, at 250 seconds.

Soon afterwards, Joseph J. Lucas, veteran Chicago model builder, sent his ship all the way across the creek for 264 seconds. Thomas Condax, Philadelphia, who has been building planes less than a year, put his ship in the same territory for an official time of 249.4! Henry Goebel, of Rochester, lost many seconds when his plane disappeared. Jack Loughner, the defending champion, could get only 147 seconds out of his well-constructed ship. Lloyd Fish, Washington, D. C., placed high in the running with 217.

All through the day, the busy contestants stuck to the field, taking time out only to run to the post exchange for sandwiches and drinks. An extremely interested spectator at the contest was Lieutenant-Colonel Charles H. Danforth, commandant of the field and host to the outdoor contestants.

When the last official flight was finished, the word passed that Thomas Hill had the best flight of any contestant under 21, and therefore would go to Europe. Hill, lanky, smiling, and bashful, deserved his victory. For four years he has studied aviation magazines. He joined the A.M.L.A. soon after it was organized and followed closely the articles in THE AMERICAN BOY. For months he was the only model plane enthusiast in Winston-Salem, and before he came to Detroit he had never seen another boy's model.

(*Continued from page 47*)

Hill didn't have enough money to pay his own expenses to the contest. The A. M. L. A.—because of Hill's excellent record as a builder—suggested that the Lions Club send him. For days the Lions Club debated, and finally exhausted its treasury to do it. Hill arrived four days early and in that time built two completely new outdoor planes and three indoor ships!

EARLY in the afternoon, the last few entrants piled into the buses for the Ford Airport. The roads were jammed with traffic, and although the outdoor winners failed to arrive in time to take their final flights before the 100,000 spectators of the Air Olympics, they were fortunate to get there soon enough to witness, at close range, the take-off of the big balloons in the international race.

At eight that night the finals of the indoor contest began at the Olympia. Around the immense floor space were seated the 259 contestants. At one end of the hall, the twelve senior contestants who had placed highest in the preliminaries started tuning up. One of the judges in this squad was Edward P. Warner, assistant secretary of the Navy for aeronautics.

At the other end of the hall were the juniors. At the judges' stand, in a special block of chairs, sat Griffith Ogden Ellis, general chairman of the contest; Frank A. Tichenor, publisher of the *Aero Digest* Magazine and vice-president of the A. M. L. A.; William B. Stout; Walter Hinton, president of the Aviation Institute of the U. S. A. and first transatlantic flier—member of the famous N. C. 4 crew.

Then, while announcers informed the spectators of each flight and large clocks on the balconies marked the time each plane stayed in the air, the competition began. Ernest McCoy still led the pack with his Thursday's flight of 331 seconds. To-night, the best he could do was 272.4 seconds. Immediately following him, Albert Mott, 17, Detroit, broke all existing records with a flight of 341 seconds!

Before the cheering for Mott had died down, a wave of applause broke out from the other end of the hall where the juniors were fighting it out. There, high against the 90-foot ceiling, circled the ship of Aram Abgarian—a ship he had stayed up all night to build, a plane similar to the "mystery ship" of McCoy but with a special 12-inch propeller. It had already been in the air nearly five minutes and was still scraping steel rafters. When it finally glided, slack-motored, to the floor, the cheering shook the hall. A moment later, the announcer told the crowd that Abgarian had set a new world mark of 353.6 seconds!

Two hours later, when the official flights were finished, when the balloon-busting, commercial plane exhibitors and stunt flying were done, Abgarian's flight still headed the list.

Throughout the two days of the meet, while indoor and outdoor contests were in progress, six judges, headed by George F. McLaughlin, technical editor of *Aero Digest*, worked continuously at the job of judging the 232 scale models at Convention Hall. There were Curtiss *Hawks*, Navy *Hawks*, Ford Trimotors, Boeings, Fairchilds, Sikorsky two-motored ships, a Junkers, and many replicas of the *Spirit of St. Louis*.

The scrap for first place finally became a duel between a marvelously accurate *Hawk* and a beautiful Fairchild cabin plane with folding wings and transparent fabric to show the minute workmanship of ribs and braces beneath the surface. Time and again, the judges went over the two with calipers, to seek any slight variations from scale. Finally, because the *Hawk* was slightly more correct in outward appearance—the Fairchild had transparent fabric—it was given first place with a rating of 97 per cent. Its builder, William L. Dennis, Miami, Florida, thereby won the trip to the National Air Races, to be held in Los Angeles this fall, as guest of Mr. Tichenor. He won also the beautiful silvered bronze trophy donated by the Ideal Aeroplane and Supply Company.

The official program of the meet closed with the midnight banquet. At the head table, along the wall of the Statler ballroom, sat Stout, Ellis, Harry Heilmann, Detroit Tiger outfielder and leading batsman of the American League last year, Merrill Hamburg, secretary of the A. M. L. A., Frank Tichenor, and Elmer P. Grierson, business manager of THE AMERICAN BOY.

THROUGHOUT the dinner there were stunts to keep the diners in a state of hilarity and suspense. After the dinner, Harry Heilmann extended to the contestants on behalf of the Detroit Baseball Club, the privilege of free seats to a Detroit-St. Louis baseball game. Then, on the ballroom stage, appeared a blackface act having to do with the hilarious attempts of two dusky aviators to fly their ship, *The Spirit of St. Vitus*, on a hazardous hop from Cairo, Illinois, to Cairo, Egypt. The "aviators" were Gurney Williams, Jr., author of *Two Boobs Abroad* and Franklin M. Reck, AMERICAN BOY staff member and writer.

George F. Pierrot, managing editor of THE AMERICAN BOY, then announced the winners of the many divisions of the contest. Aram Abgarian and Thomas C. Hill, winners of the trip to Europe! Albert Mott, a summer, tuition-free, at Camp Charlevoix, Michigan! Thomas Condax, Philadelphia; Ernest McCoy, Detroit; Tudor Morris, Peru, Indiana, winners of second places in the senior indoor, outdoor and scale model divisions, all three received correspondence courses at the Aviation Institute of the U. S. A.! Thirty-three winners in every division of the contest!

Sunday was a day of rest and sight-seeing for some, a day of departure for others. On Monday, the European party, Abgarian and Hill, plus Jack Loughner and Ford Grant, of Detroit, who were being sent by their parents, and Merrill Hamburg, shopped and packed their prize-winning planes and their personal belongings. Abgarian and Hill outfitted themselves with clothes and luggage to the extent of $150 each—the gift of the J. L. Hudson Company and THE AMERICAN BOY—an added prize for their victory. On Monday, they boarded a train for Toronto and climbed into Canadian Pacific Railway berths for the first real rest they had had in four tense, strenuous days.

From Toronto, they took a boat at noon Tuesday for Niagara Falls, where they rode the *Maid of the Mist* to the foot of the falls and took the aerial car over the boiling rapids.

Wednesday, July 4, the party was entertained by Toronto city officials. There was sight-seeing over the city, over the campus of Toronto University and through the beautiful Hart House; a trip

"I Wish I Could Be With You!"

Wrote Commander Richard E. Byrd to the Contestants at the First National A. M. L. A. Meet

"Though I cannot be present, I would like the boys of the Airplane Model League of America to know how proud I am to be their honorary commander.

"We are living in an air-minded age. I want to tell every boy that when he is building and learning to fly model airplanes he is taking a long step toward a knowledge of practical aeronautics. I have been a model airplane flyer for a number of years and it has been a help to me in all my aeronautic problems.

"My wish to every member of the League is great success—in all that he undertakes.

Very sincerely yours,

R. E. Byrd.

The plane that rises from the ground is subjected to greater strains than the hand-launched type, and requires extra strands of rubber. For that reason, you should have a special frame with stronger beams and cross braces. You can, however, use the wing, elevator, and propellers that you already have.

This is just one of the many hints on construction that will be carried in this department during 1928-29. Next fall and winter, you'll learn how to build record-breaking duration ships, new scale models, and a speed ship that will go fifty miles an hour! Membership in the A. M. L. A. enrolls you with famous leaders in aviation and with 175,000 other builders who are keeping abreast of the fascinating game of building models. If you haven't already done so, you can join the League by sending a two-cent stamp with your name, age and address to A. M. L. A. headquarters, American Boy Building, Second Boulevard at Lafayette, Detroit. You'll get back your membership card, signed by Commander Byrd, Stout, and Merrill Hamburg, and your official button.

And remember that this is the official department of the A. M. L. A. Send us news of your club doings, of your flying experiences, and your experiments!

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to the Royal Canadian Yacht Club on Centre Island in Lake Erie, where Acting Mayor Gibbons entertained at a luncheon. There were indoor and outdoor plane exhibitions. In the evening, the boys were the guests of the Boy Scouts at dinner and theater.

Ottawa was the next stop. Here, at the indoor exhibition in the city council chamber, Mayor Arthur Ellis was so carried away with the smoothly performing models that he asked for a kit so that he could build a plane himself! Thursday afternoon the party took a private interurban to Luna Park as guests of the owner, and for the rest of the day the park with its scores of entertainment features—its coasters, ships and roller skating rink—belonged to them.

The party arrived in Montreal 10 o'clock Thursday night. The first job was that of fixing up passports. It was in the vice-consul's office that the weary, but happy, guests of Canadian hospitality reached the limit of physical endurance. While the vice-consul asked questions, Aram—sleepy national champion—said "yes" and nodded with his eyes shut. As soon as the vice-consul had finished with him, Aram retired to a comfortable chair and fell instantly asleep.

The next morning, the champions were entertained by William Baird, general traffic manager of the Canadian Pacific Steamship Company, at breakfast. Then another demonstration and a quick sightseeing jaunt before boarding the *Montcalm* for the start of the voyage.

On board ship, after the boys had met Captain Landy, they found, to their surprise, that the Canadian Pacific had provided them an extra cabin! The toss of a coin decided that Jack Loughner and Ford Grant were to occupy cabin 300, and Tom Hill and Aram, 286. Mr. Hamburg was given a cabin all to himself.

Two days later, out at sea, as the *Montcalm* plowed through those North Atlantic wastes where so many transatlantic fliers had met their death, the champions launched a plane over the side of the ship—launched it reverently, while the ship's bugler sounded taps.

Liverpool—then London, the world's largest city. At Croydon, the great airport outside of London, United States and British champions met in the first international model airplane competition. The meet was conducted by the Society of Model Airplane Engineers. Ford Grant won the flying stick—called by English experts "spar model"—division. W. J. Plater, of England, won "fuselage" division. This class was limited to model planes with built-up fuselages, similar to our commercial models.

The winners received prizes—given by the Canadian Pacific Steamship Company—from the hands of Lady Sophia Heath, the famous airwoman who set a new altitude record for light planes by going up 19,000 feet, and who flew alone from Cape Town, Africa, to London—a distance of 6,000 miles.

After London, Paris, and a round of sight-seeing and demonstrations as the guests of Marshall Hubert Lyautey, conqueror and colonizer of Morocco. Then Camp Vaumarcus, on the shores of Lake Neufchatel in Switzerland, where boys from twenty nations greeted them. And Geneva, and two weeks of freedom to wander through Italy and Germany and France!

The invasion of Europe and the introduction to the old continent of America's endurance-type models is the climax of the Airplane Model League of America's first year of work. The League has done much. It has enrolled 200,000 boys in work that will be of tremendous value to aviation. And its program will be continued through the columns of THE AMERICAN BOY, next year.

"You fellows," William B. Stout, League president, told the 300 banqueters on the final evening of the contest, "will be the designers and airport managers of the future. Just as John Carisi, 'Buck' Weaver, and scores of other old-time model plane builders are now leaders in aviation, so will you be ten or twenty years from now. You are learning the principles of flight, the meaning of torque, of aspect ratios, propeller pitches, and all the rest.

"The airplane model meet, while it's less spectacular than the balloon race of the Reliability Tour, is in some respects the most important event of all.

"I value more highly my connection with the Airplane Model League of America than almost any other connection I've ever made."

The League has answered more than 400,000 letters, the majority of them requiring detailed technical answers. It has supplied, at cost, 125,000 kits of materials for building model planes. It has distributed a special two-reel model airplane movie. It has enlisted the co-operation of 55 leading daily newspapers.

THE success of the first year's work and the League's first contest are due in a large measure to the whole-hearted co-operation of many groups. Porter Adams and Carl F. Schory, president and secretary of the National Aeronautic Association, gave the League their hearty endorsement. The Detroit Board of Commerce contributed time, money and trophies.

Frank A. Tichenor contributed a trip to the National Air Races at Los Angeles (for a boy and his parent) as first prize in the scale model contest, and many other courtesies. Trophies and prizes have also been donated by George R. Wallace, Jr., of the Fitchburg Paper Company, Fitchburg, Mass.; the Ideal Aeroplane and Supply Company; the J. L. Hudson Company, Detroit; the Weyhing Brothers Manufacturing Company; the Hotels Statler Company, Inc.; Camp Charlevoix, Charlevoix, Mich.; and the Aviation Institute of the U. S. A. The Michigan Mutual Liability Company of Detroit presented the official programs of the meet.

Mr. Edsel B. Ford, president of the Ford Motor Company, and Lieutenant-Colonel Charles H. Danforth, commanding officer of Selfridge Field, were unstinting hosts. The City of Detroit, through the council, provided bus transportation free.

William P. MacCracken, Jr.; the Detroit Baseball Club; the Stout Air Services Inc.; S. E. Loughner, of the Michigan Model Airplane and Supply Company; the Canadian Pacific Railway Company and the Canadian Pacific Steamship Company; Frank Cody and F. R. Kepler of the Detroit public schools; F. N. Litten, *American Boy* writer, rendered countless services.

The co-operating newspapers are: Chicago Tribune, New York Telegram, Buffalo Evening News, Springfield (Mass.) Union, Des Moines Tribune-Capital, Columbus (Ohio) Dispatch, San Francisco News, Rochester Democrat and Chronicle, Oakland Tribune, Louisville Times, Milwaukee Leader, Tulsa World, Albany Evening News, Portland (Me.) Express, Johnstown (Pa.) Tribune, Chattanooga News, South Bend Tribune, Reading (Pa.) Times, Fall River Herald-News, The Detroit News, Cleveland News, Philadelphia Record, Minneapolis Journal, Toledo News-Bee, Seattle Times, Oklahoma City Oklahoman, Washington Post, New Orleans Item, Syracuse Herald, Harrisburg Telegraph, Winnipeg Tribune, Allentown (Pa.) Call, Tacoma News Tribune, Fort Worth Press, Wisconsin State Journal (Madison), New Bedford (Mass.) Times, Williamsport (Pa.) Sun, Honolulu Star-Bulletin, Berkshire Evening Eagle (Pittsfield, Mass.), Spokane Press, Springfield (Ohio) Sun, Moline (Ill.) Dispatch, Richmond (Ind.) Palladium, Pratt (Kans.) Tribune, Staten Island (N. Y.) Advance, Rockford (Ill.) Register Gazette, Watertown (N. Y.) Times, Paterson Press-Guardian, Palm Beach Post, Webster (Mass.) Times, Sweetwater (Tex.) Reporter, and Abilene (Kans.) Chronicle.

The complete list of winners at the First National Meet follows (every contestant received a certificate attesting to his performance):

NATIONAL OUTDOOR, SENIOR DIVISION:

Joseph J. Lucas, Chicago, Ill., 264 seconds, Mulvihill (N. A.) trophy, $100 cup, $200 cash prize, gold medal. Thomas C. Hill, Winston-Salem, N. C., 250 seconds, trip to Europe, $150 outfitting prize, $200 cash prize, gold medal, $100 cup. Thomas Condax, Philadelphia, Pa., 249.4 seconds, gold medal, Home Study Scholarship from Aviation Institute of U. S. A., $100 cash prize. Henry E. Goebel, Rochester, N. Y., 240 seconds, gold medal, $75 cash prize. Robert E. Hayes, Detroit, Mich., 234 seconds, gold medal, $50 cash prize. Floyd Fish, Washington, D. C., 217 seconds, silver medal, $30 cash prize. Joseph Culver, San Francisco, Calif., 207.6 seconds, silver medal, $20 cash prize. Ford Grant, Detroit, Mich., 207 seconds, silver medal, $15 cash prize. Don Gardner, Detroit, Mich., 184 seconds, silver medal, $10 cash prize.

Bronze Medal Winners: Paul H. Coleman, Columbus, O.; Paul A. Mayer, Cleveland, O.; Edward Miller, Jr., Chicago, Ill.; John Redmond, Champaign, Ill.; Herbert Fish, Cleveland, O.; Irving Johnson, Chicago, Ill.; Albert W. Mott, Detroit, Mich.; Virgil Rassner, Peru, Ind.; Daniel Ludlow, Champaign, Ill.; Jack Loughner, Detroit, Mich.; Charles Miller, Cleveland, O.; F. L. Jenkeh, Gagetown, Mich.; Donald Lockwood, Chicago, Ill.; W. A. Johnson, Chicago, Ill.; John Markley, Bartlesville, Okla.; R. R. Meyers, Chicago, Ill.; Bertram Pond, Peru, Ind.; Bernard Schwartz, Chicago, Ill.; Wendell Bailey, Oklahoma City, Okla.; Harry W. Cone, Elmira, N. Y.; Fred L. Johnson, Birmingham, Mich.; Howard C. Smith, Kenosha, Wis.; Fred M. Johnson, Hawthorne, N. J.; Henry E. Faville, Madison, Wis.; Walter Samsoe, Kenosha, Wis.; John T. Bird, Detroit, Mich.

NATIONAL OUTDOOR, JUNIOR DIVISION:

Carl V. Carlson, Chicago, Ill., 175 seconds, gold medal, $100 cup, $200 cash prize. Edward Petruska, Cleveland, O., 169.4 seconds, gold medal, $100 cash prize. Sartor E. Stewart, Louisville, Ky., 160 seconds, gold medal, $75 cash prize. Aram Abgarian, Detroit, Mich., 160 seconds, gold medal, $50 cash prize. Casimir Leja, Chicago, Ill., 149 seconds, silver medal, $30 cash prize. H. J. Dorsey, Washington, D. C., 139 seconds, silver medal, $20 cash prize. Robert E. Atwater, Elmira, N. Y., 132 seconds, silver medal, $15 cash prize. William Chaffee, Detroit, Mich., 129.4 seconds, silver medal, $10 cash prize.

Bronze Medal Winners: Katsuro Miho, Kahului, Hawaii; Francis Klute, Detroit, Mich.; Lawrence Sim, Wyandotte, Mich.; Arthur Liephart, Cleveland, O.; Fay Stroud, Detroit, Mich.; Irving Ranka, Wyandotte, Mich.; Evan Sharpe, Springfield, O.; Wallace Johnson, Fort Dodge, Wis.; Kenneth Belliveau, Springfield, Mass.; John Dawson, Evanston, Ill.; Allen Donovan, Syracuse, N. Y.; John Sigford, Minneapolis, Minn.; Jack Laister, Wyandotte, Mich.; Edward Harms, Evanston, Ill.; Robert MacLaren, Detroit, Mich.; Fred Schelter, Detroit, Mich.; Joseph Ehrhardt, St. Louis, Missouri; Charles Mayer, Bridgeville, Pa.; Harvey Gunning, Gulfport, Miss.; Gordon Gilbert, Detroit, Mich.; Jack Kistler, Detroit, Mich.; Willis Kullman, Cleveland, O. Sam Taylor, Ypsilanti, Mich.; John G. Young, Lansing, Mich.; Frederick Bonadio, Watertown, N. Y.

STOUT INDOOR, CLASS A.

Albert Mott, Detroit, Mich., 341 seconds, $200 cash prize, summer tuition at Camp Charlevoix ($300), $100 cup, gold medal. Ernest McCoy, Detroit, Mich., 331 seconds, $100 cash prize, Home Study Scholarship in Aviation Institute of U. S. A., gold medal. Jack Loughner, Detroit, Mich., 315 seconds, gold medal, $75 cash prize. George Novak, Detroit, Mich., 269 seconds, gold medal, $50 cash prize. George Emmett, Fall River, Mass., 250 seconds, silver medal, $30 cash prize. Thomas Condax, Philadelphia, Pa., 231 seconds, silver medal, $20 cash prize. Jack MacLellan, Wyandotte, Mich., 228 seconds, silver medal, $15 cash prize, Nick Vitale, Detroit, Mich., 227 seconds, silver medal, $10 cash prize.

Bronze Medal Winners: William Atwood, Riverside, Calif.; Harry Cone, Elmira, N. Y.; Hale Carpenter, Philadelphia, Pa.; Vernon Conzett, Detroit, Mich.; Joseph S. Culver, San Francisco, Calif.; Charles Dybvig, Detroit, Mich.; Paul Meyers, Cleveland, O.; Richard Salathiel, Independence, Kans.; Irving Johnson, Chicago, Ill.; Lawrence Hankammer, Des Moines, Ia.; Neil Severns, Columbus, O.; Douglas Walter, Wyandotte, Mich.; Bronson R. Myers, Chicago, Ill.; Stanley Smith, Rochester, N. Y.; Kenneth A. Willard, Evanston, Ill.; Charles VanHorn, Philadelphia, Pa.; Herbert G. Dorsey, Washington, D. C.; Bernard Schwartz, Chicago, Ill.; Glenn Reichman, Buffalo, N. Y.; Myron Stepath, Springfield, Mass.; Robert Hayes, Detroit, Mich.; Donald Lockwood, Chicago, Ill.; Thomas Willis, Chicago, Ill.; Andrew Freeland, Philadelphia, Pa.; John W. Cooper, Albany, N. Y.; Arthur O. Heinrick, Baldwin, L. I.

STOUT INDOOR, CLASS B.

Aram Abgarian, Detroit, Mich., 353.6 seconds, trip to Europe, Stout trophy, $100 cup, gold medal, $200 cash prize, $150 outfitting prize. Gordon Johnstone, Detroit, Mich., 280 seconds, gold medal, $100 cash prize. Carleton Roushkolb, Detroit, Mich., 270 seconds, gold medal, $75 cash prize. Milton Wollman, Philadelphia, Pa., 258 seconds, gold medal, $50 cash prize. Neville H. Geake, Detroit, Mich., 248 seconds, silver medal, $30 cash prize. Archie Schroeder, Wyandotte, Mich., 237 seconds, silver medal, $20 cash prize. William Chaffee, Detroit, Mich., 228 seconds, silver medal, $15 cash prize. Casimir Leja, Chicago, Ill., 227 seconds, silver medal, $10 cash prize.

Bronze Medal Winners: Francis Klute, Detroit; Edward Petruska, Cleveland, O.; Byron Jilek, Cleveland, O.; John Dawson, Evanston, Ill.; Lawrence J. Sim, Wyandotte, Mich.; Alfred M. Davock, Detroit, Mich.; Cloyd Smith, South Bend, Ind.; Leonard Popham, Port Huron, Mich; George T. Bell, Washington, D. C.; Raymond Mitchell, Fall River, Mass.; Walter Anthony, Cleveland, Ohio; Richard Abbey, Oakland, Calif.; Cecil Hills, Dearborn, Mich.; Jack Kistler, Detroit, Mich.; Marsden Gribbell, Deshler, O.; Robert E. Atwater, Elmira, N. Y.; Sterling Wardell, Watertown, N. Y.; Albert Schwarzkopf, Norfolk, Va.; Edward Harms, Evanston, Ill.; Maurice Gieleghem, Detroit, Mich.; Carl V. Carlson, Chicago, Ill.; Katsuro Miho, Hawaii; Richard K. West, Evanston, Ill.; Alex Riseky, Fort Worth, Texas; Joseph H. Ehrhardt, St. Louis, Mo.

SCALE MODEL CONTEST, CLASS A.

William L. Dennis, Miami, Fla.; score 97, trip to National Air Races, Los Angeles, in company with one parent, $100 cup, gold medal, $200 cash prize. Tudor Morris, Peru, Ind.; 93.1, Home Study Scholarship from Aviation Institute of the U. S. A., gold medal, $100 cash prize. Cyprien Porrier, Chicopee Falls, Mass., 86.5, gold medal, $75 cash prize. Leon M. Gregg, Westbrook, Conn., 86.3, gold medal, $50 cash prize. Seymour Dunham, Dayton, O., 86, silver medal, $30 cash prize. Joseph Sevilla, Springfield, Mass., 84.1, silver medal, $20 cash prize. Paul A. Meyer, Cleveland, O., 82.7, silver medal, $15 cash prize. Floyd Kowalak, Buffalo, N. Y., 81.7, silver medal, $10 cash prize.

Bronze Medal Winners: Charles N. Black, Columbus, O.; Leonard W. Ross, DuQuoin, Ill.; William White, Martinsburg, W. Va.; Clayton H. Tanner, Urbana, Ill.; George F. Schultz, Buffalo, N. Y.; Harvard C. Smith, Kenosha, Wis.; Homer Henry Jones, Cincinnati, O.; William T. Howell, Detroit, Mich.; Norman E. Zapf, Rocky River, O.; James Cook, Aspinwall, Pa.; Daryl Lighthody, Oakland, Calif.; James W. Ashbaugh, Cortez, Col.; Ernest W. Fuller, Atlanta, Ga.; Hubert Harden, Verdon, Nebr.; Clarence A. Sharp, Kansas City, Mo.; Harry L. Kitselman, Hollywood, Calif.; Samuel Hays, Jr., Erwin, Tenn.; Virgil DeClaire, Detroit, Mich.; Oliver McCahon, Lorain, O.; Karel Valasek, Chicago, Ill.; Wilbur G. Bodell, Battle Creek, Mich.; Norman E. Ort, Wainfleet, Ont.; Robert W. McKee, Zanesville, O.; Daniel A. Ludlow, Champaign, Ill.; Roger Copley, Hazel Park, Mich.

SCALE MODEL CONTEST, CLASS B.

George Thompson, Jr., Winner, S. Dakota, 86.1, $100 cup, gold medal, $200 cash prize. James L. Parker, Salisbury, N. C., 81, gold medal, $100 cash prize. Merl C. Jenkins, Ithaca, N. Y., 80.3, gold medal, $75 cash prize. Joseph Garside, Milton, Mass., 77, gold medal, $50 cash prize. Wallace J. S. Johnson, Fort Dodge, Ia., 75.6, silver medal, $30 cash prize. Lewis Carlson, Naugatuck, Conn., 75.6, silver medal, $20 cash prize. Ray A. Shephard, Hilo, Hawaii, 73.6, silver medal, $15 cash prize. Richard White, Kansas City, Mo., 72, silver medal, $10 cash prize.

Bronze Medal Winners: Charles F. Marschner, Highspire, Pa.; Grover Davidson, Chews P. O., N. J.; James Coyle, Philadelphia, Pa.; Martin Stroud, Dearborn, Mich.; Richard Caldwell, Detroit, Mich.; Robert Beebe, Oak Park, Ill.; Esther Benfer, Metamora, O.; Arthur Van Laken, Detroit, Mich.; Louis F. Mahan, Iowa City, Ia.; Lawrence McClellan, Fletcher, N. C.; Frank Urso, Detroit, Mich.; William Thaler, Detroit, Mich.; Maurice Cooper, Little Rock, Ark.; Lawrence Shields, Narro, Vermont; Robert Kavanaugh, Rochester, N. Y.; Kenneth Mudie, Detroit, Mich.; Earl Peterson, Jackson, Mich.; James R. W. Bent, Wilkinsburg, Pa.; Ralph Mattoon, Little Falls, N. Y.; Byron Creel, Louisville, Ky.; Donald Hehman, St. Bernice, Ind.; Benton H. Moorhouse, Highland Park, Mich.; Lawrence Valentine, Cumberland, Md.; Frederic C. Sparrow, Jr., New London, Conn.; Emery Lindbergh, Oakland, Calif.

They're Back From Europe!

Why Not You, Next Year?

Photos by courtesy of Canadian Pacific Steamship Company

Hill, Abgarian, Grant and Loughner paused and posed in the twelfth century entrance to Notre Dame Cathedral.

At Croydon, London airdrome, American and British model experts competed. Honors were divided.

Lady Heath, famous aviatrix, presented Grant his prize check.

NO trans-Atlantic flier, no Lindbergh, or Byrd or Chamberlin, ever got more fun from his trip to Europe, and the feting and honors and receptions given him there, than did America's airplane model champions on their prize tour of the world's most famous cities. You have the word of Tom Hill and Aram Abgarian for that—and they know!

Grinning and a bit fagged (and ready to do it all over again), Tom and Aram came down the gangplank from the *George Washington*, big United States liner, in Hoboken on August 17. With them were Merrill Hamburg, secretary of the Airplane Model League of America, and Jack Loughner and Ford Grant of Detroit, two airplane model experts who had made the trip "on their own" with the party of three who were guests of THE AMERICAN BOY. Tom, 16, of Winston-Salem, N. C., and Aram, 15, of Detroit, won the trip at the First National A. M. L. A. Contests in Detroit June 28-30—Aram became world's indoor champion, Tom boy's national outdoor champion.

And what a time they had! Last month THE AMERICAN BOY told how they visited and were entertained in Toronto, Ottawa, Montreal; how they boarded the Canadian Pacific liner *Montcalm*, and launched a tiny white model over the cold, hard-surfaced North Atlantic in memory of men who had tried—and failed—to fly across it.

They first set foot on European soil in Liverpool, and they wasted no time in getting on the boat train for London. They had hardly become accustomed to the queer, small, side-entrance European railroad coach when they were whisked into a station in Europe's biggest city.

S. H. F. Crouch, secretary of the Society of Model Aeronautical Engineers, had made arrangements for an international model contest at Croydon, the famous London airdrome, and they had to put final touches on the outdoor models they had built on the *Montcalm*. The contests were held on a gusty day, with the wind doing loops and whirls and chutes; Tom, Aram and Jack, former national outdoor champion, all "cracked up" models trying to get them into the treacherous air. But Ford Grant, with his third—and last—plane, made a better-than-two-minutes flight, and it won for him the first international title for the "flying stick" type of model.

And then Lady Sophia Heath, Britain's famous air-woman, not only presented them the prizes, but invited all the American party to ride with her in her trusty little Moth plane. She entertained the group at tea, and they later were guests of honor at a dinner attended by Sir Sefton Brancker, British air minister.

They found time to see the Tower of London, to thrill in the impressive depths of Westminster Abbey, to see the other sights of the great city; they visited Shakespeare's Stratford-on-Avon. Then they flew to Paris, landed at Le Bourget, and took a honking, hustling French taxi to their hotel looking out across the Seine.

Their time in Paris, too, was jammed. Sidney B. Veit, president of the Paris chapter of the National Aeronautic Association, had made arrangements for them to visit aircraft factories, landing fields, places of historical note. They mounted the Eiffel Tower; they took an excursion to Louis XIV's Versailles where the peace treaty was signed in 1919. They saw the Gothic magnificence of Notre Dame, the gaiety of Paris' cafes and boulevards and theaters, the quaintness of its twisty side streets and musty, ancient buildings.

Here, too, they received another signal honor. They were taken to the Hotel de Ville—we call it City Hall—and asked to sign their names in the famous Gold Book. Heretofore only the great leaders in aviation were listed in the book—Orville Wright's name was the first, and among the more recent were Chamberlin, Byrd, Lindbergh, Costes, le Brix.

Then—after Aram recovered from a bad cold—they left for Geneva. There they were entertained by officials of the World Y.M.C.A., and of the League of Nations; they were shown through the official League halls by John D. Rockefeller, Jr.

After Switzerland and the Alps, then, came Venice—two days in the winding, quiet canals, the brilliance of St. Mark's Square and the Palace of the Doges, the easy smoothness of gondola rides and the fun of splashing in the surf on the famous Lido beach. Florence was the next stop. Here the boys viewed one of the world's finest collections of paintings by Raphael, Titian, da Vinci, scores of others; they walked across the Ponte Vecchio, a bridge made famous by Cellini; they saw castles that have come down unchanged since the warring, bloody days of the Medicis and the Borgias.

And Rome—Rome with its Colosseum, its Forum, its St. Peter's and its pictures of Mussolini everywhere! Rome claimed them for three hot, hurrying days. And if they missed seeing anything, they'd like to know what it was!

Time for returning home was approaching, so they took their one sleeping-car ride in Europe—twenty-eight hours from Rome to Paris. For four days they bought souvenirs and gifts and went to shows and saw the Bastille and the Louvre and the parks and the near-by World War battlefields. Then—regretfully—they boarded the boat train for Cherbourg, and on August 9, they turned toward home again.

Official receptions were not over. In New York dapper "Jimmy" Walker, mayor, received them in his office in the City Hall, to welcome them back to their own country.

And then the party broke up. There were honest tears in Tom Hill's eyes when he said farewell to the others—the kind of tears that no fellow is ashamed of.

"It was the best time I—or any fellow—ever had," said Tom. "Now, next year—"

But none of them is so sure about next year. There will be another national contest next year, and prizes will again include trips to Europe. But—

"You can't tell about model contests," declared Aram. "We all want to try—but lightning can't strike twice in one place!"

Wherever Mr. Hamburg and the boys went, their label-spotted model cases accompanied them! This was in London.

Model Aces, Get Ready for a Big Year!

Build New Models, Join the A. M. L. A., and Plan for Next Year's National Contest

Hoover and MacCracken are strong for model aviation.

Photo by Lee Krupnick, *Tulsa Daily World.*

ENROLL IN THE A. M. L. A.

Within a year, the Airplane Model League of America, headed by Commander Byrd, William B. Stout, and a dozen other leading airmen, enrolled 200,000 members. Here are the services that it extended to these members—services it will extend to you during the coming year. It will—

Help you in organizing airplane model clubs. Issue club charters. Give you expert advice in your airplane model building problems. (You may write to the A. M. L. A., enclosing a two-cent stamp, and get assistance on any phase of your model plane work.)

Send you a manual for five cents, that tells you with text and diagrams all the steps in model airplane construction. Give you free membership cards and buttons. Tell you how to hold contests and flying circuses. Send you, for use in schools or clubs, a two-reel motion picture on model plane construction, at low rental.

Issue honor certificates for meritorious model plane building. (If you win four honor certificates for the four best-known types of planes you'll receive an autographed picture of Clarence Chamberlin. For full information concerning honor certificates, write the League, enclosing a two-cent stamp.)

Supply you with kits and materials, at cost, for building the types of planes described in THE AMERICAN BOY.

Make you eligible to compete in any national contest officially sanctioned by the National Aeronautic Association.

JOIN THE LEAGUE NOW AND PREPARE TO USE THESE PRIVILEGES.

Byrd

OLD model airplane records have been shattered into bits. The ships of a year ago are "washouts" to-day.

Model airplane builders of 1928 are building ships of balsa and bamboo that last year's model builders never dreamed of. Six minute indoor planes! Looping and stunting R. O. G.'s. Outdoor ships of inconceivable lightness and strength!

Just how far model aviation has progressed since last fall was astonishingly demonstrated at the First National A. M. L. A. Contest held in Detroit last June, when Aram Abgarian, Detroit high school boy, sent up his indoor ship for five minutes and 53 seconds—more than twice as long as the world's record of a few months before.

Those outdoor ships that flew out of sight of the judges; those scale models of marvelously accurate and neat workmanship; the scores of innovations on indoor and outdoor flying models—every phase of the contest testified to the strides that model aviation has taken.

During the coming year, THE AMERICAN BOY Magazine, in a new and greater program, is going to bring you into step with this progress and lead you into new worlds of model air sport.

It's going to tell you how to build those record-smashing planes that the last contest brought forth; it's going to give you the key to experiments you yourself can conduct; it's going to introduce you to new scale models—some of them replicas of famous foreign planes; it's going to make available to you in greater degree the services of the growing Airplane Model League of America; it's going to give you a comprehensive course in elementary aeronautics; and it's going to bring the champions of the continent together in a national contest that will be even more memorable than the meet of last June.

Join the A. M. L. A.

TO make the most of the program, enroll in the Airplane Model League of America. Whether you're already one of its 200,000 members or whether you're just starting out, fill in the coupon on this page and send it to League headquarters, American Boy Building, Second and Lafayette, Detroit.

Membership in the A. M. L. A. costs just a 2-cent stamp. The League is headed by Commander Richard E. Byrd, honorary president; William B. Stout, designer of the Ford Trimotor, all-metal monoplane, president; Clarence D. Chamberlin, New York-to-Germany flyer; Major Thomas G. Lanphier, ex-commander of the First Pursuit Squadron; Eddie Rickenbacker, famous American ace, and other great leaders in aviation, vice-presidents.

Chamberlin

Your membership will entitle you to invaluable services. You'll get a free membership card and button. Your technical questions on model plane building—accompanied by a two-cent stamp—will be answered by Merrill Hamburg, secretary of the League and foremost model plane expert. You'll be able to buy, at cost, materials for building airplane models—hard-to-get materials such as balsa, the South American wood that's one-half lighter than cork; bamboo, ambroid cement, special flat rubber for motors, and finely fashioned metal parts.

The League will make available at low cost a two-reel motion picture covering every step in the construction of a model airplane. It will award honor certificates to boys who build models that exceed certain minimum flights. It will tell you how to organize clubs and conduct club activities. It will issue club charters. Experts will tell you how to hold contests and indoor flying circuses.

Send in the coupon to-day and join in the march toward a knowledge of aviation! William B. Stout, League president, says that through building and flying models you learn the laws that even the great three-motored planes must obey—and you learn them better than you could out of books.

Hamburg

Build These New Models

THE November magazine starts you on your program. In that issue you'll get the first set of drawings and instructions that will turn your den into a workshop and your parlor into an airport.

Later, you'll learn to build the improved Baby R. O. G. (Rise Off Ground). During the past year, model fans have constructed R. O. G.'s that will fly for 90 seconds—nearly twice as long as any previous record!

After that, the new indoor endurance plane designed by Ernest McCoy, Detroit model plane builder. This ship, a tractor with cambered (curved) wing and elevator, is capable of flying six minutes. It will climb gradually to a 90-foot ceiling, circle until the motor is completely unwound, and then glide lazily to the floor with a "dead" stick.

Then there'll be indoor commercial models—planes with enclosed fuselages that bear a close resemblance to man-carrying planes and will fly; scale models of famous American and European ships—models that do not fly but teach you the design of man-carrying aircraft; improvements in the outdoor twin pusher, the record-breaking contest ship that seems to have an incurable desire to fly out of sight.

If you're new to model plane building, you may buy from the League for five cents a manual that describes the technique of construction—that tells you how to cover wing and tail with Japanese tissue, how to bend bamboo, how to dope and waterproof surfaces, and how to shape metal parts.

In the spring, the League and associated newspapers and organizations will conduct local contests in every part of the United States. More than likely, you'll be able to enter one of these contests.

And then the National Meet! The meet conducted by THE AMERICAN BOY and sanctioned by the National Aeronautic Association!

Last year, 259 boys from hundreds of cities—from Maine all the way to Honolulu — competed for national honors at Detroit. They competed for six national trophies including the two official trophies of the National Aeronautic Association, for 198 medals, for trips to Europe and summer camps, for free tuition at aviation correspondence schools, for certificates of merit. They banqueted with Edsel Ford and met personally such airmen as William P. MacCracken, assistant secretary of commerce for aviation; Eddie Rickenbacker, Eddie Stinson, Lieutenant Jack Harding, around-the-world flyer; William S. Brock, Detroit-to-Tokio flyer; Edward J. Hill and Arthur G. Schlosser, 1927 winners of the James Gordon Bennett International Balloon Races, and scores of others! They visited the famous Selfridge Field, home of the First Pursuit Squadron, and met Lieutenant-Colonel Charles Danforth, commandant. They inspected and climbed through the Fokker ship, "Josephine Ford," in which Commander Byrd flew over the North Pole. They saw the take-off of the Bennett race and inspected the planes of the National Reliability Tour—nearly every type of ship built in this country to-day!

Building upon its experience in conducting this first contest, THE AMERICAN BOY is planning for you an even greater three days in 1929! Plan, now, to follow the magazine's program throughout the year and to come to the National Meet next summer. Even if you do not win a local contest, you may attend the national providing you find an organization to pay your expenses or are able to afford them yourself.

Stout

Later issues of THE AMERICAN BOY will carry a full announcement of the national meet and will introduce you to new models. If you're impatient to start building now, here are the plans of ships that are available—just send a two-cent stamp to League headquarters and tell which plans you wish:

Baby R. O. G. A plane with a 12-inch wing that will stay in the air from 30 to 60 seconds.

Indoor pusher. A ship with the propeller behind the wing, after the fashion of certain present-day naval planes.

Indoor tractor. The flat-wing type of endurance ship that—up to a few months ago—held the world's indoor endurance record.

Outdoor twin pusher. The two-propeller ship that holds the present world's outdoor endurance record.

Indoor commercial. A plane with a triangular fuselage that flies with the grace and steadiness of a trimotored monoplane.

Hydroplane. Two-propellered pusher, equipped with pontoons, that holds the world's record for length of flight after taking off from water—2 minutes 52 seconds.

Scale models of the Curtiss Army "Hawk," "Spirit of St. Louis," and Ford Trimotor. These are exact non-flying 24-inch replicas of the large ships.

Baby R. O. W. (Rise Off Water). A tiny 12-inch-wing plane equipped with pontoons.

A two-cent stamp will bring you the plans for any of the foregoing ships, and the plans will tell you just how you may obtain materials at cost for building them.

Get started on the most fascinating twelve months of your career. Your first step is to join the A. M. L. A. by sending in with a two-cent stamp the coupon on this page. Do that to-day.

Airplane Model League of America,
American Boy Building,
Lafayette and Second,
Detroit, Michigan.

.....19.....

I wish to enroll in the Airplane Model League of America and thereby to become eligible for the services it extends. I enclose a two-cent stamp for which please send back my membership card and button.

I am renewing my membership.....

I am enrolling as a new member.....
(Put a cross in the proper line above.)

.....
Your name written clearly.

Age..... Year in school.....

Home Address .....
Street and number

City..... State.....

Reprinted from November, 1928 issue of "The American Boy"

Build These All-wood Models

Start With the McLaughlin Glider and the Tichenor Midget—
They're Easy to Make and to Fly

By Merrill Hamburg, *Secretary of the Airplane Model League of America*

Mr. Hamburg.

"DO they fly? Boy! They never fail!" That was what a young friend of mine, the first boy to see the model airplane plans given you this month and to work on the all-wood kit, told me two days after he had the instructions. He wasn't an expert builder, either—he was a new member of the A. M. L. A., and he wanted to know "the right models to begin on."

He bought the new all-wood kit, made the McLaughlin Glider and then the Tichenor Midget Pusher, and now he's itching to go ahead with endurance models. What's more, he has learned the fundamentals of the game—he's prepared for more advanced work. But he hasn't given up the wood models—not by a long shot.

"They're more fun than the organ-grinder's monkey," he told me enthusiastically. "The glider will do long straight glides, or zoom, or loop. With a rubber sling I can get 'way above a hundred feet out of it. And the pusher circles in my living room for half a minute or more. Say! I didn't know how easy model plane building was!"

That is the beauty of these two models. They're easy to build and fly—even though you've never worked with model planes before. And if you're an old hand, they give you a whale of a lot of fun.

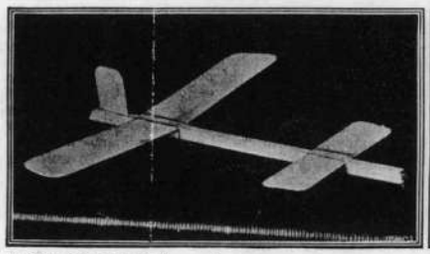
They give you the right start, too, toward the national airplane model contests—toward the trips to Europe, the prizes and cups and medals and other trophies to be offered as awards next year as they were this. You'll read announcements of these in THE AMERICAN BOY from time to time, but start getting ready now.

Start giving yourself the basic knowledge, too, that every pilot or aeronautical engineer must have. "Building models is the best way to understand aviation and its principles," says William B. Stout, noted airplane designer and League president. Orville Wright, Clarence Chamberlin, Commander Byrd tell you the same thing. Here's the way to begin.

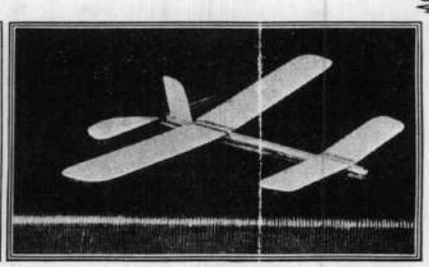
You can provide the materials for building the two all-wood models yourself, or you can buy the Two-in-One All-wood Kit from the Airplane Model League of America—described on Page 64 and have before you everything you need. Your tools will be a sharp knife and some pieces of sandpaper—probably number 00. A small pair of half-round pliers will come in handy for bending the propeller shaft.

If you don't get the special kit, you'll need these materials:

2 flat balsa wings, 1-32 in. x 2 in. x 13 in.
2 flat balsa elevators, 1-32 in. x 1 1-2 in. x 6 in.
1 flat balsa piece for fins, 1-32 in. x 2 in. x 6 in.
1 balsa glider fuselage, 3-8 in. x 3-8 in. x 14 5-8 in.
1 balsa pusher fuselage, 1-8 in. x 3-16 in. x 10 in.
1 balsa propeller block, 3-8 in. x 5-8 in. x 5 in.
1 piano wire front hook.
1 thrust bearing.
1 piano wire propeller shaft.
1 glider hook.
2 bronze washers.
1 rubber motor, 1-8 in. x 22 in.
4 rubber bands.
1 small bottle ambroid cement.



A few minutes' work—then watch it glide!



The pusher is simple, but it flies beautifully.

Next: The McCoy "Mystery Ship"

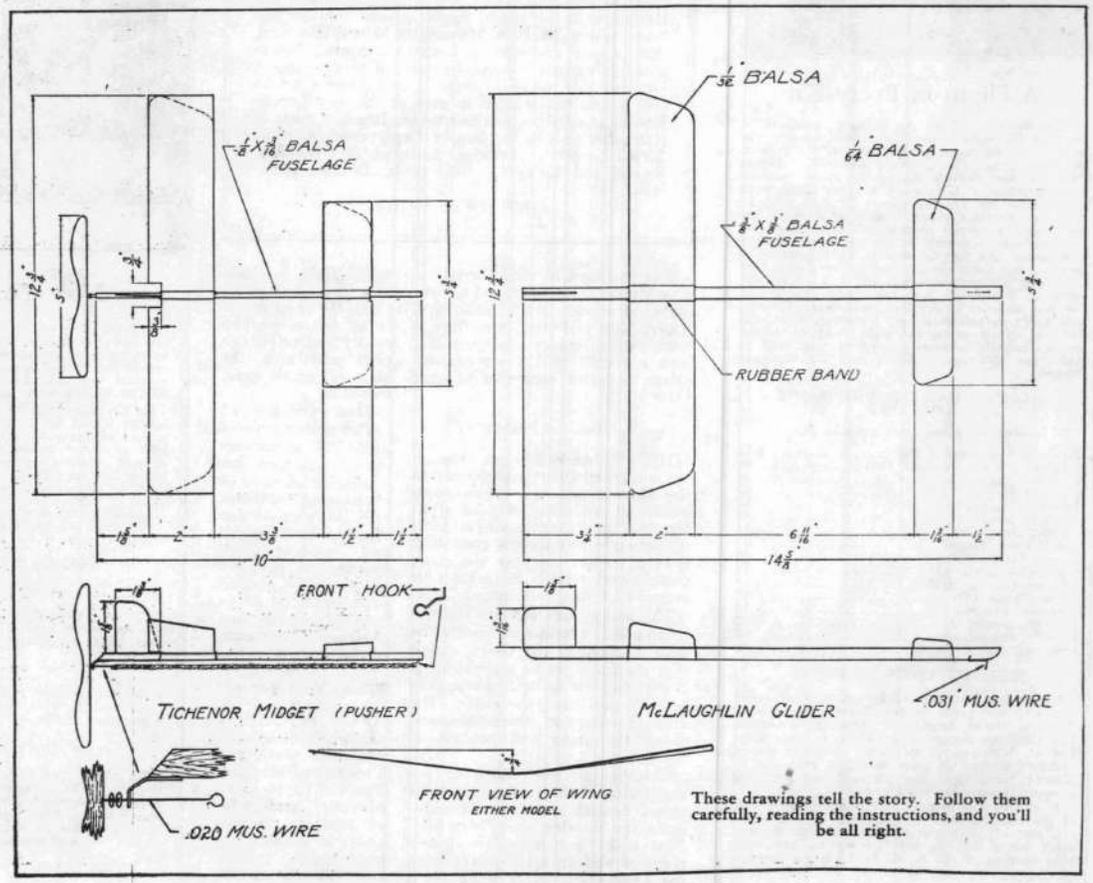
Every model builder in the nation, last June, was talking about Ernest McCoy's "mystery ship," the cambered wing model with which Aram Abgarian won the Stout Indoor Trophy, a world's championship and a trip to Europe. Abgarian had flown his ship 353.6 seconds. Now the plans FOR THAT VERY SHIP, *the best in the history of model aviation, and a special kit to build it, are going to be available to you. Mr. Hamburg talked with McCoy, the designer, and Abgarian, the builder, and obtained dimensions and drawings. Next month in* THE AMERICAN BOY *he will give you full details about this world's championship model—information you can get nowhere else.*

BUILD IT YOURSELF!

Remember, from the start, that the lighter you make your models, the better they will fly. That is why balsa, half the weight of cork, is the wood recommended. That is why ambroid cement, which will hold wood pieces, or wood and metal, together without supplementary fastening, is suggested. And that is why you must work every piece and part down to the finest dimensions consistent with strength.

The McLaughlin Glider—named, as a lot of A. M. L. A. members will know, for George McLaughlin, technical editor of the *Aero Digest* and the hard-working chief judge at the national scale model contests in Detroit last June—is the model you'll first build. Except for sanding and smoothing to size, the fuselage needs little work. Cut to the proper dimensions, it is practically ready to use.

Next cut the fin from the pieces of flat balsa—the dimensions are 1 3-16 in. x 1 5-8 in. Sand it smooth, then cement it at the rear end of the fuselage stick as shown in the drawing.



These drawings tell the story. Follow them carefully, reading the instructions, and you'll be all right.

Build These All-wood Models

(*Continued from page 19*)

If you want to cut a shallow groove in the fuselage to receive the fin, you'll reduce weight a trifle and increase strength.

Right now you've done most of the work. If you're furnishing your own material, you must warp your wing and elevator at the exact center to the dihedral angle shown in the drawing. This you do with steam or heat as explained in the A. M. L. A. Manual which is included in every League kit—on this page you are told how to get this if you are not using the kit. Once you have the warped pieces, you may either leave the ends square, round them or give them any other desired angle. Greater lightness may be obtained by sanding the elevator to 1-64 in., though this is at the expense of strength.

Now, with two rubber bands, attach wing and elevator to the fuselage. Each band goes under the fuselage and is drawn up over the wing or elevator. The drawing shows the model set for a long, even glide.

Your glider's ready to fly! Simple, isn't it?

To launch it, hold it in your hand with the elevator forward, your forefinger at the rear end of the fuselage stick, thumb and second finger grasping it firmly. A little practice will tell you the proper "horse-power" to apply to get best results. It won't be much, for a very little push sends the McLaughlin Glider scooting and sailing along.

By setting the wing forward, you can make it climb; by advancing it still farther, you can loop it. Some fellows, removing the elevator entirely and setting the wing almost at the center of the stick, have obtained four loop-the-loops!

To use the glider with a rubber sling, get a piece of 1-8 in. flat rubber eight feet long, double and tie it, and fasten the ends of this two-strand motor to two stakes set in the ground about three feet apart. Fasten the glider hook (made of No. 13 piano wire, .031 size) into the lower side of the fuselage as shown in the drawing, using ambroid to strengthen the fastening after the prong is pushed firmly into the wood. Catch the hook over the rubber, pull it back five or six feet, and let it ride! One boy sent his glider 200 feet over a big church with a rubber catapult like this. See what your best record will be.

Now you're ready for the Tichenor Midget—a mite, but mighty! Its namesake is Frank Tichenor, a vice-president of the League and the publisher of the *Aero Digest*—a great friend of model aviation. The Midget is a pusher, and a corking good model. You'll recall that Albert Mott of Detroit won the national senior indoor championship, with a record of 342 seconds, by using an indoor pusher of another variety.

Next, the Pusher

THE Tichenor Midget, though not so excellent a performer as the Mott pusher, is a lot easier to build and productive of a lot of interesting stunts. Once you've built it, moreover, you have a good start toward putting together the more complicated model. So take your motor stick and commence.

The motor stick receives the stabilizing fin or rudder in exactly the same manner as the glider, except that the fin is set at a slight angle if the model is to be flown indoors—this makes the plane circle. The drawing tells you dimensions, and shows the angle and position of the fin.

Cement the front hook to the under side of the fuselage, and the thrust bearing to the rear end—again the drawing shows you how. Now take your propeller—already prepared and drilled if you're using the League kit, but a thing you'll have to make according to directions in the Manual otherwise—and insert the propeller shaft. Notice that, since the model is a pusher, the shaft goes through from the straight leading edge. Be very sure that the propeller shaft is straight; otherwise your prop will wobble and upset the balance of the plane.

When the shaft is through the prop, bend the projecting end back upon itself in a U and push the U so that the short end locks itself in the prop. Ambroid the prop lightly all around its hub for strength. Put the two small brass washers on the shaft, slip the shaft through the eye in the bearing, and you may hook the two-strand motor, a tied piece of 1-8 in. x 22 in. rubber, to the front hook and the shaft.

Wing and elevator, you'll note, are almost identical with those on the glider. The elevator is 5-16 in. wider; the wing has wash-in and wash-out, and a slot 3-8 x 3-4 in. cut in it. Once they're made, attach them with rubber bands to the fuselage.

You're ready to take off!

First, you should glide the plane several times to be sure the wing setting is right. When wing and elevator are adjusted so that you get an even, loafing glide, give the propeller 150 turns, counter-clockwise. Hold the fuselage in the right hand, the prop in the left; when you're ready, release the prop and give the plane a gentle push forward.

Then watch her fly!

The pusher type of plane is sometimes erratic, but there are a number of ways of overcoming balkiness One is wing-setting. Another is "wash-in" and "wash-out," a twisting of the two wings (the Manual explains it fully) to increase stability and overcome the torque of the propeller.

What's Your Record?

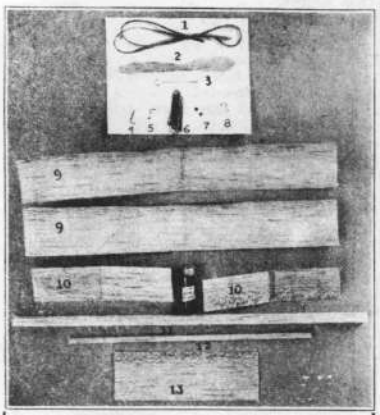
YOU can have a whale of a lot of pleasure with the Tichenor Midget. You can fly it, if it's carefully made, for as long as 60 seconds; 30 seconds is a good flight, though, and will win an official honor certificate if you send in a record of the flight witnessed by an adult, together with ten cents to cover issuing and mailing the certificate.

What's more, you can teach yourself the fundamentals of model building, so that next month, when THE AMERICAN BOY gives you the plans for the McCoy-Abgarian indoor tractor you'll be able to go ahead.

So watch for the tractor. Make use of the League's question and answer service, too; let League headquarters tell you how to organize a local club, how to hold contests, how to get an official charter. Start right away to get ready for next year's national contests.

Remember that, if you haven't the materials at hand, you can join the League and get them at cost. There's a kit for each flying model in these articles.

You're starting right toward a knowledge of aeronautics—perhaps toward being a pilot yourself—by building the McLaughlin Glider and the Tichenor Midget. William B. Stout started with models. So did the Wrights. Why not you?



A Flight in Every Kit

Sometimes it's hard for League members to get just the right materials for building scientific models. Balsa wood grows only in the tropics. Ambroid cement isn't always available. Thrust bearings are ticklish things to make, without costly machinery. Wire parts, too, are often tough assignments for the beginner.

So the Airplane Model League of America has established a special parts-at-cost department for its members—a central supply depot where they can obtain kits for the models Mr. Hamburg is going to tell them about. And in the Two-in-One All-Wood Kit members will get a lot for their money! A finished *bent* balsa propeller, drilled for the propeller shaft! Two ready-warped wings, two ready-warped elevators! Fuselage sticks, cut to size! Metal parts, the right kind of rubber motor, ambroid cement—everything you need to build the McLaughlin Glider and the Tichenor Midget.

HERE'S WHAT THE TWO-IN-ONE CONTAINS

(*Numbers in parentheses refer to picture*)

2 balsa wings, warped (9)	$.12
2 balsa elevators, warped (10)	.08
1 glider fuselage stick (11)	.04
1 pusher fuselage stick (12)	.02
1 bent balsa propeller, drilled (2)	.12
4 rubber bands (6)	.02
1 glider hook (5)	.03
1 A.M.L.A. Manual	.05
1 piece flat balsa for fins (13)	.02
1 propeller shaft (3)	.05
1 thrust bearing, drilled (4)	.05
1 front hook (8)	.05
2 bronze washers (7)	.02
1 rubber motor (1)	.02
1 bottle ambroid glue	.05
1 set of instructions	.01

THE KIT COSTS 65 CENTS

Here's how you get the kit: Send your order and sixty-five cents to the Supply Department, Airplane Model League of America, American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan. Send either check or money order—the check or order should be made out to Merrill Hamburg. The kit will be sent you postpaid. *Stamps are not accepted.*

If you want individual parts, send the total cost of the material you need, figured on the above list, *plus ten cents for packing and mailing.* And don't forget that, to use this service, you must be a member of the A. M. L. A. If you haven't already joined, use the coupon on Page 69 to do so.

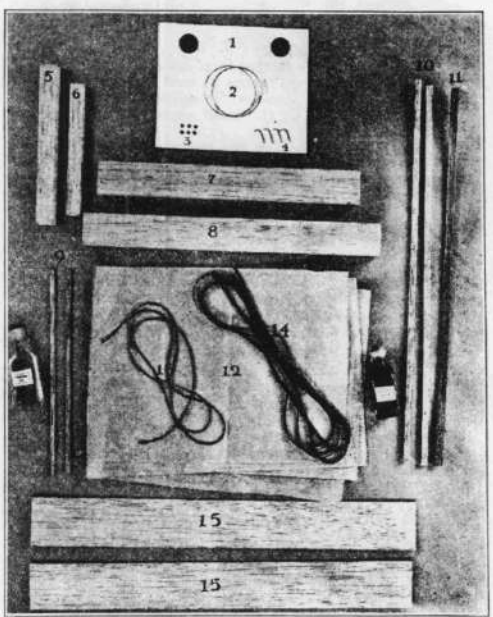
The Manual Tells How

DO you know how to bend balsa? How to cover a contest model wing? Are you up to snuff on propeller carving? Can you make a pontoon waterproof?

Do you know what *air-foil, wash-in, torque* and *drag* mean? Are your tools exactly the right ones? When your wing warps, do you know how to straighten it?

All these things, and a great many more—all the fundamentals of model building—are told in the brand-new A. M. L. A. Manual, by Merrill Hamburg, that is now available to League members. You're going to want this manual as an aid to your model building this year—if you're a new builder or an old. It will be included in each of the *new* League kits, or it may be obtained by sending five cents in stamps or cash to the Supply Department, Airplane Model League of America, American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan.

GET YOURS NOW!



Now You Can Experiment

Lots of fellows want to build models to test their own ideas—use designs of their own, improve on established planes by varying the construction. That is the way the cambered wing indoor tractor and pusher were developed, and that—most likely—is the way some League member is going to win himself a trip to Europe next June!

So the League is announcing, this month, the new Experimental Kit—a kit intended for no particular model, but containing materials so that you can build yourself just about any kind of indoor model that meets your fancy. There are four sizes of propeller blocks—four fuselage sticks—two sizes of rubber motors, enough for four models. There are bottles of banana oil and ambroid, and two sizes of piano wire. There are strips of bamboo and balsa for ribs, wing tips, struts. There is Japanese tissue—a full-size sheet.

With this kit you may find the road to a world's championship!

HERE'S WHAT THE KIT CONTAINS

(*Numbers in parentheses refer to picture*)

1 ½-oz. bottle ambroid glue	2 strips flat balsa (15)
1 ½-oz. bottle banana oil	4 fuselage sticks (9-10)
1 yd. .045 in. square rubber (13)	1 strip bamboo (11)
2 yds. 1-32 x 1-8 in. rubber (14)	1 lot piano wire, size .016 (2)
1 sheet Japanese Imperial tissue, 21 x 31 ins. (12)	1 lot piano wire, size .020 (2)
4 propeller blocks (5-8)	4 thrust bearings (4)
	6 washers (3)
	1 A.M.L.A. Manual
	2 fibre wheels (1)

THE KIT COSTS 95 CENTS

To obtain this Experimental Kit, send ninety-five cents in check or money order (payable to Merrill Hamburg) to the Supply Department, Airplane Model League of America, American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan. The kit will be sent to you postpaid. Parts for this kit are not sold separately. *Stamps are not accepted.*

THE LEAGUE ACCEPTS CASH ORDERS ONLY

A. M. L. A. Chat

ECHOES of the First National A. M. L. A. Contests, held in Detroit last June, come from Los Angeles, where the National Air Races took place early in September. William L. Dennis, 17-year-old Miami, Florida, boy whose expert Curtiss Hawk won the scale model contest, was collecting his first prize—the trip to the races offered by Mr. Frank Tichenor of the *Aero Digest*.

And what a time Dennis had of it! The races themselves—stunting, zooming planes, flashing scouts and graceful lazy transports! A young man known as Lindbergh leading two other planes through a spectacular threesome, with all three ships doing Immelmans, barrel rolls and loops as though one hand operated them. The finishes of the ocean-to-ocean air derbies, the sight of hundreds of planes in the air at one time!

There were Hollywood and the Grand Canyon, the California mountains and the California beaches, too. There was

Dennis and his prize cup.

Mr. Tichenor himself as host to Dennis, and "Tich, Jr." as co-host.

"The national contests lasted two and a half months for me," grinned freckle-faced Dennis. "I wish there were more contests to conquer!"

William M. Kelley of Baltimore, Maryland, takes a page from the books of the transatlantic fliers when he goes out with his twin pusher to try for a record. "We find," he writes, "that we make the best flights in a low pressure atmosphere preceding storm forecasts from the weather bureau."

And Kelley's achievements seem to show that he knows whereof he speaks. "In company with a friend and my father this afternoon," he says, "I flew a twin pusher two flights—one of 12 minutes 15 seconds and a second of 27 minutes 28 seconds. The first flight resulted in a landing, but the plane, the second time, went out of sight behind a white cloud—and was easily a mile or more high! Still rising, too."

More recently, from Columbus, Ohio, comes word of a flight of one hour and four minutes with an outdoor twin pusher. In the national contests one outdoor plane, after disappearing from the judges' sight, rose so high that it was taken by a reverse current of air *in the direction opposite* to that in which it started, and landed in Mt. Clemens, four miles away!

True, these are "freak" records—dependent on exactly the right weather conditions. An outdoor flight of two to four minutes is a very creditable one. But the records show what models will do.

Joe Martin and Edward Cordell of Columbus built a six-foot flying model of a Fokker Super-universal monoplane and took third place with it in a contest at the Ohio State Fair. Then, before they got the plane back, it was stolen. The machine had scarlet fuselage and silver wing. Anybody know anything about such a plane?

Twenty-six boys' leaders—Y. M. C. A. men, vocational training teachers and others—were on hand to attend the first school in model airplane building ever held when it opened in Detroit late in August. The course, under the direction of Mr. Hamburg, was given by THE AMERICAN BOY. It provided the men with groundwork in airplane model building and flying, and gave them hints on club organization, contests and a lot of other features of the science. Those who attended were:

The teachers learned how.

Arthur F. Peterson, Worcester, Mass.; Edmund B. Redington, Owego, N. Y.; Harlan A. Colburn, Battle Creek, Mich.; M. S. Grant, Battle Creek; Lloyd W. Norris, Chicago; Perry S. Bogart, Owego; W. L. Osmun, Cleveland; Eugene Lutzeier, Detroit; John Pollard, Amsterdam, N. Y.; Leonard Popham, Port Huron, Mich.; M. A. Shook, Bay Village, O.; Henry Nessner, Detroit; Edward Walters, Grand Rapids, Mich.; Fred P. Lirette, Ann Arbor, Mich.; Howard Rarick, St. Clair, Mich.; M. Lincoln Miller, Ambridge, Pa.; C. H. Stolpe, Pontiac, Mich.; Walter B. Baird, Toledo, O.; Louis W. Ulrich, Buffalo; Raymond W. Brown, Newark, O.; Howard D. Walters, Fort Wayne, Ind.; L. R. Stolpe, Pontiac; Fred C. Finsterbach, Buffalo; John A. Kubiak, Wausau, Wis.; Henry B. Mulder, Grand Rapids; Wilbur J. Brown, Newark.

Out in Los Angeles they have a junior airport—a big tract of land for the exclusive use of model builders and fliers. And last summer, under the auspices of the Air Cadets of America, a summer camp for "future fliers of the country" was held at Tuxedo, N. Y. Headquarters of the A. C. A. are at 11 West 42nd Street, New York City, under the direction of George R. Coe.

Model aces haven't waited for the new Experimental Kit, announced in this issue of THE AMERICAN BOY, to start experimenting. Albert Bardwell, of Keene, N. H., tells of using aluminum wire for his Baby R. O. G. landing gear. Robert Mertens, Fairview, Pa., built a model of tube and sheet aluminum, with balsa propeller and rubber motor. James Flynn, Newark, N. J., discovered that banana oil could be used in mending broken balsa parts.

And so it goes. What have *you* discovered?

The Elkhart Model Airplane Squadron, the first model club in Indiana to have the official A. M. L. A. charter, is a "he-man rarin' to go club of 12 members," according to Charles Longacre, its secretary. Longacre writes that in the recent Elkhart American Legion Air Circus his club won $40 of the $50 in prizes offered.

Albert Schwarzkopf, Jr., took first place in the outdoor contest on September 14, in his home town, Norfolk, Va., with a good flight of 234 3-5 seconds. Schwarzkopf was a medal winner in the 1928 national contests. Smith McKann won the Norfolk indoor contest, with 164 1-2 seconds. Judges were George A. McLaughlin and Lieut. Alfred J. Williams, famous flier; medals and a cup were donated by Frank A. Tichenor.

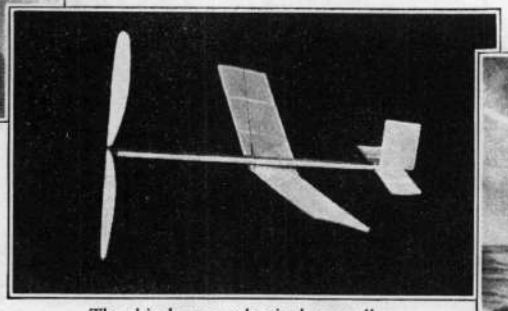
Have you seen "Beginning to Fly," Mr. Hamburg's new book telling everything about model planes? You can borrow it from your library, or buy it from your local book store or from A. M. L. A. headquarters. The cost is $2.50.

Here's the Mystery Tractor

It Has Cambered Wing and Tail and Built-up Fuselage

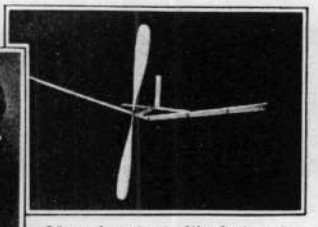
By Merrill Hamburg, *Secretary of the Airplane Model League of America*

Ernest McCoy, Detroit, developed the cambered wing and tail model.



The ship has a twelve inch propeller.

Aram Abgarian, whose plane won him a trip to Europe.



Note the wing's dihedral angle.

"WHAT'S the secret of the mystery ship?"

That query was going round on the day last June when Ernest McCoy, with a record-smashing flight of 271 seconds, won the Michigan indoor airplane model championship. McCoy had developed something new. And he kept it carefully hidden. He obtained permission from the starters to wind his model off in a corner, with only one trusted helper to observe; when his plane came to earth he quickly clapped a box over it.

And so, when the day's trials were over and McCoy had won, everybody wondered:

"What's the secret of the mystery ship?"

Cambered wing, somebody suggested. But a cambered wing on an indoor ship wasn't new—it had been tried and found better than the flat wing in producing lift, but so unstable as to be useless. More winds on his motor? No, for somebody learned that he gave his egg-beater winder, geared five to one, just 190 turns, and that meant 950 turns on the rubber. It would stand 1300.

Two weeks later, at the great Olympia auditorium in Detroit, preliminary trials in the national contest for the Stout trophy began. Again McCoy led. His "mystery ship" flew for 331.1 seconds — five and a half minutes!

McCoy was no longer keeping it a mystery, though. Everybody watched, and before long everybody discovered that, after all, part of the mystery was a cambered wing.

But, unlike previous cambered wing models, it was stable. It climbed steadily and sailed while its propeller revolved; it glided in a long, flat descent when the prop stopped. Why?

The stabilizer was the answer. Instead of being flat, it had a *reverse* camber—it was curved *upside down*. Thus McCoy had learned to take advantage of the known efficiency of camber.

If you were one of the model enthusiasts who attended the contests, you'll remember how cambered wing models sprung up from every model box. It seemed as though fellows had cambered wings concealed in their vest pockets. The work room was besieged with requests for balsa, paper, everything to make the McCoy model.

And that was where Aram Abgarian, Detroit boy whose record of 287 seconds put him at the head of the junior division, came in. Abgarian had a new model ready for the finals — a model with flat wing and tail, but with a feature of his own—a *built-up* hollow fuselage. The day before the finals he was practicing with this model in the Olympia. Bicycle riders were circling the board track, getting ready for races. Abgarian's model went up, circled nicely, glided down—

Squarely onto the board track! A bicycle swerved, but not far enough. The contest model, built-up motor stick and all, was a wreck.

It happened that Abgarian had a second motor stick of the same type. He went home, got to work on it that night. All through the evening he pared and sanded and shaped ribs, wing spars, a paper-thin propeller. He built his wing with camber; he curved the tail surface upside down, as had McCoy. When six o'clock in the morning came, he was just finishing the model.

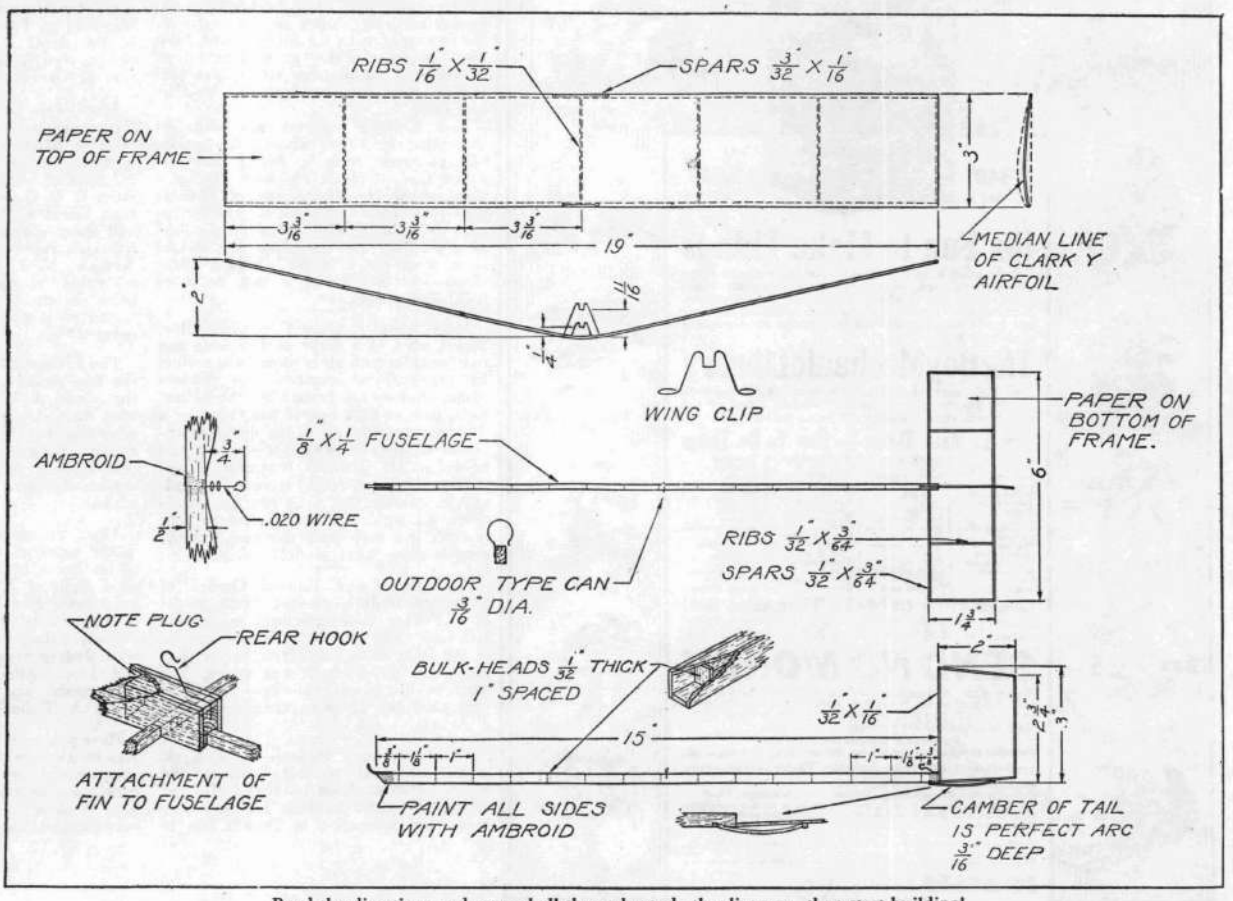
And that night, after he had competed in the outdoor contest at Selfridge Field, he took his new ship, gave its rubber motor 1200 turns — and flew it to a new world's record! It stayed up 353.6 seconds. Albert Mott, with a pusher with cambered wing and reverse-camber elevator, took second, McCoy's record of 331.1 won him third place.

HERE, for the first time, you can get the details of every corner and angle and inch of the plane that won for Abgarian the Stout trophy, a world's championship and the AMERICAN BOY trip to Europe. It is not an easy job to build the McCoy cambered wing, the Abgarian built-up fuselage; they require patience and stick-to-itiveness. But once you have them made properly, they will more than repay the effort. The champion's plane is by all odds the finest indoor model I have ever seen.

To build the McCoy-Abgarian tractor, you'll need these materials:

A balsa wing spar, 1-16" x 3-8" x 19".
Two balsa strips, 1-32" x 2" x 15 1-4".
A balsa strip, 1-16" x 3-16" x 6".
A balsa propeller block, 1-2" x 1 1-4" x 12".
A drilled front bearing.
Two bronze washers.
A propeller shaft.
A rear hook.
An S-hook.
A can (open-side type).

(*Continued on page 50*)



Read the directions and manual all through, study the diagram—then start building!

Two wing clips, front and rear.
A flat rubber motor (1-8 - 30), 31″ long.
A sheet of Japanese Imperial tissue, 10″ x 21″.
A bottle of ambroid.
A bottle of banana oil.

All of these materials are contained in the Championship Kit furnished by the A. M. L. A., at cost, to members (see Page 52). You can, of course, obtain them elsewhere if you wish. Keep in mind that the music wire for the propeller shaft and other wire parts is No. 8 (.020″).

With the materials at hand, you need one more thing—the new A. M. L. A. Manual. This is included in the League kit, or may be obtained for five cents from League headquarters (see Page 52). You should read all these directions, and the hints in the Manual, carefully and completely before starting to work. Study the diagram, too.

Your hardest job is to make the built-up fuselage. Abgarian needed twelve hours for each of the two he built. So count on plenty of time for it.

The outside dimensions of the fuselage stick are 1-8″ x 1-4″ x 15″. For its four walls you need four strips of balsa, 1-32″ thick, 15″ long. Two are cut 1-4″ wide, the other two 1-16″. Before they are cut they should be marked for plugs and bulkheads—the little inside reinforcements set at one-inch intervals.

First, sand carefully a strip of 1-32″ flat balsa, cutting it to the exact 15″ length. Draw light pencil lines across the strip 3-8″ from each end, 1 1-2″ from each end and at one-inch intervals between these last two marks. Now you have located the thirteen bulkheads and the two end-plugs.

Next, split the strip lengthwise—with a very sharp knife and a straight edge—into the four side walls of the fuselage. The Manual tells you how. Take one of the 1-16″ strips and paint the two edges with ambroid, taking extra care not to get it on either face. Lay it flat on the table, and stand the two 1-4″ side walls up against it to form a square-cornered U. If you have laid the strips properly, the pencil lines will correspond exactly; if they don't, some of the strips must be reversed, end for end.

Now, the end-plugs and bulkheads. Cut off two pieces 3-8″ long from the balsa strip 1-16″ x 3-16″ x 6″—the pieces you want, if your U is properly made, will be exactly 1-16″ x 3-16″. Make sure that they fit exactly—they must not bulge the ends—and then ambroid them and set them in place. For the bulkheads, cut a strip 1-16″ wide from the 1-32″ flat balsa, then cut off pieces 3-16″ long—thirteen of them. Every piece must be precise—it must fit neither too tightly nor too loosely. When they are finished and you have found them to fit *exactly* by setting them into place without glue, take them out one at a time, paint lightly with ambroid and reset them.

There must be room left on top of them, of course, so that the fourth side of the fuselage will fit in. Ambroid this in place, then sand the whole stick lightly to finish it.

And you have a fuselage that is stiffer—less subject to twist by the wound motor—than a solid stick, yet lighter by the weight of the propeller. You save that much weight, and weight counts in an endurance model.

NOW paint the stick with ambroid at each end, for added strength, and set the thrust bearing and rear hook in place. Ambroid the can—an open or outdoor type to facilitate winding—in position.

You are ready to build the tail group. The stabilizer is rectangular, hence slightly less efficient than a rounded-tip surface, but has an all-balsa frame, lighter than one employing bamboo tips. Both the fin and the stabilizer are fastened to the fuselage by setting the connecting members into grooves cut into the end of the motor stick; the sketch in the lower left hand corner of the diagram gives you the detail of this. Notice that the base of the fin is set at a light upward angle to permit the rear spar of the stabilizer to come up even with the front spar—otherwise the whole tail would be set at a positive angle of incidence that would prevent the ship from climbing.

The fin is not hard to build. The drawing shows its dimensions. Its bottom spar is 2 1-2″ long, so that it can be set 1-2″ into the motor stick groove cut for it.

Next the stabilizer. It has a reverse camber, you recall. Its ribs are all of balsa, and you curve a piece of 1-32″ flat balsa, about 3-8″ x 2″, over a tea kettle's steam jet to make them. The curve is that of a perfect arc, 3-16″ deep. Once the piece is curved, cut it to the 1 3-4″ length and split it into five identical ribs. Make the two 6″ spars, then assemble the frame—"butt-joint" the ribs to the spars. Ambroid the leading edge of the stabilizer into the groove cut in the motor stick, and the trailing edge to the base of the fin. Cover both fin and stabilizer (on the under side) with paper, and this part of the model is complete.

On the Abgarian model the wing was curved to the median line of a Clark-Y airfoil. An exact-size template for this camber is given you on this page. Using this as a model, you can bend the ribs for your wing to the same curve. Perhaps, though, you'll want to use some different curve. McCoy used another camber, and probably you'll find one to suit you. It is far from proven that the Clark-Y is the best to be found.

The method of making and assembling the wing is much the same as that you used in building the stabilizer. Use extreme care to get it absolutely accurate. Probably you'll want to bend the long piece from which the wing spars are to be cut before you split it—thus you'll get exactly the same degree of dihedral angle into both spars.

Cover the wing, once the frame is completed, and ambroid the wing clips to it. It is wise to be sure the clips fit the fuselage before you attach them, however. You'll save yourself trouble.

YOUR last job is to make the propeller. It is carved from a balsa block 1-2″x 1 1-4″ x 12″—an unusually large prop for this type of plane, hence one which must be made paper-thin. The Manual gives you details of all the steps in its carving. Don't forget that you want it to be the best-made prop you've ever completed—so thin, if it's properly done, that you can bend the blade backward and forward at least two inches without breaking it. Except at the hub, it should never exceed 1-32″ in thickness.

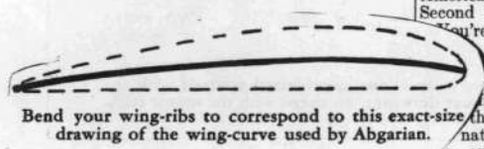
For so large a propeller, the plane must be exceptionally light. That means that there's no latitude for slipshod or "nearly as good" work in the construction of the model. It might be a good idea for you to test your ship with a ten-inch prop when it's finished if you have one available, so as to see how it performs. When it's properly adjusted, put on the longer prop.

The Manual tells you just how to change the wing setting if the ship climbs or dives, how to give the leading edge washin and washout and other ways of improving its flight.

Don't be discouraged if it doesn't suit you the first time you try it. Perhaps the stabilizer angle is wrong; perhaps the prop isn't quite correctly balanced. By repeated trials you can doubtless find the difficulty.

And don't forget that the A. M. L. A. question and answer service is at the disposal of all League members. If you have any kind of model aviation problem that you can't untangle yourself, write to the A. M. L. A. If you haven't joined the League, do so at once—send a two-cent stamp for your membership card and button. The League's address is American Boy Building, Lafayette and Second Boulevards, Detroit, Michigan.

You're going to get a lot of pleasure this championship model. You'll win an honor certificate with it t of 120 seconds or better earns ficial League award. And—with the model may win you a trip to national contests in Detroit next ar, and perhaps a trip to Europe! So start now.



Bend your wing-ribs to correspond to this exact-size drawing of the wing-curve used by Abgarian.

Here's Your Championship Kit

WANT to build this McCoy-Abgarian world record-holding indoor tractor? Here's the kit with the materials for it—everything you'll need to put this corking model together, and an S-hook with which to attach the rubber motor to the egg-beater winder. You may be able to buy materials separately, of course. But if you want the complete kit, ready to start work on, you can get it from the League.

HERE'S WHAT KIT NO. 10 CONTAINS.

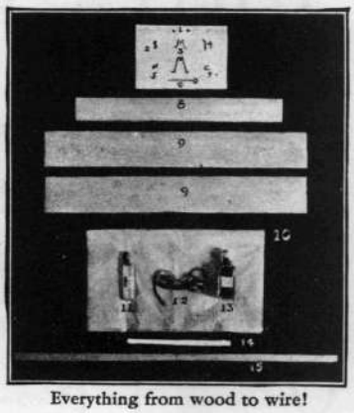
(*Numbers refer to picture*)

1. Two washers	$.02	10. Japanese tissue paper, 10x21	.04
2. Rear hook	.05	11. Banana oil	.08
3. Two wing clips	.12	12. Rubber motor	.05
4. Drilled thrust bearing	.05	13. Ambroid glue	.10
5. S-hook	.05	14. Small balsa strip	.01
6. Propeller shaft	.05	15. Long balsa strip for wing spars	.02
7. Can	.05	A. M. L. A. Manual	.05
8. Balsa propeller block	.08	Set of instructions	.01
9. Two strips flat balsa	.08		

THE KIT COSTS 85 CENTS.

If you want this kit: Send your order for Kit No. 10, with eighty-five cents in check or money order (payable to Merrill Hamburg), to the Supply Department, Airplane Model League of America, American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan. The kit, complete and well packed, will be sent to you postpaid. *Stamps are not accepted.*

If you want the A. M. L. A. Manual alone, send five cents to the League. If you want separate parts instead of the whole kit, send your order with money to cover the cost, *plus ten cents* for mailing and packing.



Everything from wood to wire!

If you do not care to build the Championship Tractor right away, remember that the Indoor Endurance Tractor, the indoor plane with solid fuselage stick and flat wing and stabilizer, is also supplied in kit form—Kit No. 3—by the League, for seventy-five cents. This plane has a record of more than five minutes—nearly as good as the Championship Tractor—and it's a trifle less complicated.

THE LEAGUE ACCEPTS CASH ORDERS ONLY.

A. M. L. A. Chat

IN his spare moments, when he wasn't watching powerful engines turning a marine propeller, A. L. Jackson, engineer on the Great Lakes steamer *Peter Reiss*, built himself an outdoor twin pusher last summer. It was his first attempt at that particular plane—he didn't know how well it would fly.

A passenger who watched him was skeptical. "That thing won't stay up," he said. "Why, I'd give you ten dollars if it flew!"

Jackson thought ten dollars worth winning. He adjusted the wings, wound up the twin motors, and launched the model on its first flight. And it rose, dipped—then rose and soared and flew out of sight miles away, still going strong!

A special feature of the plane, otherwise built from plans in THE AMERICAN BOY, was the cambered, single surfaced elevator. The highest point in the curve was 5-16″ from the chord joining the two ends, one-third of the length of the rib from the front.

Every member of the Clearwater, Florida, airplane model club who wins three League honor certificates is awarded one of the special gold A. M. L. A. pins. The club has made that inducement to its members to improve their model work, and Jack Ransom, one of the club's officers, writes to headquarters that the award is eagerly sought.

In Englewood, N. J., League members are making model airplane building an honest-to-gosh industry!

Under the leadership of Robert H. Clary, these fellows have organized the Clarycraft Shops, and they turn out model airplanes for sale in a big-business manner. "'Yours truly' does most of the work," writes Clary, "while Hugh Parsons, Germain Glidden, Dave Cory and Charlie Luedemann lend helping hands. In general we try to use the mass production principle. Working in units of seven to ten, we make ten props, ten fuselages, etc., and then put them all together."

With the Clarycraft "Endurance Hummingbird," a little monoplane developed by Clary, a flight of 80 seconds was obtained. The ship is of the Baby R. O. G. type, and weighs about one-twentieth of an ounce.

FIFTEEN TOWNS! That's the number now air marked through the efforts of the boys enlisted in THE AMERICAN BOY Air Marking Campaign. Four were announced in October. Here are the eleven added:

Valley City, North Dakota; Compton, Illinois; Canisteo, New York; Marlboro, New Hampshire; Parma, Ohio; Laurium, Michigan; Auburn, New York; Ashtabula, Ohio; Denver, Colorado; Newburgh, New York; Richmond, Indiana.

Thirty-three campaigners in these towns have earned Honorable Discharges signed by the sponsors of the project. And among these sponsors are:

Herbert Hoover; General J. E. Fechet, chief, U. S. Air Service; Admiral William A. Moffett, chief, Bureau of Aeronautics, U. S. Navy; Frank A. Tichenor, publisher, *Aero Digest* Magazine; Griffith Ogden Ellis, editor, THE AMERICAN BOY Magazine.

Nearly 2,000 boys have enlisted in the campaign. Join them, and help make America safe for pilots. Fill out the coupon and send it with a two-cent stamp to headquarters. To-day! You'll get back a plan of attack that will tell you how to carry the job through.

American Boy Air Marking Headquarters,
550 West Lafayette Boulevard,
Detroit, Michigan.

I wish to enlist for service in the American Boy Air Marking Campaign. I enclose a two-cent stamp to cover postage on the plan of attack.

Signed .....
(Write clearly)

Street .....

Town .....

State..... Age.....

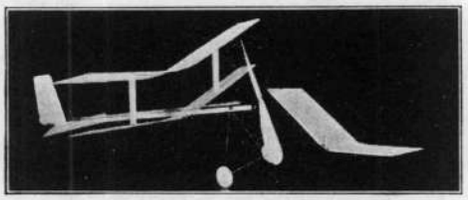
Build the High-Climb R.O.G.

Then Change It to a Soaring, Lazy Biplane

By Merrill Hamburg

Secretary of the Airplane Model League of America

Here it's a high-climb R. O. G.—



but here it's a soaring biplane!

342 Seconds!

Some flight!

Albert Mott made it, in the First National A.M. L. A. Indoor Contest last June, with his indoor pusher, and won senior first prize, a cup, a medal, $200 and a summer in camp. Only one model flew longer than his. He developed his plane from experiments with the pusher introduced last year. The pusher, says William B. Stout, A.M.L.A. president, is the coming type. Why not try some experimenting yourself? The kit may be obtained from the Supply Department, Airplane Model League of America, American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., and it costs only 65 cents in check or money order. Easy to build, too. There will be no new indoor endurance pusher in THE AMERICAN BOY'S airplane model series this year. But there's a good chance that somebody will build a pusher that will beat the tractors hands down!

ONE day last spring a group of model experts was demonstrating special models before A. M. L. A. members in Albany, New York. The flights were taking place in a big armory, and somebody asked how quickly a Baby R. O. G. could reach the ceiling.

"Here's one that'll get there in about a second," said one of the experts. Some of the boys looked at him doubtfully, for the ship he held in his hand was a little biplane, one that soared beautifully but wasn't made for high climbing or speed.

But he knew what he was talking about. He took his jackknife from his pocket, and with careful strokes he cut the top wing squarely off. He adjusted the wing he had left, wound up the ship and launched it.

And it shot roofward like a rocket! In one big spiral it almost reached the top of the hall. And the crowd of watchers went wild.

Here's your chance to learn how to build that same high-climber, then convert it into a biplane. You'll find it, when you have finished it, a dandy ship for exhibitions. You can show it before your school, or your club, or your dad's luncheon group; you can entertain endlessly with it. And you'll find that, with a pin through the propeller hub, it can't be beat for "balloon-strafing."

To build this two-winged model you'll need the following material—all of it is contained in the High-Climb R. O. G. Kit furnished by the League and described on Page 38.

A balsa propeller block, 3-8 x 3-4 x 5 inches; a flat balsa strip for spars, ribs, etc., 1-16 x 2 x 12 1-2 inches; a balsa motor stick, 1-8 x 3-16 x 10 inches; a strip of bamboo, 6 inches long; a sheet of Japanese imperial tissue, 10 1-2 x 15 inches; a piece of .016 music wire, 10 inches long; a drilled thrust bearing; a propeller shaft; two bronze washers; a rear hook; four wing clips, two front and two rear; two rubber motors, one high-climb type, 1-8 x 30, the other duration type, .045 square, both 21 inches long; two fiber wheels; a two-dram bottle of ambroid; a two-dram bottle of banana oil.

The first thing to do is study the drawing carefully. Be sure you know every part, and just where it goes. Read this article all the way through before you commence to build. Familiarize yourself with everything in the A. M. L. A. Manual, contained in every kit or obtainable from League headquarters for five cents. This article assumes that you have studied the Manual.

Now start on your motor stick.

YOU'LL want a fairly heavy stick, for the high-climb monoplane takes a husky motor—two strands of 1-8 x 30 flat rubber. Sand the stick down to absolute uniformity, 1-8 x 3-16 x 10 inches. A coat of banana oil will strengthen it if the strain of the motor seems a little too much for it; but this also adds to its weight.

Cement the rear hook and the thrust bearing into place, following the drawing. Then get to work on the tail group. The fin, like the championship tractor you built last month, has an all-balsa frame. Cut balsa 1-16 inch in width from the two-inch flat stock—the Manual tells you on Page 5 how to do this. Make the fin by ambroiding three pieces—1, 1 1-2, and 2 inches—together as in the drawing, then fit a fourth side to these three.

One-half inch from the rear end of the motor stick, cut a tiny groove for the cross spar of the stabilizer. The 4 inch spar you can take from the 1-16 inch strip you've already cut from the flat balsa. Sand it down to size, 1-32 x 3-64 inch. Ambroid it into the groove so that its top is level with the motor stick.

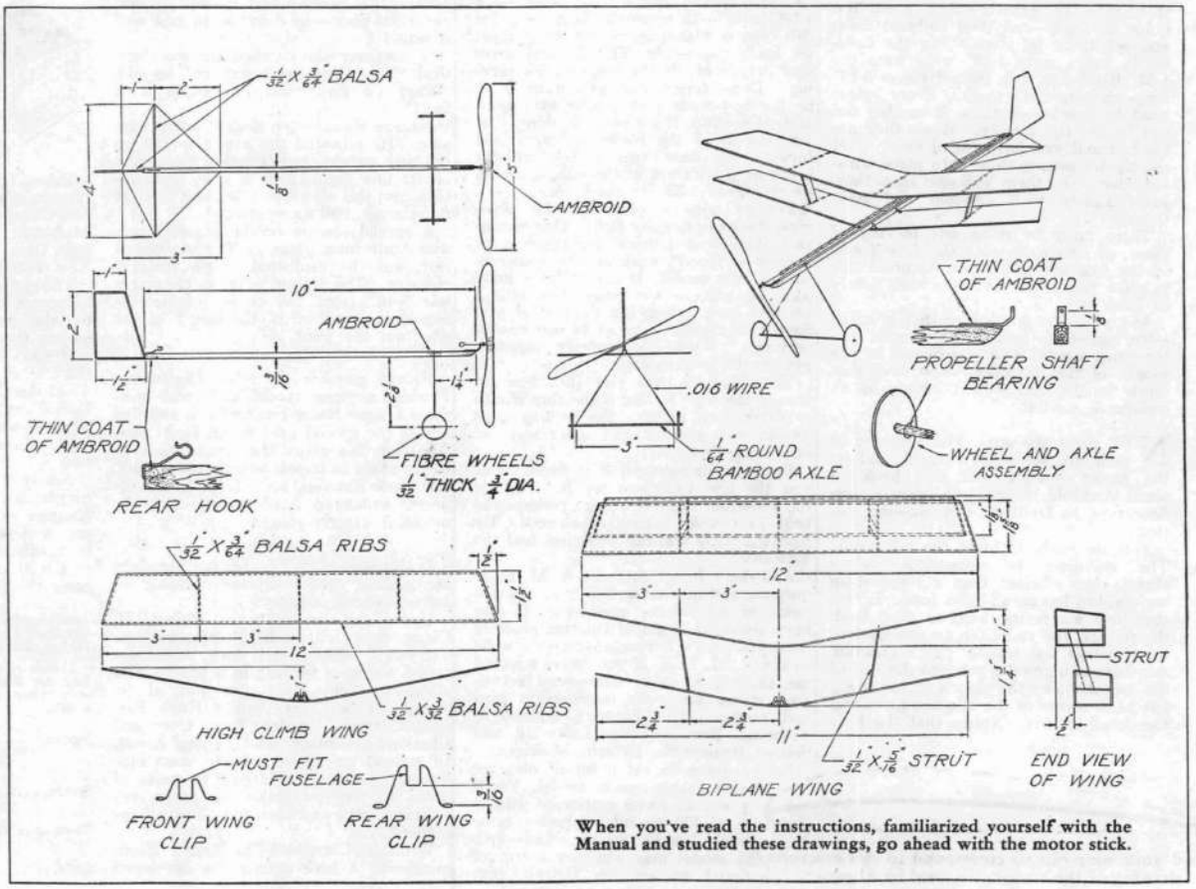
Now cement the fin to the motor stick. Note that the two pieces are "butt-jointed"—that is, they do not overlap, but are joined where they meet with ambroid. Be sure that the fin is vertical—that is, perpendicular to the crosspiece. Check this by laying the fuselage flat on a table and lining the fin up with some vertical line, such as the edge of a square block.

You're probably going to fly this model indoors, so you'll want the fin set at a tiny angle—the rear edge should be 1-8 inch to the left when it is dried. You can increase the angle, if you desire, by breathing on the finished fin—warm damp air will soften it.

Notice that the stabilizer consists only of the cross spar and the paper covering—there is no thread or balsa outline. Lay out the shape of the stabilizer on your Japanese tissue, therefore, being sure that you're leaving sufficient for the three wing coverings. Then fasten the paper to the fuselage and spar with banana oil—Page 7 of the Manual tells how. Cover the fin, too—one side only.

You have materials for three types of landing gear. In the drawing you see a music wire and bamboo gear. The wire is bent at the center to fit the motor stick; the sides of the V it forms are 2 7-8 inches long and the ends form 1-16 inch loops. Through the loops is thrust the 1-16 inch square bamboo axle, with its ends sanded round. The two wheels are ambroided to the ends of the axle.

If you make the landing gear of bamboo or balsa, it should be of the "split" type—without a complete axle. Bamboo struts should be (*Continued on page 36*)



When you've read the instructions, familiarized yourself with the Manual and studied these drawings, go ahead with the motor stick.

Build the High-Climb R. O. G.

they should be ambroided in place 1 1-4 inches from the front end of the motor stick, as shown in the drawing for the wire gear. Make two small axles of wire bent to L-shape, and cement these to the struts to protrude to the sides. Slip the wheels on them, and put drops of ambroid or hubs made of tiny pieces of balsa on the ends to hold the wheels on. Since these axles are stationery, the wheels must turn.

Fiber wheels are furnished in the League kit. You can make wheels of thin balsa, 3-4 inch diameter, or of paper. The paper wheel is a very flat cone; from a circle of stiff paper a little larger than 3-4 inch in diameter cut a segment like a narrow piece of pie, then glue the two edges together. These are excellent on the split landing gear.

YOUR propeller is carved from a balsa block 3-8 x 3-4 x 5 inches. Page 7 of the Manual gives you details of the job. Remember that a prop should be perfectly balanced, and that its blades should be no more than 1-32 inch thick.

Be sure that the propeller shaft is perfectly straight so that the prop will run true. Hook up the propeller and the fuselage as shown in the drawing. Tie the ends of a rubber motor and attach it. Now you're ready for the wings.

Though the three wings are of different sizes, they are built in exactly the same manner, with the same dihedral angle. So you can split from your flat balsa strip a piece wide enough for six wing spars, and mark it where you want to cut it later (both for width of the spars, 3-32 inch, and for the length—two of 12 inches, three of 11 inches and one of 10 inches). Remember that spar length should be measured from the center to the ends—that is, spars should be 6, 5 1-2 and 5 inches in each direction from the center. Bend the piece to the proper angle in the manner suggested by the Manual, then split off the separate strips. Cut and sand down the cross ribs—they come from the flat balsa piece also. Then ambroid the pieces together and cover the frames with Japanese tissue.

Add the wing clips to the high-climb monoplane wing, and that part of your job is done. Better give the plane a try and yourself a rest before going on with the final work!

The biplane wings have "positive stagger"—that is, the upper and larger wing is set ahead of the lower. Positive stagger, you've noticed, is usually employed on big biplanes. It throws the greater part of the load on the upper wing, and increases the efficiency of the two wings.

The "gap" or distance between wings is 1 3-4 inches. Don't make it any smaller—if you do, you won't be able to get the finished motor stick in between the wings!

Cut the ends of the balsa struts, pieces 1-32 x 5-16 x 1 3-4 inches, at an angle. To get this angle correct, make a model of the strut on paper. Draw two lines 1 3-4 inches apart, and connect them with two lines 5-16 inch apart, the connecting lines 1-2 inch farther to the left where they meet the top line than they are where they meet the bottom line. Cut the balsa struts to fit this model.

Be sure, in joining struts to wings, that you ambroid the strut to the balsa rib rather than to the paper. You'll have to scrape away bits of paper on the lower wing to do this; but remember that it's necessary for strength.

Now your job is done. You've built yourself an all-service ship, one that will stunt and zoom and loop with its monoplane wing and its flat motor, or soar for duration with either the monoplane or the double wing and its duration motor. The Manual tells you how to adjust it for various kinds of flights. But you'll learn a lot by experimenting with it yourself.

And it will bring you a lot of fun from contests. You can win a League honor certificate for a flight of thirty seconds with the ship, using either wing. You can make it fly for close to two minutes if you build it with extreme care and wind it properly. You will learn a lot that will help you toward your city championship and the second National A. M. L. A. Contests, to be held in Detroit next June, with it.

Remember that the League wants to help you in any way you can think of. It will answer your aeronautical questions, it will give you suggestions for forming clubs and holding contests, it will furnish model airplane information to your manual training teacher. Always send a two-cent stamp for reply to your queries. And look for the airplane model articles that are coming in THE AMERICAN BOY in the next several months—they'll tell you about prize-winning models and about arrangements for the contests. Don't miss them!

Raymond Phillips, of Binghamton, N. Y., is going to be one of the first A. M. L. A. members to build this new biplane-monoplane "if the money holds out." Phillips writes, "I was mightily pleased to find out, in the November AMERICAN BOY, that you were announcing *two* new kits. I have built a model of every one of your planes, and intend to keep it up if the money holds out. Please send me the Experimental Kit and the All-Wood Kit. I enclose a money order.

"I have all afternoon to make and fly airplanes. I find that a candle or gas flame is most satisfactory for bending bamboo, and that a biplane R. O. G. flies slower and higher than the single wing variety, also makes perfect three-point landings with slow landing speed. I've also discovered that, if talcum powder is put on the rubber bands occasionally, they will outlast two pairs."

Here's the New Two-Wing R. O. G. Kit

It Replaces the Old R. O. G.

1. Two fiber wheels	$ .02
2. Four wing clips	.20
3. Music wire, No. .016	.01
4. Propeller shaft	.05
5. Rear hook	.05
6. Thrust bearing	.05
7. Two bronze washers	.02
8. One strip flat balsa	.04
9. Balsa propeller block	.04
10. Ambroid cement, 2-dram	.10
11. Balsa fuselage	.02
12. Bamboo strip	.02
13. Banana oil, 2-dram	.08
14. Japanese tissue paper	.04
15. High-climb rubber motor	.02
16. Duration rubber motor	.02
A. M. L. A. Manual	.05
Instructions	.02
Total	$ .87

A. M. L. A. Chat

Model Plane Building Is a World-wide Sport!

ONLY a few years ago there were, at most, several hundred expert model builders. To-day there are some 200,000 members of the A. M. L. A. alone. Letters come from Stockholm and Bombay, Florence and Tokio. The Model Aircraft League of Canada has been formed. Australia is planning an A. M. L. A. of its own, to work directly with the League here. England has had the Society of Model Aeronautical Engineers for some years; France wants a model aircraft organization, and has written to League headquarters for suggestions.

Last summer an international meet was held at Croydon Airdrome, London, and honors were divided by American and English entrants. Now announcement is made of the Wakefield Cup for international competition. Sir Charles Wakefield, famous British patron of aeronautics, is the doner. Sir Charles specifies that the annual competition for the cup be held in England, that any form of power may be used, and that models must have completely enclosed fuselages, hiding their motors. Thus the competition will be for the type of miniature airplane commonly called "commercial model" in this country. The only limitation is that a cross section of the fuselage must have an area, in square inches, of the square of the length of the model divided by ten. If your model is thirty inches long, divide thirty by ten and square the quotient: the fuselage cross section must contain at least nine square inches.

The Wakefield Cup.

The second A. M. L. A. contests in Detroit next June will have international flavor, too. Many members of the Model Aircraft League of Canada plan to enter. Which means that Canadians may win the American model plane championships!

"It will soon be just a year since a copy of THE AMERICAN BOY came into my hands and I built the little R. O. G.," writes Lawrence E. Hankammer, of Des Moines, Iowa. "That little plane started me in the greatest sport of the day, model airplane building. Please send me my new membership card and button."

"I appreciate your aid during 1928," says Loren R. Burkholder of Dover, Ohio. "I have learned very much from the material you sent me. It certainly was helpful."

"I want you fellows at Detroit who are running the service end of this League to know that we fellows building models sure do appreciate this being able to get first class supplies at a reasonable price!" This from Richmond Sonrack, of Portland, Oregon.

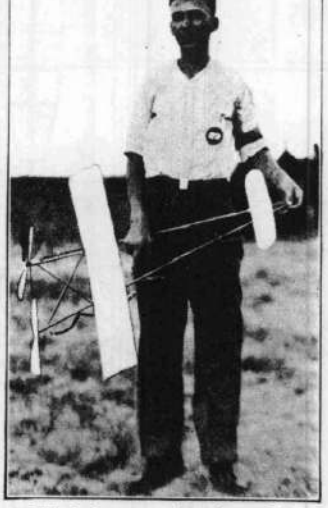
And they come like that to League headquarters in every mail. What can the League do for *you*?

Speaking of scale models, Rudy Germain in Detroit built one—an army Hawk—that proved this type of ship could be built to fly. Germain used a twelve-inch wing span and a corresponding fuselage length—about seven inches. The model is chiefly of balsa construction—balsa longerons and wing ribs, balsa struts and landing gear, balsa wheels and balsa prop. Cross members in the fuselage are of 1-64 inch bamboo, leading edge on the wings are five strands of No. 100 cotton thread. Covering is entirely of Japanese imperial tissue, the wings dyed yellow with Easter egg dye mixed with a six-to-one solution of acetone and banana oil; the fuselage is painted olive drab with a very thin paint. Control surfaces are adjustable.

The notable feature of Germain's model is the detachable nose—the prop, "motor" and motor stick (six inches long) all come loose. They are attached to the fuselage by means of a tiny music wire prong which fits into a hole in the forward balsa fuselage cowling, and an ordinary snap like those used on women's clothing.

With six strands of very fine square rubber, wound to about 150 turns, Germain obtained flights of 17, 20 and 21 seconds. He did this with a five-inch propeller, its blade 3-4-inch wide at the widest point. The model takes off from the ground; with the toothpick prop in the picture it will climb very rapidly.

League members write in to say that they are watching Russ Farrell on the movie screen and getting as much fun and thrill from his exploits as they have in the magazine. Russ is played by Reed Howes, stunt flyer, in the Educational Pictures series made from the Thomson Burtis stories which have appeared in THE AMERICAN BOY. The pictures are being shown all over the country. Tell your neighborhood exhibitor he can get the Russ Farrell series from Educational Film Exchanges.



Fish had square wing tips on his winning model.

This Hawk flies for twenty seconds.

Wayne Brown, of Andalusia, Alabama, drew up workable plans for an ice plane—modeled somewhat after the Rassner hydroplane described last March in THE AMERICAN BOY. His trouble was finding ice in Alabama to try the model out! A number of builders have made up successful ice models. With balsa skis, fairly short and wide, they take off from the ice and fly splendidly.

The outdoor twin pusher which won for Lloyd F. Fish, Washington, D. C., fifth place in the First National A. M. L. A. Contests at Detroit last June has brought him further honors. On July 14, in Washington, it flew for five minutes fourteen seconds above Bolling Field—that made him one of Washington's official representatives at the annual playground contests in Atlantic City in October. And in the playground contests, in spite of a gusty day, unfavorable for flying, it remained aloft for two minutes twenty-five seconds and won first place in the senior outdoor event.

Herbert Dorsey, also of Washington, was all-round senior champion, placing first in the outdoor speed event and winning points in seven other events. Ernest Marcouiller, Evanston, Ill., was second, and Fish third. Edwin O'Donovan, Topeka, Kansas, was junior champion with points in nine out of ten events, indoor and outdoor; Robert Atwater, Elmira, N. Y., was second, and George Bell, Washington, D. C., third.

The ship is made in accordance with Mr. Hamburg's plans as given in THE AMERICAN BOY just a year ago, except that it has square wing tips——it is cut off at the two end ribs, for lightness. Fish built the plane largely from a League kit.

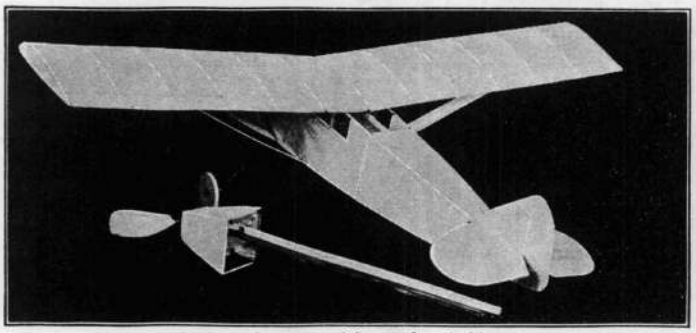
The best individual record made in the contest was that of Tudor Morris's hydroairplane. Morris's ship flew for twelve minutes 30 seconds—it took off from a pond, climbed 700 feet and flew nearly a mile over the ocean before it descended. Coast guardsmen in a surf boat rescued the plane, uninjured.

Morris lives in Peru, Indiana, where he works with Bertram Pond, former national outdoor champion, and Virgil Rassner, designer of the model hydroplane described in last March's AMERICAN BOY. His new record displaces Pond's, two minutes fifty-three seconds.

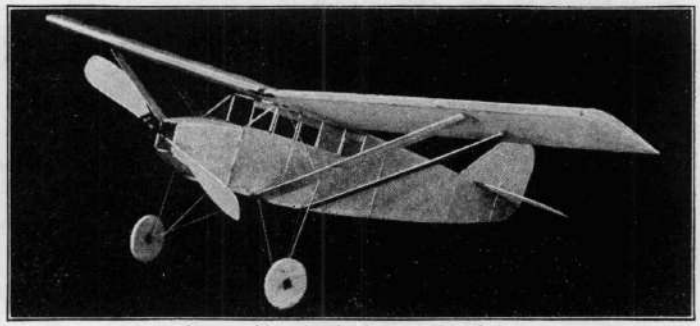
Morris's scale model of a Fairchild cabin monoplane won second place at the national contests in Detroit in June.

Build a Flying Stinson-Detroiter

Here's a Two-Foot Model That Flies and Looks Like a Real Ship



Nose and motor stick are detachable.



It resembles closely the real ship, below.

By Merrill Hamburg

Secretary of the Airplane Model League of America

REMEMBER when, in 1927, Eddie Schlee and William Brock flew from Detroit across the Atlantic, across Europe and Asia and all the way to Tokio in record-breaking time? Or when, last year, Eddie Stinson and George Haldeman established a world's endurance record of more than 53 hours? Or, again, when the Mexican government put into operation a regular air-line between Laredo, Texas, and Mexico City?

If you're up on air events, you remember all of these. And likely you know that the airplanes used in them were Stinson-Detroiters, ships built by one of the vice-presidents of the Airplane Model League of America. This month you're going to get plans and directions for building a two-foot model of this famous ship—it's a model that really flies!

As a rule a model that approximates a man-carrying plane in scale dimensions isn't balanced properly to take the air. But this one, almost an exact miniature of the Stinson-Detroiter, soars and circles beautifully. And it isn't hard to build.

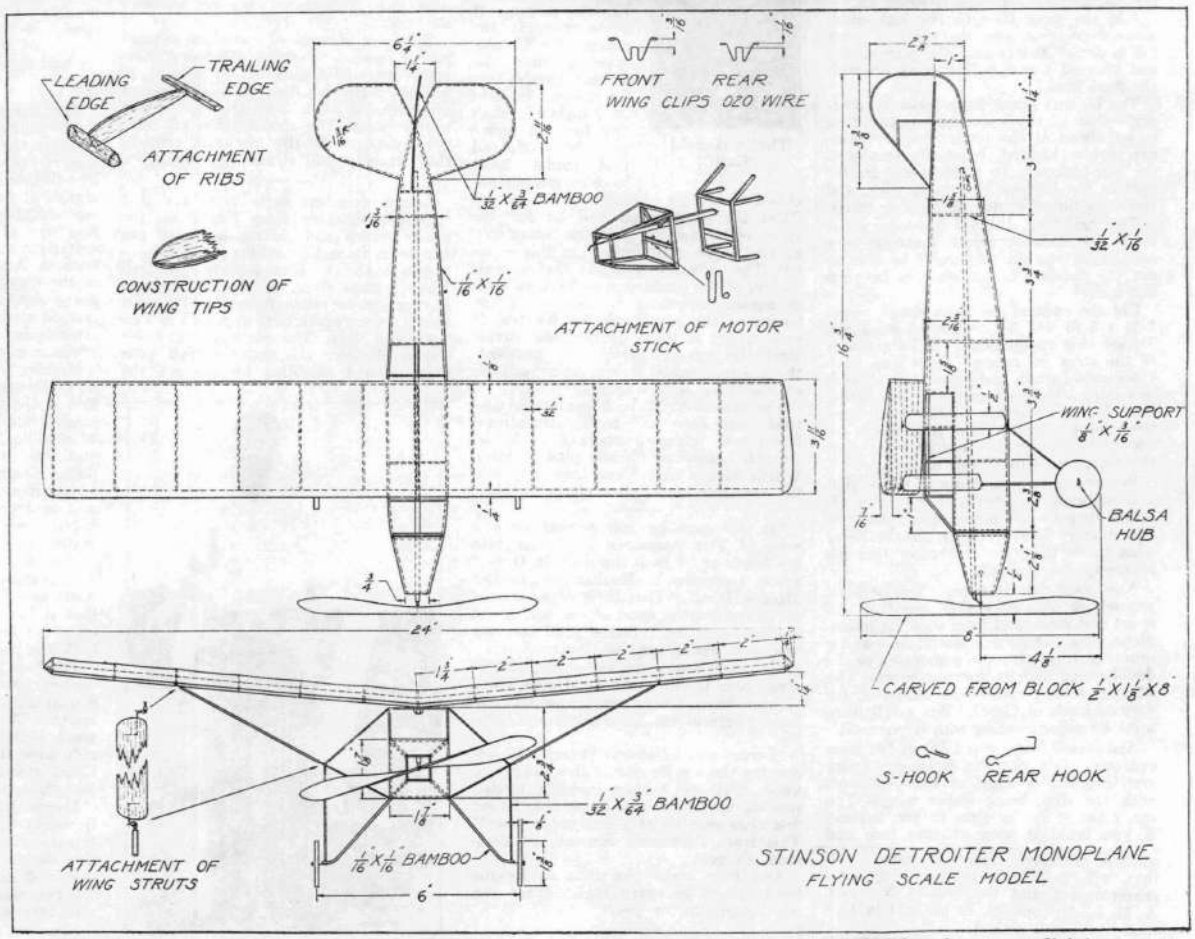
The League is furnishing full-size scale model drawings for the Stinson-Detroiter, also—drawings that will help you League members interested in reproducing the ship down to the last detail to build a two-foot replica which you may enter in the national scale model contests in Detroit in June. Since contest models don't have to fly, they stand a better chance of reaching perfect accuracy than the flying model described in this article, and that's why the prints were made. Because of lack of space, the big drawings (they measure 34 x 44 inches) aren't pictured in THE AMERICAN BOY. But you get them by sending twenty cents to League headquarters in Detroit—and perhaps you'll win yourself a trip to Europe!

And here's good news for the long list of League members who are looking forward to the Second National A. M. L. A. Contests in Detroit in June—there's to be a special unofficial exhibition contest for commercial models. It won't be one of the official contests, but it will take place at the finals of the Stout Indoor contests, and there will be but one restriction on models—they must have a built-up fuselage with a maximum cross-section whose area is equal to, or greater than, the square of one-tenth the length of the ship (the Stinson-Detroiter meets this restriction). The formula is the same as that used for the Wakefield Cup competition in England—maximum cross-section of fuselage at least equals $\left(\frac{\text{overall length}}{10}\right)^2$.

What's more, the two winning models will make their owners A. M. L. A. commercial model champions; and, if these champions wish, the two fellows who win trips to Europe as guests of THE AMERICAN BOY by winning the indoor and outdoor championships will take the ships to England, carefully packed, and there fly them against British builders for the Wakefield Cup. This cup was pictured in the January AMERICAN BOY—how'd you like to see it on your mantel?

Building the flying model of the Stinson-Detroiter is a job that takes time, but no greater skill than does the construction of a good endurance model. Before you start to work, be sure that you are thoroughly familiar with the A. M. L. A. Manual, included in every League kit or available at headquarters for five cents, and with the diagrams in this issue. Read all through these instructions first, too. Then lay out your materials—everything you'll need, from paper-thin balsa to wire and thrust bearing, is included in the League kit—and get to work.

To build the ship you'll have to have: two balsa leading edges, 5-16"x5-16" x12"; two flat balsa strips



When you are familiar with every detail of these diagrams, the Manual and the article, start building for a pretty flight!

for small parts, 1-16″x1 1-2″x12″; fifteen "M-6" balsa ribs; balsa motor stick, 5-32″ x1-4″x13 1-2″; flat balsa for wheels and wing support, 1-8″x1 1-2″x6″; balsa propeller block, 1-2″x1 1-8″x8″; two strips of bamboo, 1-16″x1-4″x12″; one thrust bearing; one rear hook, one propeller shaft, one S-hook, two wing clips, eight hooks and eyelets and two special fuselage nose clips, all of .020 music wire; two brass washers; two sheets of Japanese tissue, 21″x31″; 2 drams of ambroid; 4 drams of banana oil; a rubber motor, 1-8″x1-30″x 52″.

The two photographs show the model you want to build. The differences from the large plane are in the front cabin windows and the engine cowling, made square for simplicity. Note, too, that the diagram shows a difference in the forward wing struts, made full-length on the model in the picture. On the real ship they are shorter than the rear wing struts, and the diagram shows them true to scale.

The wing is of the built-up type—your Manual tells you how to make it, Page 6. Follow the dimensions given in the diagram. The wing section is known as the M-6 airfoil, the same as that used on the large plane. With this article you are given an exact-size pattern for this wing —you may cut your ribs on this model from 1-32″ balsa, or use the ready-cut ribs in the League kit.

Assemble the two halves of the wing separately. Glue the ribs to the leading edge as shown in the detail drawing, then attach the trailing edge. Your kit furnishes special pieces of balsa for the leading edge; you cut the trailing edge from flat balsa, making it 1-8″ wide. Form the wing tips by gluing ribs, with their lower surfaces trimmed to a straight edge, to the two end ribs at right angles (see diagram). You'll find that the kit furnishes 15 ribs, 13 for cross-ribs and two for the tips.

Now put the two halves together. Remember that you must give the wing dihedral angle; to do this glue the two halves in a flat V, with the ends 1 1-4″ higher than the center. The ends of the leading and trailing edge spars are the points of contact—and don't forget the thirteenth or center rib. You can hold the two halves in place while the ambroid is drying by putting a block 2 1-2″ high under the tip of one wing, allowing the other to lie flat on your work table. When the ambroid is set, cover the wing with paper as directed in the Manual.

Attach the wing clips to the center of the wing, being sure that they are glued to wood, not paper. Fasten four small eyelets to two of the cross ribs as the drawing shows, so that you may hook the wing struts to them.

Now start on the fuselage. You'll make it in two sections, as the detail drawing marked "attachment of motor stick" indicates. The longerons are made of 1-16″ balsa, and the crosspieces of balsa 1-32″ x1-16″, split from your flat pieces; you can get the dimensions of the various sections directly from the drawing.

See why it's a good idea to make the nose and the motor stick all in one piece, with the motor stick unconnected to the main body? In the first place, it's easy to replace the motor or make minor repairs; in the second the winding of the motor puts no twisting strain on the body. You attach the motor stick, which is 5-32″x 1-4″x13 1-2″, to the nose by ambroiding it to the top of the small square opening at the front, and to two diagonal braces at the rear frame. The nose and the body are hooked together by means of two clips of .020 music wire, shown in the drawing. Ambroid is used, of course, to attach rear hook, thrust bearing, clips and other metal parts to the model.

To the top of the fuselage, in the opening forward above the windows, you glue the wing support—its upper edge is flush with the top of the fuselage frame. Make it of balsa, 1-8″x3-16″x5 1-8″.

COVER the fuselage and the nose with paper, as explained in the Manual. Leave open the section just under the wing, so as to facilitate its adjustment. You may cover the windows with isinglass or some such glassy, light-weight material, if you wish—[illegible] oil is the adhesive used. You can obtain the "window panes" from the wrapping of a package of candy!

The rudder and fin frame is formed from bamboo, split very thin and bent to shape. The diagram shows a balsa right angle on the combination fin and rudder—this is merely to indicate where the rudder would be hinged on the large plane. The two could be made separate and hinged with music wire, but this isn't advisable on a flying model. Better make them of one piece and set the whole fin at a slight angle, as shown in the top left drawing.

Because the tail group must be very light—else the model will be tail-heavy—the stabilizer and elevators are made with balsa frame. Bending balsa is a delicate job, but you can do it nicely by following instructions in the Manual. If you don't care to do this, substitute thin bamboo. You will probably need additional weight on the nose to make up for it, but this can be taken care of later.

Follow the Manual, Page 7, for instructions as to how to carve your propeller. This model takes a tractor prop, with the center section cut away from the trailing edge.

The landing gear is made from bamboo split 1-16″x1-8″. Bend your pieces to the shapes shown in the drawing, then split it to 1-16″ square strips. The wheels are all-balsa, 1-8″x3-8″. They turn on very small .020 music wire axles ambroided to the landing gear, and are kept on by tiny stream-lined balsa hubs ambroided to the axles.

The four wing struts, or "lift struts," are of very thin balsa 1-2″ wide. You'll have to suit their length to your ship—length varies on every job. The two front struts hook, as shown in the drawing, between wing ribs and the landing gear, and the two rear struts between wing ribs and the lower edge of the fuselage. Thus the wing may be removed at will, or may be moved backward or forward along the wing support for flying adjustment.

Now you've done all the work, unless you want to color wing and wheel fairings (the sections inside the tires) orange, and landing gear and fuselage black, with an orange strip around the top of the fuselage. You can do this coloring either by dyeing paper before covering the model, or by painting it with banana oil and light-weight dyes after it is completed. You'll add weight by coloring it, of course.

Put the rubber motor on the motor stick—knot the two ends and you'll have a motor of four strands. Test the ship very carefully. Adjust the wing forward or backward until you find its best position for gliding. If the plane insists on stalling, no matter how far back you put the wing, you'll need to add a little weight to the nose. Some boys do this by increasing the weight of the wheels; one I know ambroided two tiny wire brads to the front end of the motor stick.

When you've found the right adjustment, get ready for a pretty flight. For there's nothing in model work more satisfying than a slow trim commercial ship

(*Continued on page 53*)

Two Minutes—and Up!

With an Outdoor Ship

YOU'VE learned in THE AMERICAN BOY how to build the best indoor airplane models ever made. Next month Merrill Hamburg is going to give you new tips on the outdoor twin pusher—a model that has won every important outdoor contest for years.

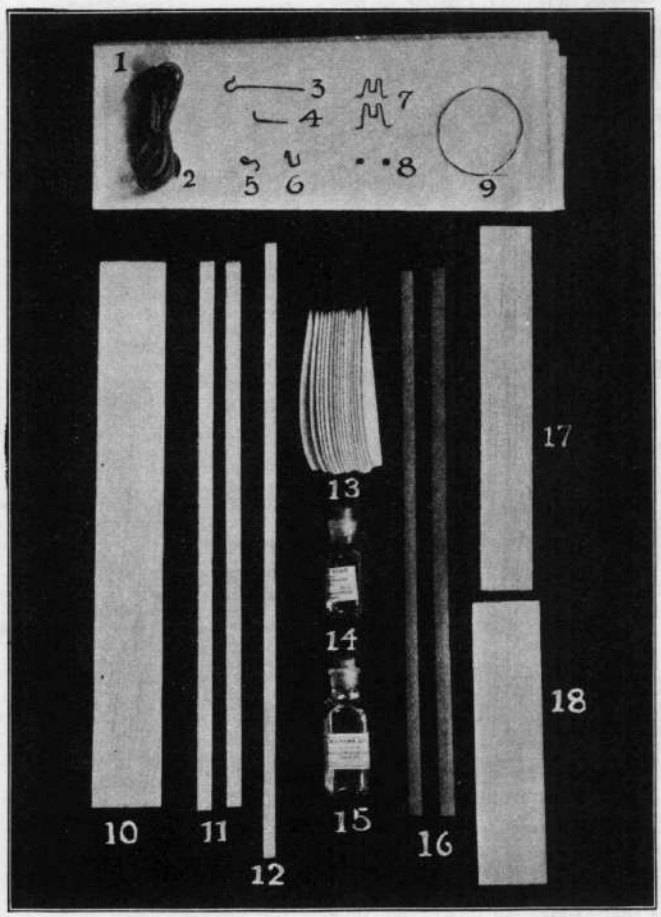
Tom Hill, of North Carolina, won a trip to Europe with one last summer. Lloyd Fish of Washington won the national playgrounds outdoor championshi[illegible]. Dozens of boys won trips to national contests, cash prizes, trophies, re[illegible] airplane flights.

Next month Mr. Hamburg is going to give you new wrinkles on this ship, first described in the January, 1928, AMERICAN BOY. What's more [illegible]he's going to tell you about a brand new outdoor ship—a twin tractor th[illegible] a whiz. Its builder claims it's good for four minutes, any time. Some fel[illegible]v's going to win a trip to Europe next June with an outdoor ship.

Will It Be You?

It Looks and Flies Like a Real Ship

Here's the Flying Stinson-Detroiter Kit



THE kit you've been waiting for! It contains all the material you'll need to build a flying model of the famous Stinson-Detroiter—all you'll need and a bit to spare, for it's particularly generous in paper, bamboo and other materials. And—best of all—the League is able to price it at $1.50, lower than the commercial model of last year.

If you want the kit, send $1.50 in check or money order to the Supply Department, Airplane Model League of America, American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan. Ask for Kit Number 12. And remember that the League can't accept stamps in payment for kits or parts.

If you want to buy separate parts, find out from the list below just what they cost; add 10 cents for postage if your order is $1 or less, ten per cent of the total amount if it is more than $1; and send check or money order for the total. Better not send cash. It's often lost in the mails.

Numbers refer to the kit picture.

1.	Two sheets Japanese tissue, 21 x 31	$ .20
2.	Rubber motor	.05
3.	Propeller shaft	.05
4.	Thrust bearing	.05
5.	Rear hook	.05
6.	S hook	.05
7.	Two wing clips	.10
8.	Two brass washers	.02
9.	Music wire	.01
10.	Two strips flat balsa	.08
11.	Two balsa leading edge spars	.08
12.	Balsa motor stick	.03
13.	Fifteen M-6 balsa ribs	.50
14.	Bottle ambroid	.10
15.	Bottle banana oil	.12
16.	Two strips bamboo	.04
17.	Balsa propeller block	.07
18.	Flat balsa for wheels	.02
	A. M. L. A. Manual	.05
	Instructions	.02

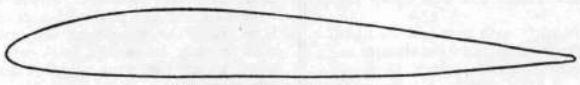
DON'T SEND C.O.D. ORDERS—THE LEAGUE CAN'T ACCEPT THEM.

Build a Flying Stinson-Detroiter

(Continued from page 28)

in flight. This Stinson-Detroiter will take off the ground; it will fly for sixty to ninety seconds (a flight of more than thirty seconds indoors or sixty seconds outdoors will win you an Honor Certificate); and it will make a three-point landing that would make Colonel Lindbergh jealous.

Remember that the League question and answer service is eager to help you with knotty problems, and that the parts department can furnish you with the materials you need to build this or other flying models described in THE AMERICAN BOY. And watch this magazine for new models, for advance information on the national contests and for hints on the things that make models fly longest.



Wing section—actual size.

Three Trips to Europe for Model Makers Who Win

AT the Second National A. M. L. A. Contests, to be held in Detroit by THE AMERICAN BOY next June, you'll have *three* chances at winning a trip to Europe!

Last year, you'll remember, the contestants competed for two trips to Europe and one to the National Air Races at Los Angeles. THE AMERICAN BOY was host to Aram Abgarian and Tom Hill, flying model contestants at the tops of their two classes, who went to London, Paris, Rome; Frank Tichenor, publisher of the *Aero Digest*, was host to Lofton Dennis, scale model winner, on the trip to Los Angeles.

This year Mr. Tichenor is offering to the winner of the scale model contest a trip to Europe along with the winners of the two flying contests, indoor and outdoor. The three will go with a representative of THE AMERICAN BOY to the great cities of Europe; they will meet British and Continental airplane model builders, and display their models in London, Paris and Geneva. They will compete with British builders for the Wakefield Cup—they will have the times of their lives!

Mr. Tichenor, a vice-president of the League, is the man for whom the "Tichenor Midget," the all-wood pusher described by Mr. Hamburg in the November AMERICAN BOY, was named. You don't need to be told that he's an enthusiastic friend to every builder of airplane models!

Any scale model of a man-carrying ship, provided it has a wing span of exactly two feet, will be eligible for entry in the scale model contest. It does not have to fly, and since you may use any material you choose, the League does not supply kits for scale models. If you want to build the replica of the Stinson-Detroiter, you can obtain detailed plans for it—drawn by engineers of the Stinson aircraft factory—by sending twenty cents to the Supply Department, Airplane Model League of America, American Boy Building, Second and Lafayette Boulevards, Detroit, Mich. The plan 34 x 44 inches is a complete guide to construction of the miniature ship. The League also has plans for the Curtiss Army Hawk, the Ford all-metal tri-motor monoplane and the Ryan "Spirit of St. Louis," available for twenty cents each.

A. M. L. A. Chat

Here's the Honor Certificate Champ

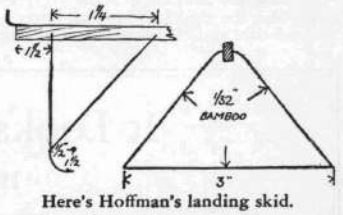
MEET Robert Atwater, honor certificate champ!

Atwater is a member of the live Elmira, N. Y., branch of the A. M. L. A. He took medals in both the indoor and outdoor events at the national meet at Detroit last June, and he placed well up in the playground contests at Atlantic City in October. But he's done more than all that—he's won eight honor certificates!

Atwater

As this is written, he's the only model builder in the world to have gained for himself eight separate awards from the League. One other boy, Melvin Brazee of Cleveland, Ohio, has won six. Sixteen builders have won four, and with them the autographed photograph of Clarence Chamberlin; Atwater was the second to accomplish this, coming in close behind Kazmier Kluz of Ambridge, Pa.

Atwater won his first certificate on February 13, 1928, with an indoor pusher that flew 89 seconds. On March 27, his Baby R. O. G. flew 35 seconds for certificate Number Two. Two came his way in the next month—the indoor tractor, 140 seconds, on April 17, and the outdoor twin pusher, 205 seconds, on April 19. October 24 brought him two more—the indoor commercial, 66 seconds, and the hydroplane, 136 seconds. On November 6, he won the championship tractor certificate with a flight of 123 seconds, and two days later the all-wood pusher award, with 37 seconds. He was the first in America to win the last two named, the second to win the hydroplane (Edward Drutchas of Detroit was the first) and the third to win the commercial, coming in behind Carl Merl of Erie, Pa., and B. Fullman of Sewickley, Pa.



Here's Hoffman's landing skid.

Among all his feats, his building of the champion tractor stands out. He saw the model flown by Ernest McCoy at the Detroit indoor championships, and—without drawings or instructions—he copied and flew the ship. Plans for this model, as improved by Aram Abgarian, were published in the December AMERICAN BOY. "My model has made lots better flights than that which won the certificate," Atwater wrote to League headquarters.

Any model builder may qualify for a certificate by having his flight witnessed and certified in writing by an adult, and then sending the certification, with ten cents, to League headquarters. Here are the records you must equal or surpass to win certificates: Baby R. O. G., 30 seconds; indoor pusher, 65 seconds; indoor tractor, 100 seconds; outdoor twin pusher, 120 seconds; hydroplane, 50 seconds; commercial model, 15 seconds; Baby R. O. W., 15 seconds; all-wood pusher, 30 seconds; championship tractor, 120 seconds.

Who's going to take Atwater's championship away from him?

"I sure like the new containers for the League's new kits," writes C. S. Andrews of Chicago. "Those corrugated board boxes bring the materials through in fine shape. Good stuff!"

Henry Hoffman, of Detroit, has developed an interesting variation on landing gear for endurance models. It consists of bamboo skids, instead of wheels. "It eliminates the trouble with wheels," Hoffman writes.

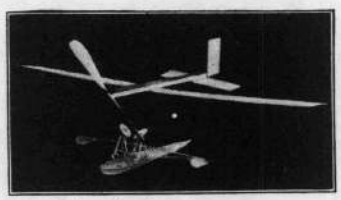
The drawings show the details of his device. He uses a double inverted-V bracing of 1-32-inch bamboo, the front V set 1-2 inch from the forward end of the motor stick and the rear V 1 1-4 inch farther back. The ends of the two Vs are joined and held firm by a 3-inch bamboo strip, and the skids are bamboo curved approximately to the arc of a 1-2-inch circle.

"Wings," the Little Falls, N. Y., branch of the A. M. L. A., has devised a monthly competition system that a lot of other airplane model clubs are going to use. Gilbert B. Stinger, president of Wings, writes about the system:

"Each major contest we hold has four divisions—indoor, outdoor, scale model and flying scale model. The winner of each division gets 3 points, second gets 2 and third 1. The fellow who wins the most points out of the 24 keeps the cup for one month. Anybody who wins the cup three times in succession keeps it permanently. We hold contests about every two weeks, weather permitting."

Here's the first flying model amphibian. Robert Hayes of Detroit, twice national model boat champion as well as a model plane expert, built it. As the picture shows you, it has an all-balsa frame, except that the struts are of .016 music wire and the pontoon frames of bamboo. By an ingenious arrangement of music wire pins, the balsa wheels, on their balsa tripods, may be raised or lowered.

The prop is 6 inches long, motor stick 9, rudder 1 1-8 x 2, stabilizer 1 1-4 x 4, wing 16 x 2. The main float, with interior bracing, is 8 1-2 x 1 1-2 (beam) 5-8 (depth). The small floats, 7 inches apart, are 1 3-4 x 7-8 x 1-2.



It has wheels and pontoons—and it flies.

And the darn thing flies!

The Eagles of the A. M. L. A., a New Orleans club, have a club library nucleus consisting of "We," "Skyward," "War Birds" and "The Wonder of War in the Air." "We intend to get 'Beginning to Fly,' by Merrill Hamburg," writes Moise Dennery for the club. "A number of magazines, including THE AMERICAN BOY, make up the shelf."

And the Newport, Vt., club has its special uniform. It consists of a pair of jumpers with A. M. L. A. and the owner's name on the back—a most practical outfit for model airplane work! "We have two men in the Vermont Airways Corporation helping us," the club secretary, Robert G. Baker, informs the League.

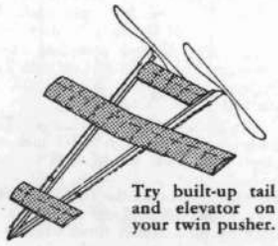
Lots of League members are finding the Experimental Kit a boon to original work. "It lets you try out all kinds of nut ideas—and sometimes they work!" writes T. Wills, of Seattle.

Reprinted from The American Boy Magazine, March, 1929

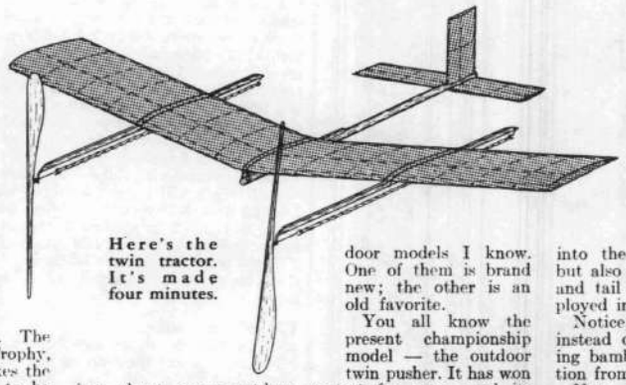
Get Your Outdoor Model Ready

Is It a Twin Pusher, or a New Twin Tractor?

By Merrill Hamburg, *Secretary of the Airplane Model League of America*



Try built-up tail and elevator on your twin pusher.



Here's the twin tractor. It's made four minutes.

WHOSE outdoor model is going to carry him to Europe next summer?

Last year the outdoor twin pusher built by Thomas C. Hill of North Carolina did just that. Hill's ship took first place among fellows under twenty-one in the First National A. M. L. A. outdoor contest at Detroit—so he rode on its wings to Paris!

Next June, at the Second National A. M. L. A. Meet, another builder is going to win the same prize (Hill is ineligible to compete for the trip again, though he may try for other prizes). The same builder may win the National Outdoor Trophy, too—it goes to the boy under seventeen who makes the best outdoor record. The *three* European trips to be offered—two in the indoor and outdoor flying contests presented by THE AMERICAN BOY, one in the scale model contest by *Aero Digest*—are open to anybody under twenty-one, however.

You'll read all about the contests—all about the prizes, the rules, the sparkling entertainment—in next month's AMERICAN BOY. Perhaps you've already built your indoor models in preparation for the contests. If you have, you're smart; for construction of indoor models is the best kind of training for the fellow who wants to build the somewhat more difficult outdoor ships. The chap who can start on outdoor models and do them well is unusual. So practice on the indoor models.

This month I'm going to tell you about the best outdoor models I know. One of them is brand new; the other is an old favorite.

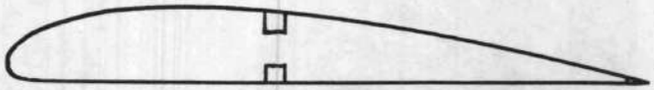
You all know the present championship model — the outdoor twin pusher. It has won just about every outdoor contest for years, and its records are still unapproached by any other model. It was described in detail in the January, 1928, AMERICAN BOY, and kits for its construction, with diagrams and directions, may be obtained from the League Supply Department for $3.00. Both Hill and Lloyd Fish, of Washington, 1928 playgrounds champion, built their ships from these kits and plans; and a lot of fellows are going to enter that identical model in the 1929 contests. Maybe you're one of them. It's unquestionably a championship-caliber piece of work.

But here are some suggestions that may interest you as they have interested other airplane model enthusiasts. Remember that Joseph J. Lucas, Chicago man, a model builder of sixteen years' experience, won the National trophy at Detroit last year? Lucas was using an outdoor twin pusher with two distinctive features. The small picture of the o. t. p. shows both of them—one is a built-up elevator to replace the old single-surface, warped type, the other a small built-up tail surface, fastened between the fuselage sticks ¾ inch forward of the two thrust bearings. This surface is built into the frame, so that it not only contributes lift but also replaces a bamboo cross bracing. Both elevator and tail may use the same airfoil, reduced, as is employed in the main wing.

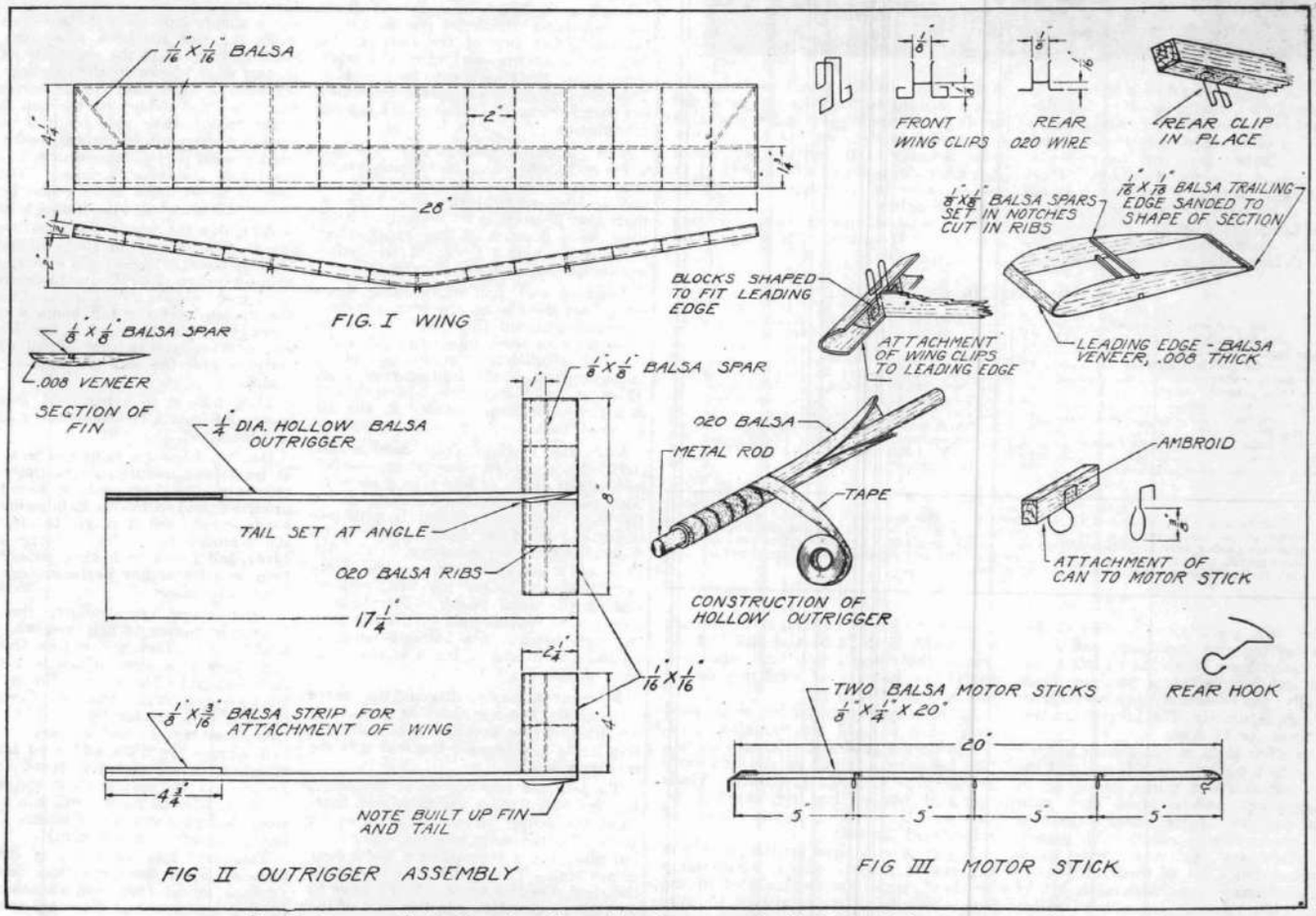
Notice, in the drawings, that wing tips are all square, instead of being rounded. This saves weight, eliminating bamboo tips, and permits use of a true airfoil section from end to end.

Note, too, that the built-up elevator retains dihedral angle as an aid to stability (in a 12 inch elevator, wing tips should be 1 5-8 inches above the center), but that it is not set at an angle of incidence—the airfoil furnishes enough lift by itself.

To make all these suggested additions and changes.



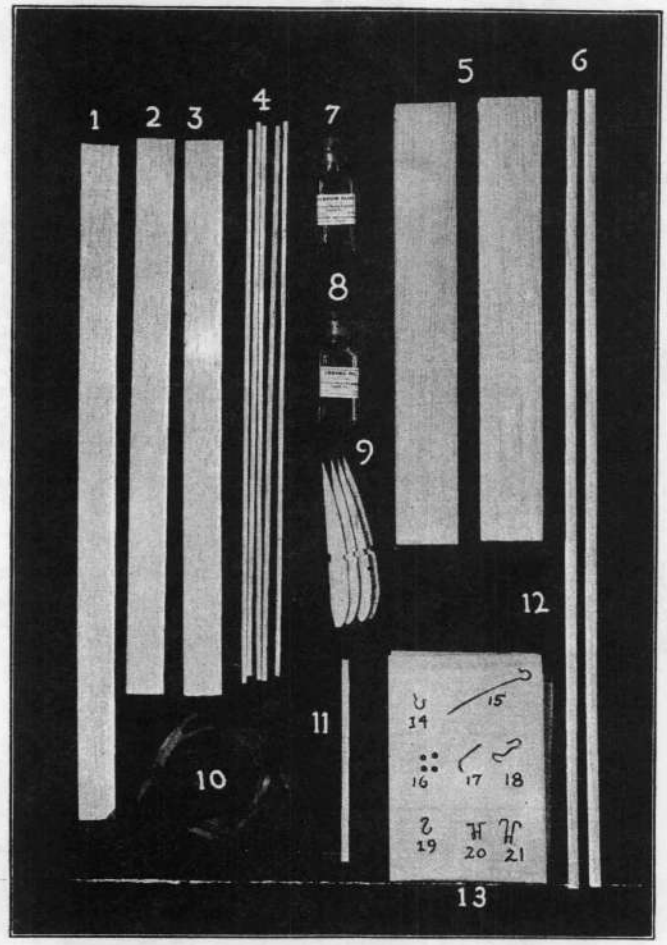
This wing template is actual size. Cut out the slots after you've made the ribs



Familiarize yourself with Manual, article and drawings—every detail of them—before you start work.

CAN YOU FLY IT FOUR MINUTES?

The Outdoor Twin Tractor Kit



EVERYTHING you'll need to build the new Twin Tractor—a ship that flies like a bird—is included in Kit Number 13. Wing clips are already formed, wing spars and other parts cut to size—you need to sand, trim and assemble. To get the kit, send $2.25 in check or money order to the Supply Department, Airplane Model League of America, American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan, and ask for Kit Number 13. It will come back by mail.

If you want to buy separate parts, figure from the accompanying list just what your order totals; add ten cents if the total is under $1.00, and ten per cent if it is more, for postage; and send check or money order to the Supply Department with the order.

Don't send stamps or cash, and don't send C. O. D. orders. The League cannot accept them.

These Parts Are in the Kit

Numbers refer to picture.

1.	Flat balsa for tail boom	.03	
2.	Balsa leading edge strips	.04	
3.	Balsa for tail and trailing edge	.04	
4.	Five balsa center spars	.10	
5.	Two balsa propeller blocks	.18	
6.	Two balsa motor sticks	.08	
7.	Bottle ambroid	.16	
8.	Bottle banana oil	.10	
9.	Fifteen balsa ribs (only four shown)	.50	
10.	Rubber motor	.10	
11.	Balsa strip for tail attachment	.01	
12.	Three rubber bands	.01	
13.	Large sheet Japanese tissue	.10	
14.	Six cans	.30	
15.	Two propeller shafts	.10	
16.	Four brass washers	.04	
17.	Two thrust bearings	.10	
18.	Two rear hooks	.10	
19.	Two S-hooks	.10	
20.	Three rear wing clips	.15	
21.	Three front wing clips	.15	
	A. M. L. A. Manual	.05	
	Instructions	.02	

The League has prepared a set of materials for the construction of tail and elevator of the Lucas type on your twin pusher. The big kit for building the championship pusher may be obtained from the League for $3.00. If you want to put on built-up tail and elevator, send 15 cents for the balsa and Japanese tissue you'll need. Ask for the Elevator Kit. You'll get it, by mail.

to the ship, you'll need a strip of flat balsa for the ribs and spars, and Japanese tissue. Your kit includes enough ambroid and banana oil, if you use them carefully; the balsa and tissue you'll have to obtain separately. The League can furnish them for 15 cents.

Now a few hints on last-minute touches to that twin pusher. Don't forget that extreme lightness is a prime quality in all championship models. Make each individual part just as light, sand it down as thin, as requisite strength will permit. One over-heavy part won't make much difference, but a lot of them will!

Take extreme care with each bit of work, too. You can lessen wind resistance, increase lift and add to performance by seeking neatness and exactness. Remember, also, that the successful contest performer is the one who has plenty of spare parts—props, motors, even fuselages and wings. Both Lucas and Hill had extras at the contests last June—and used them! One bad gust of wind may be the end of a good fuselage.

Be sure that your rubber is in good shape—not too old nor too often used. You'll need a good eggbeater winder, too. The League can furnish an excellent winder—see your A. M. L. A. Manual. You'll find that you get best results when the two propellers turn up in the center and out toward the sides.

If you haven't plans for the plane, you can get them by sending a 2-cent stamp to the League. They're included in the kits, of course. With or without the suggestions given you in this article you may be building the championship pusher!

Now for the new model.

It's a twin tractor, and it's built on a plan unique in championship planes. Though it has points of similarity to the twin pusher, it has plenty of differences. It is smaller, somewhat easier to build and lighter. It carries less rubber than the twin pusher; its wing, rather than its fuselage, is its chief member.

Before you start building it, examine the drawings from A to Z. Read through these directions, too, so that you'll have a complete picture of what you're going to do. Study the A. M. L. A. Manual, obtainable at League headquarters for five cents, or included in the kit the League provides to build the model.

To build the ship you'll need these materials: 2 balsa propeller blocks, 3-4 inch x 1 1-2 inches x 11 inches; 2 balsa motor sticks, 1-8 inch x 1-4 inch x 20 inches; 5 balsa center spars, 1-8 inch x 1-8 inch x 14 inches; 2 strips balsa for tail parts and trailing edges, 1-16 inch x 1 inch x 14 inches; 15 flat balsa ribs; 1 strip balsa for tail boom, 1-16 inch x 1 inch x 17 1-4 inches; 2 balsa leading edge strips, 1-32 inch x 1 inch x 14 inches; 1 balsa strip, 1-8 inch x 3-16 inch x 5 inches; 4 drams ambroid; 4 drams banana oil; 1 sheet Japanese tissue, 21 inches x 31 inches; 3 rubber bands; 7-foot motor, 3-16 inch flat rubber; 6 wing clips, 6 cans, 2 propeller shafts, 2 rear hooks, 2 S-hooks (all of .020 music wire); 2 thrust bearings; 4 brass washers. All of these materials are included in the League kit.

FIRST, the wing.

Notice the differences between this wing and other built-up wings you've seen. Instead of one main center spar, it has two small spars running along top and bottom of the ribs. The leading edge may be of solid balsa, or of paper-thin bent balsa; the trailing edge is solid balsa.

Made with the Clark-Y airfoil, the same as that in the twin pusher, the wing has a 28 inch span and a 4 1-4 inch chord. If you're not using the League kit, make your ribs according to the exact-size pattern with this article. Cut a template like the pattern from brass or tin, then cut the ribs from thin balsa. The diagram shows you where to cut grooves or slots for the two center spars.

You'll need fifteen ribs, five of them 1-16 inch balsa, the other ten sanded to 1-32 inch. Let two of the heavier ribs form the wing tips, and place the other three where the clips are to be attached. This gives you a square wing tip which is better because of lightness and ease of construction.

Sand the center spars to size (1-8 inch x 1-8 inch), cut them to 14 inch length and mark them for the ribs. Mark the trailing edge spars at the same time, so that they'll correspond exactly. Sand these spars down until they taper off at the rear, forming the end of the airfoil section as well as the rear braces.

Assemble each half of the wing separately. Set the ribs on the bottom center spar and ambroid them in place. Lay them on your work table, straighten the ribs and ambroid the top spar into place, following it with the trailing edge spar. These are split from the 1-16 inch x 1 inch flat balsa strip included in the kit for small parts.

Next, the leading edge. Sand a flat strip, down to extreme thinness—.008 inch, about twice as heavy as a sheet of bond paper, is approximately right. Paint the front tips of the ribs lightly with ambroid, and bend the leading edge to fit them. Do this very carefully, or the flat piece will crack. If you are cautious, however, you can do the job well, without making the wood pliable. The Manual tells you of this method of making such an edge—boiling thin balsa, bending it around a form and taping it in place until it dries.

Now put in the two diagonal tip braces —necessary because the tips of a wing are likely to be knocked about when a ship lands, and because the rear tips are relatively weak.

To join the two halves of the wing, lay one half flat on the table and butt-joint the center rib to the ends of its spars. Do the same with the other half, but place the outer end on a block four inches high. Thus you'll give it exactly the right dihedral angle. You'll have to do a bit of nice fitting in this part of the job, but it won't be hard.

Next, attach the wing clips. These clips are different from others you've seen—they have more surface bearing on the sticks they hold, and don't cut into the wood because of their slightly curved tips. The diagrams show their details.

For the three front clips, you must ambroid into the leading edge small solid pieces of balsa. There will be six of these, one on each side of the three heavier ribs. Ambroid holds the clips in place.

The three rear clips are ambroided to the bottom of the lower center spar.

The wing is now complete except for covering. This job you'll do with Japanese imperial tissue and banana oil, as explained in the Manual.

The motor sticks are simple. Their dimensions are 1-8 inch x 1-4 inch x 20 inches; both ends are tapered to cut down weight, and ambroided for additional strength. Ambroid the thrust bearings and rear hooks into place, as shown in the drawing, and attach three cans to each—two fastened on one side, the center can fastened on the other.

PROPELLERS you probably know how to make. If you don't, the Manual tells you all of the operations. Remember that one of them is right handed, the other left—they turn in opposite directions. Each motor is of two strands of 3-16 inch flat rubber.

The job is nearly finished now. Better make the "tail boom" or outrigger next. This is a hollow tube made of .020 inch flat balsa—thinner than 1-32 inch, but heavier than the bent leading edge. The sketch and the Manual tell you how to do this job. You'll find the finished tube both lighter and stronger than a solid piece of balsa of the same size.

Ambroid a piece 1-8 inch x 3-16 inch x 4 3-4 inches to the top of the front end for the center wing clips. Notice that you must reinforce the clips, both here and at the motor stick attachments, by using rubber bands—this because the clips by themselves will not have the necessary strength.

Both the stabilizer and the rudder, you will see from the drawing, are built up. A section slightly thinner, or flatter, than a true Clark-Y has usually proved most successful. After you've made the wing, these two jobs will be simple. The rudder is simply half the stabilizer—you can make the ribs for both jobs from the same pattern. Note the simplicity of the leading edge, shown in the drawing. The stabilizer is ambroided to the bottom of the tube, the rudder to the top (at a slight angle). Here you get into an interesting aeronautical principle—for the rudder, with its built-up section, is causing lift in a sidewise direction. This, as well as the rudder's angle, pulls the tail to one side and helps the model to circle.

Assemble the whole job, and it's finished! The two motor sticks should extend in front of the wing's leading edge about 9 inches. You'll have to determine the exact location by gliding and testing the model. Set the tail boom with its front end directly under the leading edge. When you're sure of all of the settings, give the ship a couple of trial flights.

Then take it to a big field, give the motors at least a thousand turns apiece, and let it go!

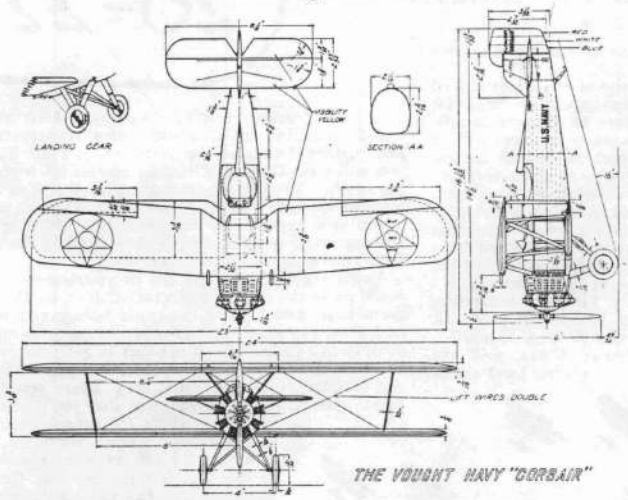
One boy I know says he can be sure of at least four minutes, every time, with this ship. As I've said, it hasn't approached the records the twin pusher has to its credit; but it may. In any case, it's a model with a lot of things in its favor, and I look to League members to turn in a lot of fine performances with it and the pusher.

Don't forget, incidentally, that the League is waiting to help you with your model work. There's the free Question and Answer service. (Include a stamp for postage.) There are Honor Certificates—you can win a Certificate for the twin tractor by a flight of 90 seconds or better. Get an adult to time and witness the flight and send his certification of it, with ten cents, to the League for the award (four certificates, for four different planes, will win an autographed photograph of Clarence Chamberlin, League vice-president).

There are kits for a lot of different models. There are suggestions for your airplane model club, and directions for holding contests. And there are membership cards and buttons for you and every one of your friends interested in model building.

Build the Navy Corsair

It's a Corking Scale Model!



LEAGUE members — particularly those who built the scale model of the Curtiss Army Hawk last year—have been clamoring for a navy plane to add to their collection. And here it is—the famous Vought "Corsair," the standard two-seated convertible observation-fighting plane of the U. S. N.

Like the Hawk, the Corsair is a biplane. It has a speed of 158 miles an hour, and it can out-maneuver a swallow. It's going to make a dandy scale model, if it's built from the special plans prepared by the League and now available at headquarters.

The plans are exact-to-scale—they give precise drawings and necessary instructions for building a two-foot model that will be eligible for entry in the Second National Scale Model Contest at Detroit, June 20-22. They give details of construction and all the dimensions you'll need to know, as the small drawing here published indicates.

It may be a model of the Corsair that wins some fellow a free trip to Europe!

Do you want the full-size drawings, on a big sheet 34 x 44 inches? Then send 20 cents to the Supply Department, A. M. L. A., American Boy Building, Second and Lafayette Boulevards, Detroit, Mich. The plans will come back to you by mail.

Follow One of These Newspapers

In co-operation with THE AMERICAN BOY, the following publications are sponsoring the Airplane Model League of America. Watch the paper nearest you, as well as THE AMERICAN BOY, for information on local contests, the building of airplane models, and the Second National A. M. L. A. Contests at Detroit.

Chicago Tribune, Detroit News, Cleveland News, New York Telegram, Buffalo Evening News, Springfield (Mass.) Union, Portland (Ore.) Journal, Tulsa (Okla.) Daily World, Rochester (N. Y.) Democrat and Chronicle, Oklahoma City Oklahoman, Oakland (Calif.) Tribune, Witchita (Kans.) Evening Eagle, San Francisco (Calif.) News, Akron Beacon Journal, Milwaukee Leader, Albany Evening News, Jackson (Mich.) Citizen-Patriot, Fall River (Mass.) Herald-News, Bloomington (Ill.) Pantagraph, Bay City (Mich.) Times, Watertown (N. Y.) Daily Times, Honolulu (Hawaii) Star-Bulletin, Lansing (Mich.) Capital News, Santa Ana (Calif.) Register.

A. M. L. A. Chat

IF all the records being made by model airplane clubs these days were placed end to end, they'd come close to surpassing the 151-hour flight of the Army Fokker, "Question Mark!"

New clubs, many of them chartered as official branches of the A. M. L. A. (a list of club officers, ten charter members and the one dollar charter fee sent to League headquarters, together with the official name of the club, gets the charter), are springing up all over the land. And how they're flying!

From Oakland, California, comes word of the activities of the Mariposa Aero Club. "Considering that we have been building models only nine or ten months, we are proud of our records," writes Dick Abbey, club secretary. "Our R. O. G. flights range from 60 to 110 seconds, tractors from 3 to 5½ minutes; Ray Gaynor, with a tractor of his own design, flew 5½ minutes with only 1,000 winds on his motor—and the ship landed in a balcony 30 feet off the ground at that! . . . We have also made many other 5-minute flights.

"With double-surfaced wings on our indoor commercial planes—we designed them ourselves—we've been getting flights of 2 minutes and above. Outdoors we've not been so successful—the best is 3½ minutes (at Detroit in June)."

Last year two members of this club won trips to Detroit, one to Los Angeles and one to San Diego in an F-10 Fokker.

"Wings," the Little Falls, N. Y., club, reports an outdoor flight of a commercial plane, by Ralph Mattoon, of 20 minutes. Mattoon is still looking for the model!

Richard Hiscocks of the Model Airplane League of Canada has been making close to 100 seconds with his Baby R. O. G., and much better with his indoor tractor. Edward Adams of the same club flew a commercial model 48 seconds. And other clubs are doing as well, or better.

Clubs are going in for other activities, too. The Duration Squadron, of Des Moines, Iowa, plans to enlist in THE AMERICAN BOY Air Marking Compaign. The Lofton Dennis Aero Club of Miami—named after the winner of the 1928 scale model contest—declares its ambition to become "the best model airplane club in the world!" The Brookline, Massachusetts, Model Airplane Club has been having flyers address it—the first was Lou Gordon, and the club hopes to obtain Amelia Earhart for a later date. Other clubs are following the same practice.

Marvin Horstman of Scotia, New York, is called the youngest full-fledged aviator in the country—and he started learning by building model planes.

Horstman is now 13 years old. When he was 11 he went to Victor A. Rickard, superintendent of a near-by airport, and got himself a job carrying gasoline, oil, water, sandwiches—and large quantities of "miscellaneous!"—for the airmen. He wanted to learn. A year ago Rickard took him up for his first dual instruction.

"He's a born flyer," said Rickard. So the other pilots of the field took him up, and he now has 25 hours to his credit, five of them on landings. Only his youth keeps him from soloing and applying for a license.

"'Pee Wee' was building models when he first came here," Rickard says. "He surprised us then with his knowledge of the science of flight. And he's added a lot of other knowledge to it since."

That's what models did for Horstman.

Ben H. Rhoads, Sandy Lake, Pa., finds that he can use very light wire for his propeller shafts by putting a tiny backward hook on the end of the large hook, then clasping this small hook around the main shaft after the rubber motor is attached. Thus he closes the hook, making a loop of it, and increasing its strength.

Rhoads also uses a thrust bearing of his own design—a pin flattened at both ends (where the hole for the shaft is drilled, and where the bearing lies along the motor stick) but left round in the portion between. The hole is drilled through the flattened head. To strengthen its attachment to the motor stick, Rhoads puts a few winds of silk thread around stick and pin.

Marvin Horstman, 13 year old aviator.

Model builders within striking distance of Detroit are planning to attend the Second All-American Aircraft Show, April 6-14. Every kind of airplane under the sun is to be exhibited, and there will be hints in the lines of the big planes for the builders of small ones. Builders will recall that Aram Abgarian, 1928 indoor champion, took the camber of his championship tractor from the median line of the Clark-Y airfoil, used on the Curtiss Army Hawk—one of the ships displayed at the 1928 show.

Show week in Detroit will also be Aviation Week. Hundreds of firms in the air industries will be represented, and many thousands of air-minded Americans will visit the displays.

When George Weber, of Windsor, Canada, got to building his championship tractor—described in the December AMERICAN BOY—he decided to put 12 bulkheads, instead of 15, into the built-up motor stick. This decreases weight and gives plenty of strength, Weber believes. He also advises painting the stick with a very light coat of banana oil, for strength.

Here's a League member who is making an aerial encyclopedia out of his copies of THE AMERICAN BOY.

"Lots of fellows around here," writes George Dalenberg, Miami, Florida, "have been keeping their old AMERICAN BOYS, not only for the good stories and articles but also for the plans for airplanes. Your new articles on airplanes by Klemm are intensely interesting, and so are the model articles. I have read plenty of books describing how to make an all-wood glider, but Mr. Hamburg's article in the November AMERICAN BOY tells the simplest and quickest way to make a *successful* one.

"All these articles make an excellent airplane encyclopedia. I have been pasting cardboard pieces to the pages so I could have an indexed reference."

Their R. O. G. biplane won a ride in a Ford tri-motored transport plane for Fred Brownlee and Charles Slade, of West Monroe, Louisiana. With the little model which they had just finished, the two went to the local airport to try it out. The big ship had just stopped there, and the model, writes Brownlee, "took the pilot by storm. As he was just fixing to make a trip, he took us along. And did we enjoy it!"

Arthur Johnson and his brother Frederick, of Hawthorne, N. J., "are getting ready for the 1929 contest," declares Arthur. "I have just finished an indoor pusher and have had 5 minute flights. My best record with an outdoor pusher is 15 minutes. My brother has had a 20 minute flight."

These are fine records. Every experienced builder, however, knows that only

This is the Date

Come to the Second National A. M. L. A. Contests!

June 20-22

JUNE 20—21—22!

Those are dates for every member of the Airplane Model League of America to mark in red on his calendar.

For on those days will be held, in Detroit, the Second National A. M. L. A. Contests, and they're going to mean free trips to Europe to three boys, national championship trophies and first prize cups to six, gold and silver medals and cash prizes to forty-eight and bronze medals, certificates and other awards to 150.

More than that. They will mean colorful banquets, attended by greats among aviation's notables. They will mean glimpses of great airports, inspections of great industrial plants, visits to a great center of the nation's business. They will mean meetings with famous aviators—chats with star Army pilots—acquaintance with the nation's best airplane model builders, from Hawaii to Maine.

And they'll mean a heaping, eventful program of entertainments and contests and hilarious fun, for the schedule for the three days is going to be so full that it will splash over on both sides!

Just as last year, when 259 boys came to Detroit to compete in the 1928 contests and some 140 more sent scale models without coming in person, THE AMERICAN BOY has been designated by the National Aeronautic Association to conduct the competitions. There will be three major contests, each divided into junior and senior classes—the Stout Indoor Contest, the National Outdoor Contest and the Scale Model Contest. Any member of the League or any other recognized model airplane organization. of less than twenty-one years of age, may compete.

And scores of boys are laying plans already to make the trip to Detroit. If you aren't one of them, better start now!

It won't be too costly. The League will arrange with railroads for special convention rates. It has already arranged with the Hotel Statler, contest headquarters, for special room rates. There will be free banquets, a number of free meals—free transportation to Selfridge Field for the outdoor contest—free entertainment, free fun! Twenty dollars ought to cover everything you'll spend in addition to traveling costs.

So, if your indoor plane or your outdoor model will fly two minutes or more, start making your plans to compete. Any fellow sure of a two minute flight is sure of placing.

The Contests' general chairman—Griffith Ogden Ellis.

If you live in one of the cities named in the list of newspapers on page 46, you'll have a chance to compete in official local contests whose winners will be sent, *free*, to the contests. Watch for announcements if you're in these territories. If you're not, perhaps your local airplane model organization is going to hold its own contests to select champions and send them on—it won't be hard for a club of live model enthusiasts to earn the money to send one or two fellows on.

Some clubs are already interesting civic organizations like the Boy Scouts, the Y. M. C. A., the Rotary, Lions, Kiwanis and Exchange Clubs, and the American Legion in sending local champions to the contest, too. Remember that last year the Winston-Salem, N. C., Lions Club sent Tom Hill—and that Hill walked (rather, sailed!) off to Europe with the boys' outdoor championship? Hill had never seen a model other than his own before he came to Detroit.

What will you do when you come to Detroit? Better arrive on Wednesday afternoon, June 19, if you can make it.

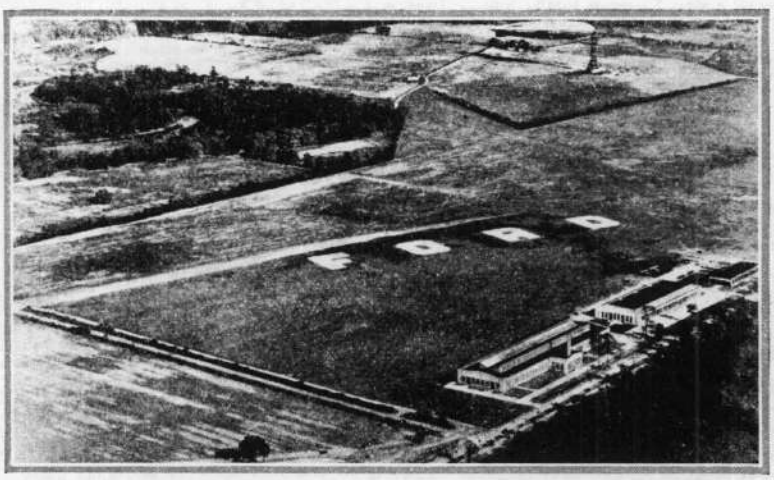
First, go to the Hotel Statler, on historic Grand Circus Park. You will have made your room reservation in advance (read THE AMERICAN BOY in May and June to find out all about rooms, transportation and further details of the contests). At the Statler you will meet Gurney Williams, greeter-in-chief, and his brother Fred, head assistant greeter. You'll remember these two as the "Two Boobs Abroad" whose adventures appeared in this magazine not long ago. Gurney and Fred will have a desk right in the hotel lobby, and they will know everything.

You'll register, and get set in your room. Then you'll go to the contest registration desk, on the ballroom floor, and receive the cards telling you where and when you are to compete, as well as your official contestant's badge. If you're eager to get your models in order, you'll make the A.M.L.A. repairs hangar, right in the hotel, your next stop. There you'll find tools, materials and everything else you'll need to give your ships their final tuning.

You'll meet Merrill Hamburg, secretary of the League, some time early in the day. You'll meet also Griffith Ogden Ellis, vice-president, who is general chairman of the contests and editor of THE AMERICAN BOY; you'll meet William B. Stout, president of the League. There'll be lots of others you'll meet, too — aviation notables, civic leaders, expert pilots, other League officers.

Perhaps you'll have time to see some sights, too. Detroit has plenty of them — the ever-spreading Ford plants, the factories where a dozen other automobiles are made, the new zoölogical gardens, the Detroit River with its scores of giant boats daily, Windsor, Canada, just across the river (ten minutes by ferry!), the aquarium on Belle Isle, the new Art Center. Airports, airplanes, airmen! More sights than a month would let you see!

That night you'll want to rest well, for the next day—Thursday. June 20,



© THE DETROIT NEWS

Two miles of Detroit sky and water line. You're looking at America's fourth city from Windsor, across the Detroit River. Above: The Stout Indoor and National Outdoor Trophies, a view of Ford Airport, and eighteen Curtiss Hawks—the First Pursuit Group—in flight above Selfridge Field.

A. M. L. A. Chat

AGAIN a model plane has passed the thirty minute flying mark—and this time there's official record of it. Lynn Sullivan's outdoor model flew out of sight after thirty-six minutes of official timing at the recent Los Angeles *Times* Aviation School model airplane meet. The runaway was captured nine minutes later, however, when it finally came down. More about the ship later.

—o—

Something must be done about these planes that go out of sight and seem still to be flying around miles above the earth—without refueling! The last to disappear forever was reported by James Fleetwood of Galva, Iowa. It was a three motored biplane of the Modelero Club of Storm Lake, Iowa, and was last seen heading south and going strong—apparently intent on joining Commander Byrd's fleet of South Pole planes!

—o—

Pluto's "Morning Mail" yarn of the airplane-eating cat is echoed in those from Harry Lusk of Douglass, Arizona, and Floyd Spearing of Rockford, Illinois.

"I made a six foot model of a Ford Trimotor," writes Lusk, "and made it fly twenty-five seconds, during which time it traveled about sixty-five feet. We had two kittens at that time, and one was air-minded; he would climb into the fuselage of the plane and wait until I flew it. Since he was only a passenger and therefore dead weight, the machine would just get off the ground, skim for about fifteen feet and come down, so I decided that the cat had to be cured. We tied him to a big box kite, and after he had looped the loop with it several times, he lost all desire for air travel."

Spearing's cat seemed to think that his master's Baby R. O. G. planes were birds for him to chase, for he took great pleasure in tearing them to pieces until one turned on him and gave him a taste of whirling prop. This effectively turned his appetite.

—o—

This year's national contests are going to uncover a lot of new ideas in construction. William Lawton of New York says he bends bamboo wing tips around an old fashioned lamp chimney, and gets the right dihedral angle for his wings by shaping the spars on a folding checker board. Robert Matters of West Allis, Wisconsin, has made a knife which he says is his cheapest and handiest tool for shaping and cutting balsa. He breaks off a wedge shaped corner of a razor blade with his pliers, and makes it into a knife by binding it firmly to a slotted stick of wood. John Peterson of Mellen, Wisconsin, put bamboo skis on his R. O. G. and got several good outdoor flights with the plane rising from the snow. He used three 1-32-inch pieces of bamboo turned up at the ends with the slick side underneath, and found that they made very satisfactory skis.

—o—

Almost a hundred clubs have obtained their official League charters, and every day brings reports of increasing club activity. Robert Brown of Dolgeville, New York, writes about the promotion system of the Dolgeville club.

A new member is a Kiwi—an Austrian bird with no wings. He may advance to the following grades as he fulfills requirements:

Crow—Build a plane of thirty seconds' duration; build glider capable of a 100-foot flight; know 10 aeronautical terms and their meanings.

Cadet—Build plane of fifty seconds' duration; build R.O.G.; build some type of commercial plane of twelve seconds' duration; know 20 aeronautical terms and their meanings.

Pilot—Build plane of seventy-five seconds' duration; build R.O.W.; build commercial plane of twenty seconds' duration; write a 150-word composition on the principles of flight; know 40 aeronautical terms and their meanings.

—o—

In spite of the high mortality rate for too successful planes, they are being turned out by thousands. Irwin Misner of Lincoln, Nebraska, writes:

"Every time I receive a new copy of THE AMERICAN BOY I'm afraid that I'll run across a notice in the A.M.L.A. department which says, 'Discontinued because we can't keep on furnishing kits to you at cost forever.' I certainly don't want the model articles to stop, for I'm in love with model airplane building."

—o—

Gilbert Stinger, president of the "Wings" club of Little Falls, New York, writes that each member gets an airplane ride when he has six League honor certificates.

—o—

Honor certificate files show that the present certificate records are: Baby R.O.G., 96 seconds; indoor pusher, 235; indoor tractor, 295; outdoor twin pusher, 1600; hydroplane, 186; indoor commercial, 90; Baby R.O.W., 28; Tichenor Midget, 41; championship tractor, 193; high-climb R.O.G., 56 1-2. Some of you have bettered a lot of these records, and have done it before adult witnesses. Any model builder may qualify for a certificate by having his flight witnessed and certified in writing by an adult, and then sending the certification, with ten cents, to League headquarters. Why not send for your certificates right away?

—o—

When you think that your letters from the League question and answer department are unduly delayed, it may be that League headquarters could not make out your name correctly. James Miller of New York City, received an answer to one of his letters nearly two months after it had left the office. The envelope was addressed to James Wilten. Print your name or write it plainly on every letter.

This Is the Date-

at 7:00 in the morning—you'll start, in special busses, for Selfridge Field and the National Outdoor Contests.

SELFRIDGE FIELD is the home of America's most famous group of fliers, the First Army Pursuit Group, and it is through the kindness of Lieutenant-Colonel Charles H. Danforth, commanding officer, that the outdoor contests are to be held there. Selfridge Field is more than a mile square, and plenty of signalers, judges equipped with field glasses and automobiles so that they can follow planes, and other officials will be on hand. Records ought to be smashed!

The outdoor contest will be continued all day, until the last contestant has had his three trials. It will be divided into two classes, junior and senior—junior for boys of 15 and under, senior for boys of 16 to 21. The National Outdoor Trophy will go to the boy under 17 who makes the best record—this by a new ruling of the National Aeronautic Association. But the trip to Europe offered by THE AMERICAN BOY in this contest will go to the maker of the best record among the whole list of contestants. It may be the winner of the National Trophy, or it may be an older boy.

Next day, the Stout Indoor Contests will commence at the huge Olympia auditorium—the scene of hockey games and bicycle races, boxing matches and athletic carnivals of every kind. The Olympia has a 90-foot ceiling, and it was there that the present world's record, 353.6 seconds, was established in 1928 by Aram Abgarian.

Like the outdoor contests, the indoors will be divided into junior and senior classes. They won't be ended, though, when every fellow has had his three official trials. The twelve contestants in each division with the best records at the end of the trials will enter the finals, on Saturday night—also at Olympia.

The trials will be the finals in the outdoor contest—there is to be no second series of trials. If bad weather puts in a hand on Thursday, indoor trials will start that day and the outdoor contest on Friday.

And while all this is going on, the judges will be working at top speed on the scale model contest—measuring, scaling, examining and appraising the hundreds of exactly-proportioned ships which will be on display at the Hotel Statler. On the opposite page you'll find announcement of plans for a new scale model, the Vought Corsair.

Remember that you may enter this contest "by mail" if it's impossible for you to come to Detroit. See next month's magazine for details of how to go about it.

You may be the winner of the trip to Europe offered by *Aero Digest* to scale model builders under twenty-one. The best ship wins this trip for its maker. There will be junior and senior divisions and prizes in this contest also.

Friday night there's going to be a big banquet—plans are still in the making, but they'll be announced soon. Watch for them!

Then another night of grade A sleeping, for a big day's coming!

Saturday will put the final touches on the contests. If there are any trials to finish, they'll be held then. Examination of the scale models will be completed. More sight-seeing—more opportunity for model builders from Maine to talk propellers with those from Los Angeles, and for the New Yorker to exchange ideas with the fellow from Hawaii. There'll be plenty to do!

Saturday night, the Stout finals. Twenty-four of the best model builders in the world, flying the best indoor airplane models in the world! Twenty-four experts competing for premier airplane model honors! The boy with the best time will take the Stout Trophy, the gift of William B. Stout. He'll also win the second AMERICAN BOY trip to Europe. He'll be champion of his class, whether it's junior or senior. And he'll win a lot of other prizes—they're listed later in this article.

Incidentally, Abgarian and Hill, winners of last year's trips, aren't eligible to win them again.

There'll be a new contest at this exhibition, too. It will be a competition for flying fuselage models—for ships more closely resembling man-size airplanes than do the flying stick ships. The two ships making the best endurance records, if their owners wish, will be taken to England to compete in the Wakefield Cup Meet (you read about it and its restrictions in the February AMERICAN BOY); and the builder of the ship winning at Croydon will become the first transatlantic airplane model champion!

FOR three hours these fuselage models and the championship indoor models will be sailing around Olympia—doubtless to new records. Then the event will be ended, and everybody will go back to the Statler for a closing banquet.

And that banquet will be just about the biggest event of the contest! There will be stunts—side-splitting stunts that will make it a problem to eat. There'll be food—palate-tickling food that will soon make it a danger to laugh! There'll be mighty little speech-making—too many other things on hand!

There'll be the award of the prizes—do you know the list of them?

Three free trips to Europe.

The Stout Indoor Trophy.

The National Outdoor Trophy.

Three free scholarships in the Aviation Institute of the U. S. A., offered by Walter Hinton, famous trans-Atlantic flier.

A summer's scholarship in Camp Penn Loch, Michigan, offered by Mr. Willis Pennington of the Camp.

Two scholarships at Camp Crosley, the football training camp at Lake Tippecanoe, Indiana, offered by the Muncie Y. M. C. A.

Six big bronze-and-silver cups to three junior and three senior champions.

Twenty-four gold medals—twenty-four silver medals—150 bronze medals.

Three thousand dollars in cash prizes, divided among 48 contestants.

Special outfitting prizes—new clothes — for the winners of the European trips.

Certificates of merit for every contestant who wins a place.

And scads of other things!

That will be the night of June 22. After the party is over, the smoke has cleared and everybody has had another sleep, there will be a last opportunity to see the things in Detroit you've missed before. Gurney and Fred, as well as the rest of THE AMERICAN BOY staff, will be on hand to direct you to your own church, to Belle Isle, to anything you want to do.

Meanwhile the boys who have won the trips to Europe will be busy. There will be passports to get—clothing to purchase—models to pack. There will be a send-off in Detroit, then a trip to Canada's national airplane model contests in Toronto—these are to be held by the Model Aircraft League of Canada in the week after the Detroit contests. The Detroit winners have been specially invited to compete at Toronto.

More entertainment for the winners, then—entertainment in Toronto, Ottawa and Montreal. A full four or five days, they will have. Some place along the line they will meet the scale model winner, if by any chance he has not attended the contest but has entered his plane "by mail."

And finally, on July 3, the party will embark on the fine Canadian Pacific liner *Duchess of Bedford*, Liverpool-bound!

The three winners will occupy one big outside cabin. The "chaperon" of the party, Franklin M. Reck—he's assistant managing editor of THE AMERICAN BOY—will have an adjoining cabin. And C. P. S. S. officials promise the group the run of the boat!

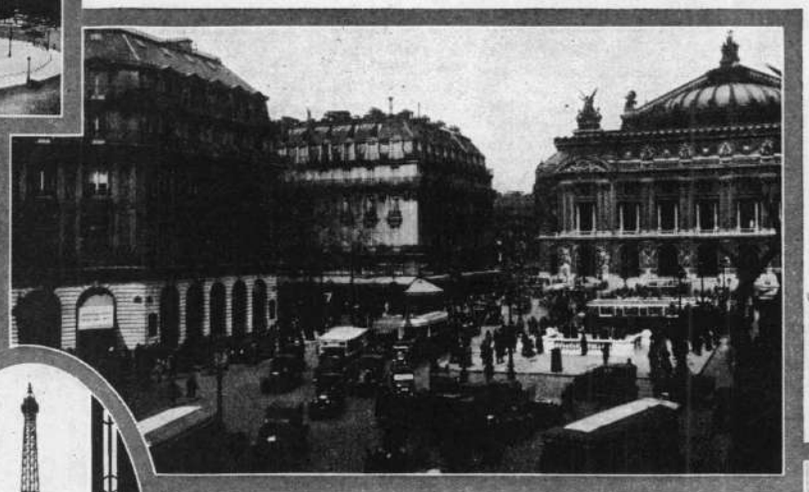
There—very briefly—is the program you fellows who are planning to attend the contests may anticipate. It's going to be a great event—"these airplane model contests are among the most important occasions in aviation history," says Mr. Stout. It's going to leave you with crowding memories of friends you have made, notables you've chatted with, things aerial you've learned.

And it's going to be a whale of a lot of fun!

Will *you* be on hand?

Europe Ahead!

For America's Airplane Model Champions



THREE model airplane champions are going to win for themselves free trips to Europe this summer!

Two of the boys—the indoor and outdoor flying champions of America—will be the guests of THE AMERICAN BOY. The third, America's scale model champion, will be the guest of Frank A. Tichenor, A. M. L. A. vice-president and publisher of *Aero Digest*. All three will be selected at the Second National Airplane Model League of America Contests, which THE AMERICAN BOY will hold in Detroit June 20-22.

Every boy in America may compete in one—or all three—of the contests; any boy under twenty-one (on June 20, 1929) is eligible to win one of the trips to Europe. He needs only to join the A. M. L. A., arrange to take part in the National Contests (next month's magazine will give all details)—and build a better indoor ship, or outdoor model, or scale model, than anybody else!

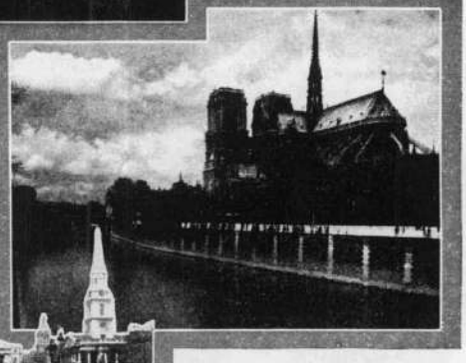
The contests will end on Saturday, June 22. Then there will be four jamful days in Detroit—arranging passports, seeing Detroit's great factories and parks and other attractions, making final arrangements. Next, in company with Mitchell V. Charnley, assistant editor of THE AMERICAN BOY, the party will leave for Toronto.

There exhibitions and contests will be scheduled. The three boys will have an opportunity to prove their skill, as well as to visit Niagara Falls across Lake Ontario, to meet Toronto officials and to enjoy the sights of the city. Then Ottawa, Canada's capital, where Dominion authorities will greet them; Montreal on the St. Lawrence, Canada's great eastern seaport.

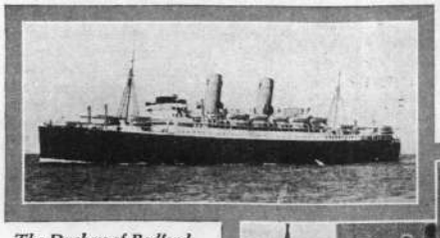
On July 3, the party will embark. With them will be Franklin M. Reck, assistant managing editor of THE AMERICAN BOY, and author of the popular State College stories. Their vessel will be the 30,000-ton, 600-foot *Duchess of Bedford*—one of the great liners of the Canadian Pacific Steamship fleet. Seven glorious days on the Atlantic, then foreign soil—Liverpool.

In rapid succession will follow a trip to London where traffic keeps to the left and "bobbies" answer questions; visits to Westminster Abbey, Trafalgar Square, Scotland

(*Cont. on page 81*)



Paris! The winners will see Napoleon's Arc de Triomphe, the busy, bustling Place de l'Opera, the Eiffel Tower, Notre Dame Cathedral, and dozens of the Paris variety of sandwich man!



The Duchess of Bedford.

London! Trafalgar Square, with Lord Nelson high on its monument, is the heart of the city. Not far is Whitehall, where the King's famous Horse Guards execute the picturesque ceremony of changing posts. And the London Tower Bridge—with London "bobbies" patrolling it above and below.

(*Continued from page 23*)

Yard, Buckingham Palace, London Bridge; a stirring inspection of the famous old Tower of London; and an international airplane model contest out at Croydon, Britain's greatest airdrome, with England's champion model builders vying with the Americans for the Wakefield Cup.

Next comes departure by tri-motor plane for Amsterdam. A day in the great Dutch city, then train for—

Paris!

Squawking, madly tearing taxis—quaint twisty streets—great graying stone buildings where world history has been made. Notre Dame, where Napoleon was crowned; Louis XIV's great chapel where he is buried. The Louvre, palace of kings, with its Mona Lisa, its Venus de Milo, its priceless art treasures. The Place de l'Opéra, in front of the grandiose theater; at its side the famous Café de la Paix, where you sit at the sidewalk tables and watch the world go by. The Latin Quarter across the winding Seine; the Ile de la Cité, once all of Paris; Louis IX's glorious Sainte Chappelle. Montmartre, with all of Paris's traditional gaiety at its foot. The Eiffel Tower; intimate small cafes, great gilded restaurants, historic buildings, even Roman ruins!

And a day in the battle fields—Chateau Thierry, Rheims, the Argonne, Belleau Wood.

Train to Cherbourg, then; and at last the return trip. The *Montroyal* sails on July 25, for Montreal. Then home—the end of the greatest trip those three champions ever made!

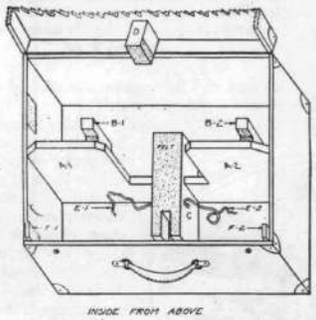
May 1929

To Ship Your Scale Model

KNOW how to ship your scale model to the Second National A. M. L. A. Contests in Detroit June 20-22?

Ray Shepherd, of far-off Hilo, Hawaii, knew how last year, and the result was that his Curtiss Army Hawk came through its long journey in splendid shape. It won for Shepherd seventh place in the junior division of the First National A. M. L. A. Scale Model Contest, as well as a cash prize, a silver medal and a merit certificate.

The drawing shows just how Shepherd built his packing case for his model, and the photograph shows the plane actually in the box. The walls and the crosspiece marked A-1 and A-2 are of heavy pine; the pieces B-1 and B-2 are of lighter pine, and piece C is a block of pine. The body of the plane rests on C, which has a slot cut in it for the tail skid.



INSIDE FROM ABOVE

The small block, D, rests gently on the nose of the plane when the lid is shut. "I padded the box with felt,"

Shepherd wrote, "wherever it touches the plane. A strap of felt fastened to the rear of C comes up over the plane when it is in place, and holds it firm.

"The box is 24⅛ x 18⅛ x 8 inches, inside measurement, which gives it ⅛-inch leeway over the extreme measurements of the plane. This particular box won't do for any other scale model; but the same type, with measurements varied, will suit the Stinson-Detroiter, the Vought Corsair or any ship. The wings, of course, rest on B-1 and B-2."

Next month's AMERICAN BOY will give full details of how and where to ship your model, if you can't come to the contests with it. Don't write for information ahead of time—it won't be ready. Watch for the June AMERICAN BOY.

A. M. L. A. Chat

TWO hundred and eighty-six A. M. L. A. chapters! And by the time you read this there'll be more, for every week brings new ones to the list. Model builders who work together and compare planes and ideas with their fellow club members are getting a lot of fun and inspiration out of group association.

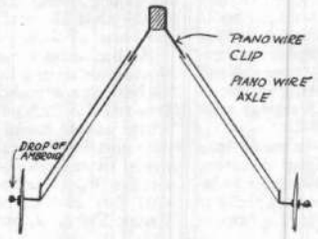
"We have tried a few biplanes," says Ira D. Kingsley of the Howell, Michigan, model airplane club, "but find that when the prop shaft line and the center of gravity are below the center of drag, there is too much tendency to loop when the plane is first released, and a too abrupt dive if we make adjustments to overcome this tendency. We are working out a triplane so that the drag resultant will occur in the center of thrust line.

"One of our biggest stability troubles is the tendency of the motor stick to warp up when full wound, causing, through lifting the rear surface of the tail, the ship to stall at the beginning of the flight. This may be overcome by a stronger motor stick. . . ."

James Hazlett, Jr., of Walpole, Massachusetts, writes:

"I've started my club among some Boy Scout chums, and expect to make a big thing of it. I built a shack in the attic of my house, and have hung out a flag with an A. M. L. A. banner that we had made. As the pilots flying from Boston to Providence and other points follow the railroad near here, and the new Ford Trimotor of the Boston Airport flies over about every day, I keep a record of each airplane that goes over."

Arthur Robin, of Washington, Pennsylvania, has been experimenting with shock absorbers for his R. O. G., and has found a way to reduce the jar on a bamboo landing gear. Light gauge piano wire should be used for the clip, which can be ambroided in place over the motor stick, or the landing gear can be made adjustable ballast by pinching the clip together so that it holds to the stick like the wing clip. The drawing shows this.



Thomas Nunley of Gary, West Virginia, writes that his newly started club already has a workshop, the backing of the City Council, two ex-army officers as instructors and a treasury of twenty dollars.

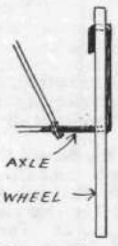
Clemens Roark, of the Littleton, Colorado, club, writes that the business men of Littleton have given forty dollars to his club to be used for prizes, and that its chief difficulty is in finding enough competition with other clubs to test planes outside of the local organization.

The approach of the second National A. M. L. A. Meet is bringing a wave of development and improvement in model building. It looks as though contestants this year are going to come to Detroit laden with new ideas. There may be a dozen "mystery ships" in 1929. Not all builders, however, are withholding their inventions.

William Woodward of Port Washington, New York, finds that a landing gear of light wire braced by very thin bamboo about halfway between the wheels and motor stick gives enough spring to absorb a lot of shock. He uses no axle, but bends angles in the wire over which the wheels are slipped.

"I built my plane in bed," writes Woodward, "and I'm still there. I haven't flown it yet, but my bed provided a good bumpy landing field, so I found out that the landing gear was practical."

George Nicholayeff, Jr., of New York City, has developed a way to hold wheels in place on the axle. The diagram explains it. "I had had considerable trouble," he writes, "and I find that securing the wheels with the end of the wire axle insures lightness, strength and correct position of the wheels, as well as neatness of appearance."



Robert Poon of San Francisco, California, uses a short, paper hub to steady the wheels. He rolls a small 1-8 inch strip of light paper into a tube which fits snugly over the axle and yet turns easily. The paper hub fits into the axle hole of the wheel, and is held rigid with a drop of ambroid. Another drop is used to prevent the wheel from coming off the axle. This method keeps the wheel rigid and increases the friction only slightly.

Herbert Carson, Richmond Deyo and Thornton Whipple, of Binghamton, New York, are doing all they can to get their city an airport. "We made a complete model airport," Carson informs League offices, "including hangar, clubhouse, dirigible hangar, Navy blimp, and mooring mast with a model of the *Los Angeles*. We provided our own system of spot and flood lights for night display. The largest plane has a wing spread of five inches, and the six Army Hawks a two-and-one-half inch wing spread. All of the planes were carved from wood. We made everything ourselves."

Before the job was finished Binghamton department stores were requesting permission to display the complete layout, and through the three boys the city is becoming airport-conscious! "We are all A. M. L. A. members," Carson concludes, "and have made several record flying models. We owe the fun we have had with our airport to the League—it first aroused interest in us."

Get Your Airplane Models Ready!

They'll Create New Champions at Second National A.M.L.A. Meet

The Hotel Statler, contest headquarters, overlooks Grand Circus Park, the heart of Detroit. Overlooking the park you see Gurney Williams, greeter-in-chief, and his brother and able assistant, Fred.

AIRPLANE model champions from Kennebunkport to Honolulu are packing delicately tuned models into their traveling hangars for trips to Detroit, and America's fourth city—headquarters of the Airplane Model League of America—is ready to receive them.

The occasion will be the Second National A. M. L. A. Contests, to be conducted by THE AMERICAN BOY for the National Aeronautic Association. The time will be Thursday through Saturday, June 20, 21 and 22. The assembly place will be the Hotel Statler, contest headquarters. And the receiving line will include William B. Stout, Merrill Hamburg, Griffith Ogden Ellis and other League officers; national aviation figures; Detroit city officials; and Gurney and Fred Williams, known as the "Two Boobs" who went abroad and as greeters plenipotentiary, extraordinary and supreme.

League members have read in THE AMERICAN BOY and in newspapers associated with the magazine in the work of the A. M. L. A. of the jammed-full three days these city, sectional and state champions are going to have when they come to Detroit—three days of models fighting for top places, sight-seeing in one of the world's greatest industrial centers, meetings with aviation's notables, banquets, fun, festivities.

They haven't read the whole story—it would take all of this magazine and part of the city directory to describe everything that's going on for their benefit. Here is one big surprise, though—they are going to be the guests of Mr. Edsel Ford, son of the famous Henry Ford and president of the Ford Motor Company, at a dinner at Ford Airport!

"We entertained the model champions in 1928, at the First National Contests," Mr. Ford told Mr. Ellis, editor of THE AMERICAN BOY and general chairman of the contests, "and we certainly aren't going to miss the opportunity to do it again. If the boys enjoyed it as much as we at the head table did, it was one of the most successful banquets I ever attended!"

So the contestants may look forward again to the expanse of white tables and glittering silver in the great hangar at the airport—to a background of shining duralumin wings on giant Ford tri-motor air transports, the weathered blue outlines of the big Fokker that took Commander Byrd, honorary president of the A. M. L. A., over the North Pole, the bright colors of a dozen different types and sizes and shapes of smaller airplanes. Famous fliers will sit among them. They may expect one of the most unusual and impressive experiences of their lives.

And at least three of them will find themselves wiring home that they won't be back for a month, for they've won free trips to Europe! The three top scorers—the boy whose indoor model flies longest, the boy whose outdoor model does the same thing, and the boy whose scale model rates highest—will be taken across the Atlantic, the two flying champions as guests of THE AMERICAN BOY and the scale model winner as guest of Frank Tichenor, publisher of *Aero Digest*. The May AMERICAN BOY gave details of the Old World sights they will see.

As every model builder knows, any League member who is properly enrolled and is less than 21 years old on June 20, may enter the contests. Any boy may compete for the trips to Europe, and for the Stout Indoor Trophy, the $3,000 in cash prizes, the six big cups, the free scholarships, the two hundred gold, silver and bronze medals, the summer in a boys' camp, and other prizes. Boys of 15 and under will compete in the junior divisions of the contests; boys of 16 to 21 will compete in the senior divisions. If the best records are made by juniors, of course, they will become national champions and winners of the European trips. Aram Abgarian, 1928 indoor champion, was a junior when he took top place. (Neither Abgarian nor Tom Hill, last year's European trip winners, nor W. Lofton Dennis, 1928 scale model winner, is eligible to win the trip this year.)

The National Outdoor Trophy, by a 1929 ruling of the National Aeronautic Association, is open only to boys of less than 17. This does not affect any of the other prizes, however. Except for national trophies, the European trips and a few special prizes, the awards in the junior and senior contests are identical.

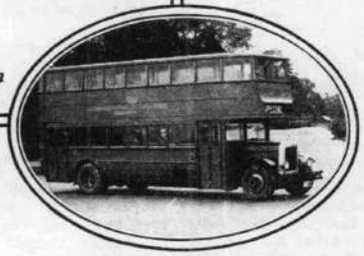
Know the rules governing models to be entered? An indoor model must "have a distance between the propeller bearing and the motor hook . . . not to exceed fifteen inches," must be rubber-motored and must be built entirely by its owner (except that he may buy ready-made metal fittings). An outdoor model must "have a wing span not to exceed 40 inches," must be rubber-motored and must be

(*Continued on page 59*)

When You Get on the Detroit Train—

Be sure that you have in your pocket these things: Your railroad certificate (obtained with your ticket); your signed "parents' consent blanks"; a copy of your birth certificate.

This Article Tells How to Get Them



Busses like this will furnish you transportation in Detroit.

The Stout Indoor Contest will take place at Olympia, huge auditorium. This shows its great size.

Model Builders Meet the President

PRESIDENT HOOVER met some old acquaintances in the White House this spring. They were two members of the Airplane Model League of America, Aram Abgarian and William Chaffee of Detroit who called on the President in company with other model experts to invite him to attend the Second National A. M. L. A. Contests in Detroit June 20-22.

They had called on him last year when he was Secretary of Commerce, to show him their models and to tell him of the work of the League.

This year's party included Abgarian, present world's indoor record holder, Chaffee, who formerly held it, Thomas Hill of Winston-Salem, N. C., boys' outdoor champion, and Ford Grant, Detroit, international champion (Grant won a contest with British builders at Croydon Airdrome, London, Last July). They were accompanied by Merrill Hamburg, secretary of the A. M. L. A., Fred Black, advertising manager of the Ford Motor Company, and Mitchell V. Charnley, of THE AMERICAN BOY'S editorial staff.

And the party flew from Detroit to Washington in a giant Ford all-metal tri-motor air transport, loaned them for the trip by Edsel Ford, president of the Ford Motor Company. The great ship made the trip in three hours and fifteen minutes—it takes sixteen hours by train!

The President recalled the boys' visit of last year, and told them that they and the 300,000 other members of the League are doing much to make America air-minded. Other governmental officials received the group and watched soaring white models, among them Secretary Lamont of the Department of Commerce and his assistant for aeronautics, William P. MacCracken; Secretary Adams of the Navy Department and Admiral William A. Moffett, chief of the Navy's bureau of aeronautics; F. Trubee Davison, assistant secretary of war for aeronautics; and Senators Arthur H. Vandenberg and James Couzens of Michigan.

The Ford Plane, 7,000 Feet Up.

Abgarian, Hamburg, Hill, Chaffee, Davison, Charnley, Grant, Black.

Are You a Record Smasher?

HAVE you flown your indoor model for longer than 353.6 seconds, or your outdoor ship to exceed 10 minutes 14 2-5 seconds? If you have, and if the flights were officially timed by three adult timers, you can have the records established as official. Here's how:

Send to the A. M. L. A., American Boy Building, Second and Lafayette Boulevards, Detroit, Mich., with a two-cent stamp for return postage, and ask for the official National Aeronautic Association form, "application for record—rubber motor model aircraft." The form, together with complete information about classifications of models, will be forwarded to you, and you can fill it out and return it to the League for certification to the N. A. A.

Don't write for the form, however, unless you have good reason to believe your record is actually a record. The indoor and outdoor marks quoted above are the present official records—be sure your new mark is higher before you try to have it approved.

Get Your Airplane Models Ready!

(*Continued from page 18*)

built by its owner except for propellers, wing ribs and metal fittings. A scale model must have a wing span of exactly 24 inches, and (if it is not made from A. M. L. A. plans) must be accompanied by a drawing giving all necessary dimensions, airfoil sections and such other details as may be considered necessary in order to construct a model. "This drawing," says N. A. A. rules, "must be one supplied by the manufacturer of the airplane . . . or must be accompanied by a letter from him stating that it has been checked and found accurate."

Flying models made from A. M. L. A. kits, of course, are eligible for entry.

HERE'S the procedure through which every boy who enters the contests *must* go, unless his arrangements are to be handled by a newspaper, department store or similar agency. All of you League members who are entering "on your own," make yourselves completely familiar with every detail—it's important!

First, write to the A. M. L. A., American Boy Building, Second and Lafayette Blvds., Detroit, Mich., for contest entry blanks. These will be ready May 25. Specify whether you want blanks for the indoor contest, the outdoor contest or the scale model contest, or all three; you may enter as many as you choose.

The blanks will be sent you, with the following additional material: Two "parents' consent blanks;" contest rules; information about reduced railroad rates; hints on getting models ready for contests; a hotel room reservation card.

If you are entering the scale model contest by express—that is, if you are sending a model but not coming to Detroit yourself—return the entry blank, properly filled out, and the "parents' consent blanks," duly signed, to the Scale Model Contest Director at A. M. L. A. headquarters, with a check or money order for $1.00, to cover cost of handling and packing. Then pack the model with extreme care — an article in the May AMERICAN BOY tells you of an excellent scale model box — and ship it *express prepaid*, to the A. M. L. A., in care of Detroit Transfer Company, 1720 Twelfth Street, Detroit. It must be shipped in time to reach Detroit by June 10.

Frank A. Tichenor.

It will be carefully unpacked, scaled and judged. It will be exhibited at the Hotel Statler. If it wins you a top place, you will be notified by wire on June 22. And if it's the best model in the contest, you'll start packing a bag for Europe!

Models will be returned to their owners in the original containers after the contest, express collect.

If you are entering one or both of the two flying contests, or coming to bring your own scale model, the procedure is different. First, you return to the A. M. L. A. the entry blanks, and the hotel reservation card properly filled out—they ought to reach the A. M. L. A. by June 10.

Next, you get the "parents' consent blanks" signed, and obtain a copy of your birth certificate from the clerk of the county in which you were born—as you've guessed, these are necessary in case you win the trip to Europe. Be sure that these are in your pocket when you get on the train.

Be sure, too, that you have obtained a *reduced fare certificate* from the ticket agent who sells you your ticket to Detroit. You pay full fare to Detroit, but the certificate, properly validated by Mr. Hamburg, will get you half fare on the return trip (provided you take the same route back). In any case, don't fail to obtain the certificate when you buy your ticket; it will help you and others to get the reduced fare privilege.

Edsel Ford.

Remember that from far Western points—west of the Rocky Mountains—it's cheaper to obtain the special summer excursion round trip ticket. This is not true for any other portion of the country, however.

You'll plan to reach Detroit, probably, on June 19—one day before the contest opens. You'll want this much time to tune up models and to get oriented—to meet your "enemies" and to see a bit of Detroit.

When you get to Detroit, go direct to the Hotel Statler. A taxi will take you there, at low cost. Ask for Gurney or Fred Williams. They will help you to get registered, and give you information as to what to do next.

You'll find a special A. M. L. A. workroom, right in the hotel—a place where you can give your models those finishing touches. You'll visit the scale model display in one of the Statler banquet halls. You'll see the sights of the city, if you have time—parks and industrial plants, the Detroit River, Canada just five minutes away by ferry.

Your expenses will not be high. You'll probably be able to hold them to $20, in addition to transportation, Pullman and train meals. Special low rates have been provided by the hotel; there will be lots of free bus service and free meals.

And you'll have the time of your life! Will you be there?

PRINCE has a reason to hold his head up—and to grin. The collar he's wearing is silver, and it was formally presented to him by W. L. MacKenzie King, premier of Canada. Prince proved himself considerable of a hero. He was leader of the dog team that carried a school teacher—stricken with appendicitis—120 miles through a Saskatchewan blizzard. And when his master lost the way, Prince took charge and followed his own unerring nose straight to the Canadian National Railway station at Big River.

"All in the day's work," pants Prince.

A. M. L. A. Chat

Devoted to the Doings of the 300,000 Members of the Airplane Model League of America

THREE happy airplane model builders, as you're reading this, are packing new grips and getting themselves ready for the jaunts of their lives—the trips to Europe offered as top prizes in the Second National Airplane Model League of America Contests. THE AMERICAN BOY held the contests in Detroit June 20-22 as official representative of the National Aeronautic Association.

As this magazine went to press, indications were that more boys than last year would enter the contests. A total of over 400 participated in 1928. Prizes this year included the trips to Europe—two offered by THE AMERICAN BOY and one by Frank A. Tichenor, publisher of *Aero Digest*—two national trophies for indoor and outdoor flying champions, six great silver cups and more than 300 medals, cash prizes, special summer camp and aviation school scholarships, certificates and other awards.

And the models that were prepared for the contests! Scale models of Lockheed Vegas, Vought Corsairs, Army Hawks, Stinson-Detroiters, Ford Tri-motors, glistening with all the shiny new paint and trappings of their big brothers. Long-propellered, slim-winged, indoor models — impressive twin-screw outdoor ships. Trick variations—"outboard tail-booms," queer-shaped rudders and stabilizers, I-beam motor sticks.

"We airplane designers are going to learn things from the ships these fellows are building," said William B. Stout, president of the League and designer of the Ford Tri-motor. And so, amid banquets (one at Ford Airport, with Edsel Ford as host) and contests, sight-seeing and friend-making, the affair goes into aviation history as a real step in the aeronautical progress of America.

—o—

Meantime, word of record flights continues to come to League headquarters, Here's an amazing story from Walter Frazier, Spokane, Wash.:

"I was flying my 'mystery tractor' outdoors, and after it had cruised around at a 250-foot level for five minutes 15 seconds it started descending. About ten feet from the ground, however, a forty-mile gust of wind struck it, blew the wing from the fuselage and sent it shooting upward. It climbed to about 3,000 feet, and we watched it for 45 minutes before it disappeared.

"Two hours later I glanced up and saw the wing again, 2,000 feet high and heading south. If anybody in Peru finds it, I wish he would return it to me!"

—o—

And here's the world's champion Battling R.O.G. The yarn comes from Louis McCreery, secretary of the Hawks Chapter of the A.M.L.A., Long Beach, Cal.

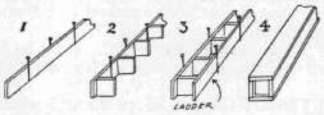
"Charles Tarwater, one of our members, was sailing an R.O.G. outdoors. It got caught on an air current and climbed. Two seagulls started chasing it, but every time they dived they caused an air disturbance and forced the plane away. They never caught it."

—o—

Robert Savage, Wayne, Pa., has developed what he calls the "ladder-method" of constructing the built-up fuselage used in the Abgarian-McCoy indoor tractor. The drawing shows his scheme.

"First, set a row of pins firmly into a perfectly flat surface," directs Savage. "Along it stand a 1-16 x 1-32 piece of balsa. Second, line up the bulkheads at right angles and ambroid them in place. Third, ambroid the other long balsa strip to the opposite side of the bulkheads. True up the work, keeping it perfectly flat and trim off the long bulkheads. This is the 'ladder.' Let it dry thoroughly before continuing.

"Fourth, sand the 'ladder' lightly and ambroid the two remaining pieces of balsa to the top and bottom sides. After these have dried, carefully sand the finished work."



Here's Savage's "ladder."

John Donahue, El Paso, Texas, is making good use of Alexander Klemin's talks an aeronautics in THE AMERICAN BOY.

"While I was flying my biplane R. O. G.," writes Donahue, "I discovered that I must have made the wings too heavy because the endurance motor would carry it around only once or twice. I put on the high climb or flat motor, wound to 275 turns, and it went beautifully. But a crash took off the top wing, and I decided to try it with only the smaller wing. I wound it up, and the speed was terrific! Professor Klemin's statement that less drag makes the landing speed greater was proved then and there.

"When Bolivas, the plane, gets out of the repair shop, I am going to compare weights, flights and wing surfaces of monoplanes and biplanes and perhaps develop some useful tables."

—o—

And Howard MacAllister, North Weymouth, Mass., has added a sewing machine to his airplane model tool kit. Placing his balsa propeller block under the needle of the machine and slowly moving the needle downward, he obtains a perfectly true hole for his propeller shaft!

—o—

Old model champions fell by the wayside at the indoor contest held in Detroit in connection with the Second All-American Aircraft Show during the spring. Victor Chylinski, 15 years old, took first place with a flight of more than five minutes, while Aram Abgarian, world's record holder and national champion, and William Chaffee, former record holder, were far behind. Just before his official trial Chylinski had made a flight of six minutes four seconds—a trial flight that could not be considered official!

—o—

Have you had trouble making dummy cylinders for your scale models? Philip A. Davis, Jr., Concord, Mass., tells of a method to do it:

"Ralph Macone, a friend of mine, drives two nails into the nose of his ship at the proper angle, ambroids a dowel stick between them and winds wire around to indicate the flanges. He paints the whole thing black. This makes a very satisfactory cylinder."

—o—

Tracy N. Shaw, of Midwest, Wyoming, offers a speculation that model planes are affected by the 5000-foot altitude of his town. R.O.G. models, Shaw reports, will make a ceiling of only about thirty feet instead of the eighty or ninety they have made in lower altitudes. "And my outdoor plane," he continues, "will fly only about one minute at a height of 140 feet." Shaw hoped to test out his theory at the Second National A.M.L.A. Contests.

New Champions--New Records

America's Model Fliers Smash All Marks in Second A. M. L. A. Contests

Judges at Selfridge followed long flights in automobiles!

Fifteen hundred spectators watched the outdoor contests, Selfridge Field.

Joseph Culver, California boy, will hold the Stout indoor trophy for a year, (left). At the right, Donald Burnham grins when he receives congratulations and the outdoor trophy from Mr. Ellis.

AMERICA has crowned three new airplane model champions, and they are enjoying their first prizes—trips to Europe—as you members of the Airplane Model League of America read this.

From a record-smashing list of contestants—more than 400 participated—the three boys won their titles at the Second National A. M. L. A. Contests held in Detroit by THE AMERICAN BOY late in June. And they had to be champions indeed to win them. For it took a new world's record in each of the three divisions—indoor flying, outdoor flying, scale model—to hold first place.

The Pacific Coast won most of the honors. Joseph Culver, 18-year-old University of California freshman from Oakland, Cal., sent his curved-wing model up to the girdered ceiling of Olympia auditorium for an astounding flight of 513 seconds. Louis Proctor, 19, of Vancouver, Wash., took scale model honors with his nearly-perfect Vought Navy Corsair that scored 94 points. And the youngest of the three, Donald Burnham, 14, West Lafayette, Ind., climaxed a set of excellent outdoor flights by sailing his model for 10 minutes 30.4 seconds at Selfridge Field before judges lost sight of it.

These records were not the only notable ones. Particularly in the Stout Indoor Contest, flight after flight that would have been world-beating a year ago was marked on the judges' cards. The assembly of city and state model champions, witnessed by air notables, pilots and leaders in the aviation industry, came to Detroit to prove their mettle, and they amazed everybody from William B. Stout, League president, down to the last contestant.

From Hawaii and Boston, from Florida, California and Louisiana they came. From cities and hamlets, by train, plane and auto they started arriving at the Hotel Statler, contest headquarters, on June 18. Ray Shepherd, of Hilo, Hawaii, completed his 4,700-mile trip even earlier—he was the first to arrive. Fulton Robinson, of Fayetteville, N. C., hitch-hiked to Detroit for $3.00. Merrill Shook of Albany "stowed away" with the Albany delegation. By Wednesday evening more than 200 were registered, had received their bronze fobs and ribbons, and were working on models in their hotel rooms or in the special A. M. L. A. workroom.

Ray Shepherd, Hawaii, has unique features in his model.

Early Thursday morning, June 20, a fleet of big yellow busses left the Statler for Selfridge Field. Approaching the home of the First Pursuit Group of the U. S. Army Air Corps, they received a royal welcome — eighteen Army Hawks, in formation, roaring down the road into the field with them, then diving and zooming and curvetting and pirouetting for half an hour over the scene of the outdoor contests. Col. Charles H. Danforth, commandant of Selfridge Field, had arranged this special air circus for the contestants.

Louis Proctor's Vought Corsair model won a championship for him.

The weather man, giving contestants a clear, sunny day with a wind of only eight miles an hour, still played tricks on them. Three times the direction of the wind changed, and each time the seven starter's squads of officials, with all the fliers, had to shift ground across the mile-and-a-half field. But flights got under way at once, and by noon a number of excellent times were on the score cards—flights that far surpassed the 1928 winning time of 4 minutes 24 seconds. The best flight was that of Herbert Dorsey, 16, Washington, D. C., 1928 playgrounds champion, whose model flew exactly 10 minutes before it landed in Lake St. Clair. George Mueller, 15, Chicago, made 7 minutes 32 seconds; Norman Fain, 14, Providence, 6:55; Donald Shetland, 16, Providence, 6:37.4; Ruick Myers, 18, Chicago, 6:22.5; and Ernest McCoy, 17, Detroit, 6:05. It looked as though Dorsey were the winner.

But Burnham had another flight coming to him. On his first he had made nearly four minutes; on his second nearly six. He had his small single-propeller tractor—a model he had developed himself because he had not been satisfied with the results he obtained with his orthodox twin pusher—tuned exactly right. He launched it for his third trial, and it flew for ten and a half minutes—just 16 seconds better than the world's record for hand-launched outdoor models held by Robert Jaros, Chicago, since 1925.

There were sunburned faces at the buffet dinner for contestants at the Fort Shelby Hotel that evening, and plenty of tales of good luck and bad. But they were all smiling tales. And new smiles came to faces when the results of the scale model contest were announced during the evening. Thirty of the scale model contestants were in Detroit for the event, though most had entered their models by express.

Judges had been working for ten days over the models—measuring, examining, comparing, rechecking. Each model had been judged on seventy-five to one hundred separate details. Finally George F. McLaughlin, editor of *Aero Digest* and chief judge, had checked over and over again the two leading models—those built by Proctor and by William Chaffee, 16, Detroit. At length Proctor's was chosen as the most complete, and a wire went to him at his Vancouver home from Griffith Ogden Ellis, AMERICAN BOY editor and general chairman of the contests, telling him of his success.

Proctor's model, the judges agreed, was a marvel of excellence. His nine cylinders were individually cast, and bore the proper push rods and connections. His control surfaces were movable and operated from joy sticks in either of the two cockpits. His covering was accurate, the "cat walks" and hand grips and aileron horns and other details were complete and exact. Sixteen hours a day for six weeks, he said, supplemented by many other hours of planning and retouching, were necessary for the ship's construction.

FRIDAY morning the indoor contests started at Olympia. From the start world's records were threatened. Aram Abgarian, 16, Detroit, 1928 champion and for nearly a year holder of the world's record of 353.6 seconds, threatened to repeat when his ship made 391 seconds early in the day. But the mark did not stand long. Soon Yoke Wai, 16, Detroit, a Chinese boy who had been building models for only two months, established a new world's record with a flight of 411 seconds. And then, just before noon, Culver wound his motor 1600 turns, took the ship out into the arena, held it just above the floor and launched it.

It was an unorthodox ship. The wing was curved in an arc from pointed tip to pointed tip. The tail was kite-shaped, the rudder resembled a question mark stuck on behind it. It was a model developed by Culver himself, and powered with rubber lubricated by a special dope of which he held the secret.

And it flew as though it were never coming down. Set in a gradual climb, it circled lazily to the very top of the auditorium. Each time it turned it seemed about to touch the topmost girder, and every time it barely missed. It passed six minutes, and people began to watch. Six and a half, and other contestants forgot their own planes. At seven it was gliding down, but it was still high in the air.

Roars rose from the floor. Seven and a half, eight—three timers excitedly waved Culver's friendly rivals back as the ship approached the floor. It floated down lazily, slowly, at last came to rest as cheers split the air. Timers conferred. "Eight minutes, thirty-three seconds," they announced.

And Culver, seized by newspaper photographers, took time to lock his ship in his model box and grin.

"Luck," he said. But it wasn't. It was good flying plus good building.

(*Continued on page 32*)

New Champions--New Records

(*Continued from page 19*)

When the preliminaries were ended, eighteen contestants had bettered the unheard-of record of a year ago! But none came within forty seconds of Culver's mark, and he remained the leader.

That evening all contestants journeyed to Ford Airport, there to be the guests of Mr. Edsel Ford at a banquet in the great hangar. A Ford trimotor all-metal transport towered over the speakers' table, and planes roared and droned and surrounded the spot. More than four hundred boys—and the one girl contestant, Ora Hall, 17, Providence, who learned from her twin brother to build models and beat him out in the Providence elimination contests!—and officials, pilots, newspaper men, airplane model club sponsors and air notables sat at the tables. Col. Harry H. Blee, chief of the U. S. Department of Commerce division of airports and aeronautic information, the principal speaker, told the contestants that they are to be the air leaders of to-morrow, described the future of aviation, advised his hearers about their duties and mission and self-education in the development of to-morrow's air transportation.

Seated with Colonel Blee at the head table were Toastmaster Griffith Ogden Ellis, William B. Mayo, chief engineer of the Ford Motor Company and personal representative of Mr. Ford; Lieut. Ralph Rhudy of Selfridge Field, the original of "Jimmy Rhodes" in the flying cadet stories by Frederic Nelson Litten in THE AMERICAN BOY; Mr. Litten himself; Lieut. "Chick" Harding, flier and assistant football coach at West Point; Capt. W. E. Kepner, one of the balloonists who won for the United States permanent possession of the Gordon Bennett international balloon trophy in 1928; Mr. Stout; Merrill Hamburg, secretary of the A. M. L. A.; Karl S. Betts, of the Detroit Board of Commerce; Eddie Schlee, round-the-world flier; and other aeronautical leaders.

Saturday, with the contests complete except for the Stout finals, the whole party went to Lake Orion, 39 miles away, to witness an exhibition by man-carrying gliders. Saturday evening they went to Olympia, there to watch the finals—13 seniors and 13 juniors competed. It was an evening of long flights. Several contestants improved their records of the day before. But neither Culver nor anybody else could equal his mark, and it stood unchallenged. Victor Chylinski, 15, Detroit, with a mark of 396.4 seconds, won the junior division.

The Stout contest over, forty boys wound their commercial models for the trials for the Broadfield Trophy. For an hour fuselage ships with built-up wings, closely resembling large ships, whirred around the arena. At length Ruick Myers, 18, Chicago, with an excellent flight of 2 minutes 45 seconds, was declared winner.

AND then the final banquet, held in the Hotel Statler's big ballroom! Four hundred at the tables again, at the speakers' table such notables as Mr. Ellis, Mr. Stout, Mr. Hamburg, General J. H. MacBrien, president of the Aviation League of Canada; Mr. McLaughlin; William Heaslip, aeronautical illustrator for THE AMERICAN BOY and other magazines; Colonel Blee and others. A big table bearing six 30-inch silver first place cups, 198 gold, silver and bronze medals, other awards. A stage, carefully concealing an aeronautical stunt behind its curtain.

It was an inspiring scene, and a jolly one. The program opened with a burlesque introduction of duplicate "masters of ceremonies," Fred Williams and John Morse of THE AMERICAN BOY staff. This ended with custard pie a la Charles Chaplin, and everybody except Williams and Morse were happy. Next—along with fruit cocktail, soup, chicken, ice cream and "trimmin's"—came an interlude staged by Frank Reck, waiter, and Gurney Williams, irritated diner, two more members of the magazine's staff who convulsed the contestants with their haggling over such items of food as pineapple soup and hamburger steak.

Finally a speech by Mr. Stout, and his announcement of a flying fuselage model contest for outdoor ships for next year, with prizes of $100, $75 and $50; an uproarious act on the stage detailing the sad adventures of two crashed Army fliers in a bandit's lair in Mexico, with Reck and Gurney Williams as the fliers, Morse as an Army captain and Mark Haas, of THE AMERICAN BOY, as a bloodthirsty bandit; and at length the award of the 300 prizes and certificates.

A.M.L.A. Chat Postponed Until the September Issue.

Then the contests were officially over, and 400 contestants and officials and newspapermen went to bed. Next day most of them departed.

But Culver and Burnham stayed, and two days later Proctor joined them. On June 28 they left Detroit for Toronto, Ottawa and Montreal, to meet Canadian officials and display their models; and on July 3 they boarded the Canadian Pacific Liner *Duchess of Atholl*, under the care of Mr. and Mrs. Reck—contestants know Mrs. Reck as the efficient chief registrar of the contests—bound for Europe. There they visited Liverpool, London and other English cities, participated in the Wakefield Cup meet at Croydon on July 14, and went to Paris. And they are in Paris as this magazine reaches you. They go to Cherbourg late in July, to sail for home aboard the *Montrose*.

Two of the trips to Europe are donated by THE AMERICAN BOY, the third by Frank A. Tichenor, publisher of *Aero Digest*. The contests were made possible by the financial assistance of the Detroit Board of Commerce and of dozens of America's leaders in aviation, by the coöperation of thirty of the nation's outstanding newspapers and the help of teachers, boys' workers, civic clubs and airplane model enthusiasts throughout United States and Canada. Donors to the League's contest fund will be announced next month.

The complete list of prize winners and prizes follows:

STOUT INDOOR CONTEST

Seniors (16-20)

First, Joseph S. Culver, 18, Oakland, Cal. (Trip to Europe, Stout Trophy, $100 cup, $200 cash, gold medal); second, Albert Mott, 18, Detroit (Home study scholarship in Aviation Institute of U. S. A., $100 cash, gold medal); third, Ernest McCoy, 17, Detroit, ($75 cash, gold medal); fourth, Yoke Wai, 16, Detroit ($50 cash, gold medal); fifth, Aram Abgarian, 16, Detroit, ($30 cash, silver medal); sixth, Irving Johnson, 19, Chicago ($20 cash, silver medal); seventh, Norbert Foley, 17, Columbus, O. ($15 cash, silver medal); eighth, Alan Loofborrow, 17, Columbus, O. ($10 cash, silver medal).

Ninth to thirty-third, bronze medals:

George Novak, 18, Detroit; Lawrence Hankammer, 19, Des Moines, Iowa; Thomas Condax, 19, Philadelphia; Fred Johnson, 17, Hawthorne, N. J.; David Howell, 17, Detroit; Lawrence Pacifico, 16, Amsterdam, N. Y.; Glenn Reichman, 16, Buffalo; Earl Hoffman, 16, Detroit; Stanley Smith, 19, Rochester, N. Y.; John Dawson, 16, Evanston, Ill.; Marcus Deitsch, 18, Columbus, Ohio; Carl Carlson, 16, Chicago; Walter Chappelle, 17, Buffalo; Carl Haub, 17, Westmont, N. J.; Thomas Willis, 17, Chicago; Eugene Svitenky, 17, Chicago; Douglas Walters, 19, Wyandotte, Mich.; Carl Goldberg, 16, Purchase, N. Y.; Philip Copeland, 16, Detroit; Homer Jones, 18, Cincinnati, Ohio; Bernard Schwartz, 17, Chicago; Nicholson Wade, 16, Indianapolis; Edmund Morrison, 16, Hartford, Conn.; Ford Grant, 20, Detroit; Elden Wiegert, 16, Detroit.

(*Continued on page 37*)

New Champions--New Records

(*Continued from page 32*)

STOUT INDOOR CONTEST

Juniors (under 16)

First, Victor Chylinski, 15, Detroit ($100 cup, $200 cash, gold medal, summer in Camp Penn Loch, Michigan); second, George Pulas, 15, White Plains, N. Y. ($100 cash, gold medal); third, Frank Salisbury, 14, Washington, D. C. ($75 cash, gold medal); fourth, Jack Kazanjian, 15, Highland Park, Mich. ($50 cash, gold medal); fifth, Albert Schwarzkopf, 13, Norfolk, Va. ($30 cash, silver medal); sixth, Edward Carpenter, 14, Amsterdam, N. Y. ($20 cash, silver medal); seventh, Richard Morton, 15, Hyde Park, Mass. ($15 cash, silver medal); eighth, Donald Burnham, 14, West Lafayette, Ind. ($10 cash, silver medal).

Ninth to thirty-third, bronze medals:

Edward Beshar, 13, New York City; Henry Pacewitz, 15, Chicago; Robert Markham, 15, Providence, R. I.; Leonard Popham, 15, Port Huron, Mich.; Lawrence Brulin, 15, Springfield, Mass.; Fred Sawyer, 15, Providence, R. I.; David Binns, 15, Columbus, Ohio; Harvard Clawson, 14, Chicago; Edward Clevey, 13, Cleveland; George M. Mueller, 15, Chicago; William F. Campbell, 14, Toronto; Lawrence McAfoos, 15, Bellevue, Pa.; Lloyd Bevan, 15, Birmingham, Mich.; Jack Duffendack, 15, Bartlesville, Okla.; Edward Harms, 14, Evanston, Ill.; Lawrence Sims, 15, Bay City, Mich.; Rupert G. Tiffaney, 15, Owego, N. Y.; Raymond A. Mitchell, 15, Fall River, Mass.; William H. Kelly, 15, Baltimore, Md.; John Carman, 14, Elizabeth, N. J.; Ray Shepherd, 15, Hilo, Hawaii; Russell Lohr, 14, Bay City, Mich.; Jesse L. Riley, 14, Chicago; Sterling Wardell, 15, Watertown, N. Y.; Arnold Rose, 15, Toronto.

NATIONAL OUTDOOR CONTEST

Seniors (16-20)

First, Herbert Dorsey, 16, Washington, D. C. ($100 cup, $200 cash, gold medal, one week at Camp Crosley, a football training camp for high school players); second, Donald Shetland, 16, Providence, R. I. ($100 cash, gold medal, home study scholarship from Aviation Institute of U. S. A.); third, Ruick Myers, 18, Chicago ($75 cash, gold medal); fourth, Ernest McCoy, 17, Detroit ($50 cash, gold medal); fifth, Herbert Fish, 16, Akron, Ohio ($30 cash, silver medal); sixth, Casimir Leja, 16, Chicago ($20 cash, silver medal); seventh, Keith Swanson, 16, Champaign, Ill. ($15 cash, silver medal); eighth, Edward Petruska, 16, Cleveland, ($10 cash, silver medal).

Ninth to thirty-third, bronze medals:

Joseph Culver, 18, Oakland, Calif.; Honore Sommers, 18, St. Louis; Henry C. Goebel, 18, Rochester, N. Y.; Aram Abgarian, 16, Detroit; Eugene Svitenky, 17, Chicago; Homer Jones, 18, Cincinnati; Frederick Thomas, 18, EauClaire, Wis.; Norbert Foley, 17, Columbus, Ohio; Albert Mott, 18, Detroit; Joseph Cannon, 17, Champaign, Ill.; Lawrence Wilson, 16, Champaign, Ill.; Jack Fischer, 17, Cincinnati; Robert Bacon, 17, Indianapolis; Edward Miller, Jr., 17, Chicago; Thomas Willis, 19, Chicago; Carl Carlson, 16, Chicago; Nicholson Wade, 16, Indianapolis, Ind.; Irving Johnson, 19, Chicago; Frank L. Jankech, 18, Gagetown, Mich.; George Novak, 18, Detroit; Ralph Levitz, 16, Lebanon, Pa.; Charles Laughton, 17, Tulsa, Okla.; W. Reitz, 16, Baltimore, Md.; Joseph S. Ehrhardt, 16, St. Louis, Mo.; Bernard Schwartz, 17, Chicago.

NATIONAL OUTDOOR CONTEST

Juniors (under 16)

First, Donald C. Burnham, 14, West Lafayette, Ind. (National Outdoor Trophy, trip to Europe, $100 cup, $200 cash, gold medal); second, George Mueller, 15, Chicago ($100 cash, gold medal); third, Norman Fain, 14, Providence, R. I. ($75 cash, gold medal); fourth, Edward Harms, 14, Evanston, Ill. ($50 cash, gold medal); fifth, Lawrence McAfoos, 15, Bellevue, Pa. ($30 cash, silver medal); sixth, Nick Kalimir, 14, Gary, Ind. ($20 cash, silver medal); seventh, Leon Levitz, 14, Lebanon, Pa. ($15 cash, silver medal); eighth, George Wood, 14, Providence, R. I. ($10 cash, silver medal).

Ninth to thirty-third, bronze medals:

Boyd F. Richardson, 15, Oakland, Calif.; Grant Boland, 14, Carbondale, Pa.; Richard Huber, 13, Chicago; Robert Berns, 13, Chicago; John Hannon, 14, Providence, R. I.; Louis B. Struble, 15, Westfield, N. J.; Robert Samsoe, 15, Kenosha, Wis.; William H. Coughlin, Jr., 14, Providence, R. I.; Robert Rigg, 15, Chicago; Howard Jaekel, 15, Maryhill, Wash.; Irving Maurer, 15, New Haven, Conn.; Henry Pacewitz, 15, Chicago; Russell Bell, 15, Providence, R. I.; Jack Laister, 15, Wyandotte, Mich.; Ray Shepherd, 15, Hilo, Hawaii; Lawrence Brulin, 15, Springfield, Mass.; Walter Coyle, 14, El Paso, Ill.; Melwyn Yohe, 13, Parnassus, Pa.; Edward Beshar, 13, New York City; Robert Pekelsma, 15, Chicago; Albert Schwarzkopf, 13, Norfolk, Va.; Samuel E. Taylor, 15, Ypsilanti, Mich.; Frank Salisbury, 13, Washington, D. C.; Arthur M. Jester, 14, Winston-Salem, N. C.; DeWitt Nelson, Jr., 15, Chicago, Ill.

SCALE MODEL CONTEST

Seniors (16-20)

First, Louis Proctor, 19, Vancouver, Wash. (Trip to Europe, $200 cash, $100 cup, gold medal); second, William Chaffee, 16, Detroit (home study scholarship of Aviation Institute of U. S. A., $100 cash, gold medal); third, Joseph M. Sevila, 19, Springfield, Mass. ($75 cash, gold medal); fourth, Floyd Kowalak, 18, Buffalo, N. Y. ($50 cash, gold medal); fifth, Chalmers Stewart, 18, Akron, Ohio ($30 cash, silver medal); sixth, Tudor Morris, 17, Peru, Ind. ($20 cash, silver medal); seventh, Harvey Kruger, 18, Detroit ($15 cash, silver medal); eighth, Charles G. Lamb, 16, Oakland, Calif. ($10 cash, silver medal).

Ninth to thirty-third, bronze medals:

Paul Ziegler, 16, Wichita, Kans.; Fred A. Miller, 16, Copley, Ohio; Quan Gue Cheong, 16, San Francisco, Calif.; Harold Bonar, 17, El Paso, Ill.; Arthur Mott, 19, Detroit; Joseph E. Kimm, 17, Minneapolis, Minn.; Leon Gregg, 17, Westbrook, Conn.; John F. Roche, 17, Kansas City, Kans.; Edward Maissian, 18, Philadelphia; George S. Schairer, 16, Oakmont, Pa.; William A. Snow, 17, Pawtucket, R. I.; Daryl Lightbody, 17, Oakland, Calif.; Charles Miller, 19, Akron, Ohio; Philip Kesselving, 19, Dover, Delaware; Wilbur Kupfrian, 20, Hasbrouck Heights, N. J.; Wilbur E. Boyer, 18, York, Pa.; Martin D. Mathewson, 19, Ingersoll, Ontario, Canada; Bertrand Trombley, 17, Bay City, Mich.; Robert W. McKee, 19, Zanesville, Ohio; Charles D. Mattingly, 16, Wilkes-Barre, Pa.; Wilbur Bodell, 19, Battle Creek, Mich.; John O'Connor Ricci, 16, Norwalk, Conn.; Ford Grant, 20, Detroit, William A. Morris, 16, Rushville, Ind.; Albert E. Kanode, 18, Washington, D. C.

SCALE MODEL CONTEST

Juniors (under 16)

First, Kenneth Mudie, 14, Detroit ($200 cash, $100 cup, gold medal, one week at Camp Crosley, a football training camp for high school players); second, George L. Thompson, 15, Minneapolis, Minn. ($100 cash, gold medal); third, Ray Shepherd, 15, Hilo, Hawaii ($75 cash, gold medal); fourth, Lewis Carlson, 15, Naugatuck, Conn. ($50 cash, gold medal); fifth, Grover Davidson, 15, Chews P. O., N. J. ($30 cash, silver medal); sixth, Loyd Parker, 15, Salisbury, N. C. ($20 cash, silver medal); seventh, James Smedley, 15, Detroit ($15 cash, silver medal); eighth, Clinton E. Leech, 15, Springfield, Mass. ($10 cash, silver medal).

Ninth to thirty-third, bronze medals:

Louis F. Mahan, 13, Iowa City, Iowa; Lawrence McClelland, 14, Fletcher, N. C.; Clayton Kirkpatrick, 15, Westwood, N. J.; Gillette Morgan, 15, Peru, Ind.; Joseph Garside, 15, Milton, Mass.; Maurice F. Cooper, 15, Little Rock, Ark.; Melvin Johansen, 14, Oakland, Calif.; Edward W. Hermann, 14, Drexel Manor, Pa.; Gordon R. Sommers, 15, Minneapolis, Minn.; Bruff W. Olin, 15, Detroit; Richard Caldwell, Detroit; James Shields, 14, Detroit; Tim Kong, 14, San Francisco, Calif.; Bill Fealock, 12, Chicago; Carl Grunschel, 15, Chicago; Widmer Hansen, 15, Midwest, Wyo.; John A. Winter, 14, Windsor, Ontario, Canada; Donald Hehman, 15, St. Bernice, Ind.; Maurice S. Molvik, 15, Cooperstown, N. Y.; Nicholas Karstens, 15, Nebraska City, Neb.; Frederick King, 15, Jackson, Mich.; Howard Ginther, 13, Lansing, Mich.; August Doppes, Jr., 15, Cincinnati, Ohio; Tracy N. Shaw, 15, Midwest, Wyo.; John Louis Dumas, Jr., 13, Seattle, Wash.

COMMERCIAL MODEL CONTEST

First, Ruick Myers, 18, Chicago (Broadfield Trophy); second, Herman Paulsen, 18, Chicago (gold Roosevelt plaque); third, William Chaffee, 16, Detroit (silver Roosevelt plaque); fourth, Marcus Warmuth, 15, Montclair, N. J.; fifth, Bernard Collins, 17, Providence.

A. M. L. A. Chat

About the Activities of the 300,000 Members of the Airplane Model League of America

No longer are members of the A. M. L. A. asking, "What makes 'em fly?" A fifth word has been added to the question—"What makes 'em fly longer?"

And model builders are finding answers by the score. New types of model construction, new propellers, new tail groups, new motor arrangements—devices that the Wrights and Fokkers and Stouts of 1929 aviation never thought of—are appearing wherever models are built. Duration is the goal of the miniature aircraft expert, and each one has his own pet method for lengthening his flights.

Want to know some of the methods?

—o—

First, the novel device employed by Norman Perry, New York City. Perry's trouble was unique—it was the family cat, who thought his model a canary. The cat was all agin duration. "No tissue paper bird shall fly while I rule the roost," the cat declared. And Perry's R. O. G. ships fell before the feline onslaught.

So Perry armed an R. O. G. He placed a pin judiciously in the model's nose. He launched it, and the cat made the customary attack.

The pin did the business. The cat knows, now, that models may have claws like canaries!

—o—

Sullivan and his indoor model.

Lynn Sullivan, of Los Angeles, obtained a 45-minute flight outdoors with an indoor ship not long ago, and has since lost five of the planes on long flights. The plane is a tractor with a fifteen-inch motor stick and a twenty-inch wing. "It has a very low pitch prop which enables it to secure high altitude and begin sailing on the wind," Sullivan explains.

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The "Metcalf Super Gnat" is the latest production of Ted Metcalf, Lakewood, Ohio. Metcalf has specialized on speedy R. O. G. models. His newest has an eight-inch motor stick and an eight-inch wing, two inches wide at the center but tapered to one and one-half inches at the tips. The most unusual feature is the placing of the rudder, which stands above the tail and the motor stick, instead of protruding to the rear. The rudder frame is of bent bamboo, and its forward end is held above the motor and motor stick by a loop of music wire which also serves as "can" for the motor. The propeller is of the high-speed type, three inches long and sharply tapered toward the ends.

"This 'Bug' pursuit plane R. O. G.'s just like a Curtiss Hawk, and it has a landing speed that will curl your hair," Metcalf reports.

—o—

Hymen Blass, St. Louis, wraps a bit of silk thread around the hook of his propeller shaft, to prevent the shaft's cutting his motor when it is wound tight.

—o—

Adjustable propellers have helped George Steed, Memphis, Tennessee, to good flights with a small-size twin pusher. With a prop of 120-degree pitch, Steed says, he has obtained results almost twice as good as with "standard props."

Steed's small ship has 7-inch propellers, 26-inch wing spread and a 16-inch frame. "Several boys laughed at me for building it," he writes, "but I have good flights with it. I use it now for exhibition purposes."

—o—

Roderick Eddy, Athens, Ohio, makes aluminum wheels from two small discs of aluminum. He cuts small pie-shaped wedges from the discs and bends the discs into shallow cones, then puts the edges together and makes a "tire" of a narrow strip of adhesive tape holding the two cones together.

Other League members are using the same method, but substituting wide rubber bands for adhesive tape.

—o—

Milton Arthur, Great Falls, Montana, completed a commercial model and flew it 13 seconds on its first trial. Then he wound it for a real flight, after shaving some of its parts to lighten it, and it flew beautifully. "But," reports Arthur, "one of the boys was standing in the center of the gym, timing it, and when it started down he couldn't get out of the way. He and it collided, and when I picked it up it was broken in five places! So I can see my honor certificate gently flying away as did my airplane."

—o—

A "patent book" is the newest institution of the Rockaway Model Airplane Club, Far Rockaway, Long Island. "We enter all the new ideas of our members in the book if they are proved successful in practice," the club president, B. Lipschutz, informs the League. "At the end of a certain time the fellow who has the most patents gets a prize. This serves to keep our members on the go."

—o—

From Clifford W. Purinton, West Hartford, Connecticut, comes word of a triangular hollow fuselage used in his indoor tractor. The ship, with a 10-inch propeller, proved very successful. Purinton recently was high point man and winner of a silver loving cup in a contest between the Hartford Aero Model Club and a club from near-by Meriden.

"I have found the League's Experimental Kit a splendid outfit," Purinton reports. "I have built three planes from it and I can easily make two more."

—o—

Scale model builders who know what a job it is to make one expert reproduction of a big ship will be impressed to know that Robert D. Hawkins, Ashley, Indiana, built a fleet of no less than six miniature Curtiss Robins for friends. He used ordinary tissue covering, mica windows, balsa wheels with rubber-covered wire for tires, and carved radiators, exhaust stacks and shock absorbers.

"I intend to build one flying model of this plane, also a flying model of the Burnelli air liner," Hawkins declares. "I expect, too, to build a twin tractor endurance model of the Burnelli type."

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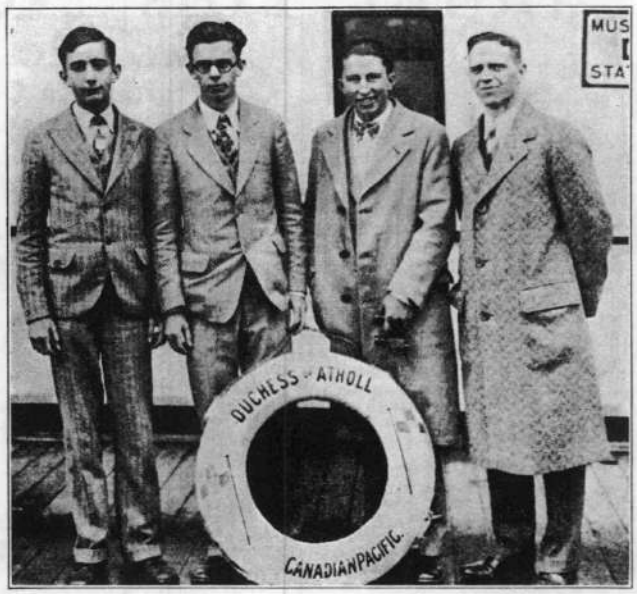
Among the clubs publishing their own "newspapers" are the Goshen, Indiana, and the Scranton, Pennsylvania. organizations.

Champions Tour Europe!



Burnham, Culver, Proctor and Mr. Reck on board ship.

THREE model airplane champions, the fortunate victors in the indoor, outdoor, and scale model events of the Second National A. M. L. A. Contests at Detroit in June, were swinging triumphantly through Europe when this issue of THE AMERICAN BOY went to press.

Yes, triumphantly!—even though at Halton, England, the Americans failed to place in the international competition for the Wakefield Cup, the famous trophy offered for the best flight made by a fuselage model plane. Lack of experience with fuselage models kept them from making a better showing, though right after the meet one of the American planes soared away on a perfect flight and disappeared over the tree tops.

But a trip to Europe is certainly triumphant when the three champions meet the Prince of Wales, have tea and supper with the winning school crew of the last Henley meet, and are the personal guests of Sir W. Sefton Brancker, chief of the Civil Air Ministry for Great Britain, at the Royal Air Force show at Hendon! And that isn't all. Read on!

You remember the three winners, Joseph S. Culver, Oakland, Calif., indoor champion; Donald C. Burnham, West Lafayette, Ind., outdoor champion; and Louis Proctor, Vancouver, Wash., scale model champion. And you remember that they toured Canada, seeing Toronto, Niagara Falls, the House of Parliament at Ottawa (where they caught a glimpse of Prince Henry, Duke of Gloucester, younger brother of the Prince of Wales), and famous old Mount Royal at Montreal. You remember, too, that they sailed for Liverpool July 3 on the Canadian Pacific liner *Duchess of Atholl*, with Franklin M. Reck, assistant managing editor of THE AMERICAN BOY, and Mrs. Reck.

At the Euston Station, London, W. E. Evans, treasurer of the Society of Model Aircraft Engineers, met them, ushered them into a taxi, and accompanied them to the Regent Palace hotel, where two other representatives of the S. M. A. E. were waiting. That was on Wednesday, July 10.

On Thursday they saw Westminster Abbey, the Science Museum, and had lunch at the Hawker Airplane plant, where Sopwiths, Tomtits, and other British pursuit planes are made. There Mr. Camm, chief designer, showed the party around—and became so enthusiastic when he learned of Culver's remarkable record of eight minutes and thirty-three seconds with an indoor ship that he made a special point of going to the Wakefield meet and arranged to have the champions fly their planes later on at Olympia hall. Their guide the rest of the day was A. P. Thurston, chairman of the S. M. A. E. council, who was assistant to Hiram Maxim in the first steam-driven flying attempt in 1895, was a pilot during the World War, and passed on the specifications of nearly every ship the British designed for war service.

Friday the party again went to Westminster Abbey, saw the guards at Whitehall, visited the Embankment, St. Paul's Cathedral, the Cheshire Cheese inn, and other famous places.

On Saturday came the R. A. F. show at Hendon, with Sir Sefton as host, and tea and supper with the Browne-Nicholls school crew, Henley champions! Next came the tournament for the Wakefield Cup. While the Americans were defeated, Burnham's ship made one excellent flight, and his flying stick model impressed the British by staying up four minutes. And then came Monday, the greatest day of all.

The International Aero Exhibition opened Monday at Olympia, in West Kensington, and the champions were there. So was the Prince of Wales. The upshot of it was that the champions met the Prince! They found him not merely gracious, but enthusiastic—he had to know all about the construction of the planes, rubber motors, airfoils, balsa, Japanese tissue, and everything else that goes into the making of a championship model. Before the audience was over, the champions had decided that the Prince, if he set his mind to it, would make a first rate model builder.

Later, while a gallery of notables in silk hats and morning coats looked on, Culver flew his ship for Thomas O. M. Sopwith, designer of the famous British pursuit ship and founder of the Sopwith Aviation Company. Like Sopwith, the spectators marveled at the light construction of Culver's model and the slowness of his propeller.

The same day the party went aboard ship once more, bound for Paris, French cathedral towns, and the battlefields. They were touring France as this article was written.

Build This New Baby R. O. G.

HERE'S the easiest flying airplane model you ever built!

It's the newest Baby R. O. G.—a model that is both an improvement over previous ships of this type and easier for a builder to put together. And it's designed especially for novices at the game—for new members of the Airplane Model League of America, for new readers of THE AMERICAN BOY, for older readers of the *Youth's Companion* who have never tried model building.

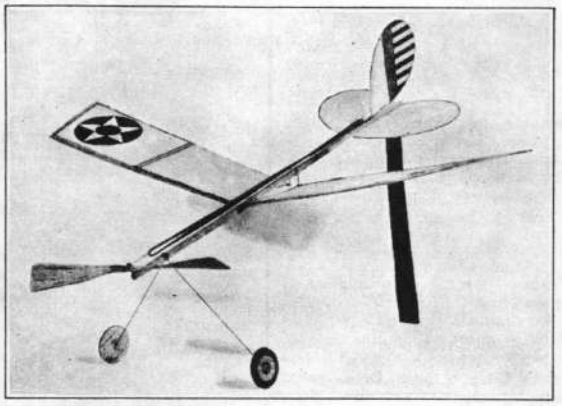
The ship is the first in the new series to be presented by the League through THE AMERICAN BOY during the coming months. It will be followed by more advanced indoor models, by plans for scale models, for flying fuselage ships and outdoor planes—the whole series will amount to an instruction course in airplane model building and in aeronautics. For, as officers of the League say—they include Commander Richard E. Byrd, honorary president; William B. Stout, president; Merrill Hamburg, secretary, and as vice-presidents Frank A. Tichenor, Eddie Rickenbacker, Alvan Macauley, Eddie Stinson, Clarence Chamberlin, Thomson Burtis, Major Thomas G. Lanphier and Griffith Ogden Ellis—there is no better way for a fellow to learn what makes airplanes fly than actually to build and sail these models.

And fun! This first ship and those to follow it are gauged to perform more aeronautical stunts in an hour than the *Graf Zeppelin* does from Lakehurst to the Azores. The new Baby R. O. G. dives and zooms and loops; properly adjusted and wound, it will fly for two minutes or more. The succeeding models, most of them designed by Mr. Hamburg, will not only do these things but will be planned as contest models, indoor and outdoor—one of them will be the Culver ship that soared to a new world's indoor record of 8 minutes 33 seconds at the Second National A. M. L. A. Contests. Among the others will be a ship designed specially for outdoor fuselage contests such as the Wakefield international competition.

As in the past, the League has prepared a special kit for the construction of the new Baby R. O. G.—it can be obtained for 50 cents *in check or money order* from the A. M. L. A., American Boy Building, Second and Lafayette Blvds., Detroit, Michigan, or perhaps from your local airplane model dealer. The League handles kits only—no separate parts are available at headquarters. The Number 1 kit (order it or ask for it by number) contains not only all materials for building the little ship, but also a special wire-bending tool, special aids for the builder and a ready-carved propeller.

If you're not obtaining the kit, you'll need the following materials: balsa for wing frames, 1-8 in. x 1-32 in. x 36 in.; balsa motor stick, 1-8 in. x 1-8 in. x 9 in.; Japanese tissue paper, 20 in. x 3 in.; 16 1-4 in. of .014 music wire for rudder and tail surface frames, 6 1-2 in. of .016 wire for landing gear; 2 balsa wheels, 3-4 in. in diameter, 1-16 in. thick; balsa propeller block, 7-16 in. x 9-16 in. x 5 in.; .014 music wire propeller shaft, thrust bearing, can, rear hook, wing clips (2); two brass washers; glue; rubber motor, 16 in. x 1-16 in. x 1-16 in.

Start with the wing. An excellent method, you'll find, is to lay your Japanese tissue on top of a sheet of oiled paper (cement won't stick to oiled paper, though it would to your work-table), pin all smoothly to your work-table or to a plain pine board, and mark out on the paper the exact places where you want the wing spars to lie. You can do this by using the dimensions in Figure 1 as a guide.



Decorate the wings of your R. O. G.

Now, using a razor blade or very sharp knife, cut your wing spars—four of them—to the proper lengths, give them light, even coats of cement or glue, and cement them into position. Do the same thing with the six ribs, and apply a drop of glue to eight of the twelve intersections—don't cement the four center intersections yet. Weight the spars while they're drying, if they don't lie perfectly flat.

YOUR next step is to trim off all excess paper, except the thin strip connecting the two halves of the wing. Fold the wing with the paper sides together. Press the spurs of the wing clips (their shapes are shown in the diagram) into front and rear spars, being sure that the front clip (the smaller) is on the leading edge (Figure V). Note that this clip extends farther from the end of the spar than does the rear clip.

Apply cement liberally to the joints, then let the whole thing dry for at least half an hour. Next, press the remaining wing clip spurs into the spars of the other half of the wing, cement as before, and cut away the strip of paper when the cement is dry (Figure VI). The wing is finished! Easy, wasn't it?

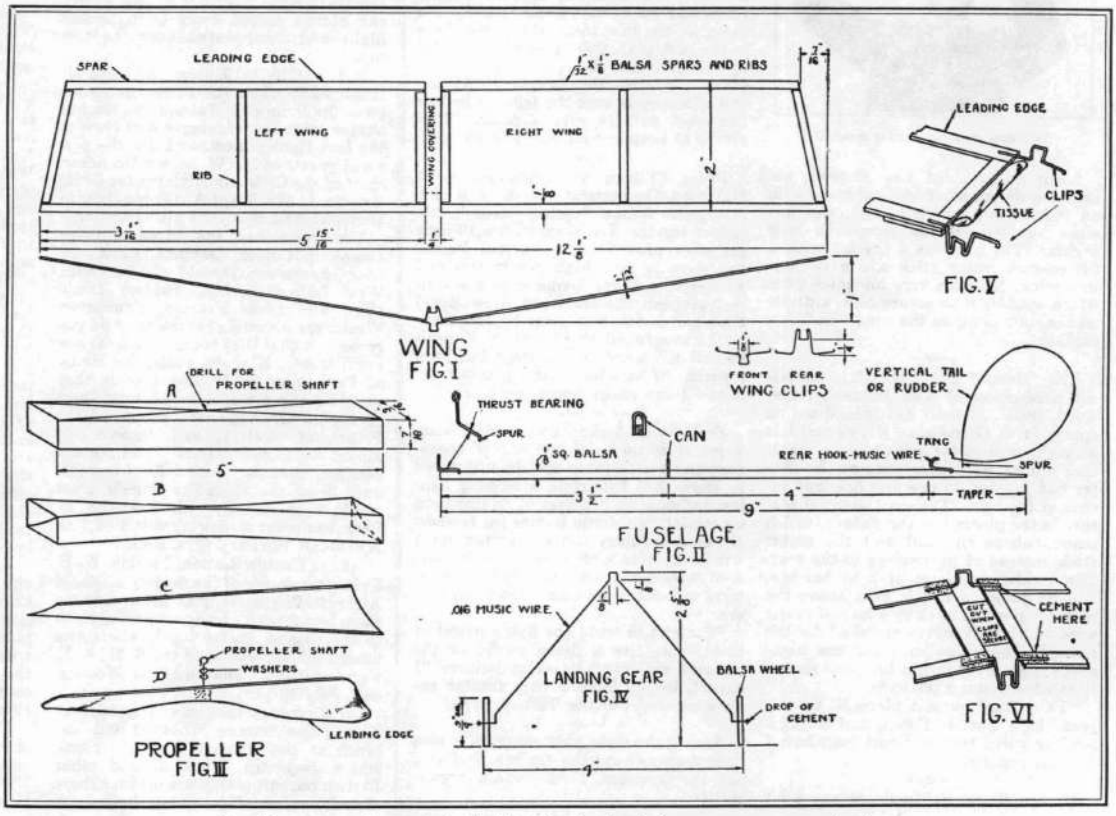
Note that the wing clips are designed so that the two halves of the wing are at a broad, flat angle to each other. This is "dihedral angle." You need this angle in a model plane to gain stability—to keep the center of gravity low, so that the ship will tend to right itself if it's thrown off balance. In this model, the angle will be right if the wing tips are about 1 inch above the center. You can adjust the angle by bending the clips.

For the tail surfaces, follow somewhat the same procedure. Draw (or trace from the exact-size drawings with this article) on the flat tissue the shapes of the rudder and stabilizer. Drive pins into the board as shown. The pin heads should lean slightly toward the center.

Now bend the finer wire—9 3-4 in. for the stabilizer, 6 1-2 in. for the rudder—inside the pins so that they conform to the outlines. Be careful not to kink the wires while you're doing it. See to it that the ends of the wires protrude as the drawings show.

Finally, cement the wires to the paper, placing the glue outside the wire only. The point to remember is to get glue under

(*Continued on page 32*)



Be mighty sure you know all the details in the drawing before you commence construction.

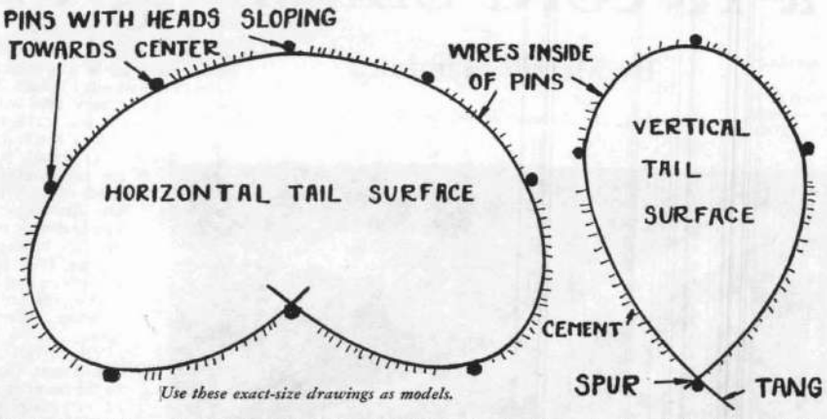
Build This New Baby R. O. G.

(Continued from page 12)

the wires without using so much that it spoils the paper by warping it. The glue should be kept carefully off the surfaces themselves.

When the glue is well dried, remove the pins and cement the spots you were unable to finish because of the pins. Let these spots dry, then trim the surfaces closely outside the wires.

Now, the motor stick or fuselage. Sand down one end of the motor stick as shown in Figure II—the tapered section is 1 1-2 in. long. Locate rear hook, thrust bearing and can as shown, press spurs into the wood, and cement all three. Cement all around the fuselage at the forward end, to gain additional strength.



Use these exact-size drawings as models.

The landing gear (Figure IV) is simple. Take the heavier 6 1-2 in. music wire, bend it according to the drawing and slip the wheels on to the axles. It's a good idea to apply a drop of cement to each side of each wheel first, incidentally, to strengthen it. The hole for the axle can then be punched through cement and balsa with a pin.

Once the wheels are in place, put "hub caps" of cement on the ends of the axles, to hold the wheels on. Cement the whole gear to the fuselage, about one inch behind the thrust bearing. The job's done!

Next, assemble the tail group or empennage. Take the rudder and insert the small spur into the fuselage, 1-8 in. back of the spur of the rear hook. Cement the longer wire-end, marked "tang," to the fuselage—take care that the rudder is in exactly vertical position.

THE stabilizer or horizontal tail is placed on the bottom of the fuselage. Lay the tail on your waxed paper, wire side up. Put drops of cement on the wire at the angle and at the exact center of the opposite edge; lay the fuselage in position, press it firmly in place and allow the glue to dry. *Be sure that the fuselage is exactly centered above the tail surface.*

Now for the propeller. If you're using a kit, you will have a ready-carved "prop," needing only sanding and insertion of the propeller shaft, as directed in the kit. If you want to carve your own propeller, however, here's the way to do it:

On the broad surfaces of the balsa block, 7-16 in. x 9-16 in. x 5 in., draw diagonals as shown in Figure III. At the intersection of the diagonals, push a pin through the block for the propeller shaft hole. Now carve out the center sections of the block as shown in the second drawing, leaving the middle or hub section about 1-8 in. thick.

Next, draw a diagonal across the end of the block as shown in the second drawing. On the other end draw a diagonal in the *opposite direction*. Carve the block away above the two diagonals, as shown in the third drawing.

The next step is to cut away the wood below the diagonals. This is delicate work, and at all times requires a very sharp knife. When the blades are pretty thin—say 1-16 in.—drop the knife and use sandpaper to get them down to 1-32 in. and the hub to about 1-16 in. Round off the ends if you wish.

The final step is to cut away the hub section so that the blades are wider at the tip than at the center—their greatest width should be about two-thirds of the way from the hub to the tip.

The propeller is ready, now, for the shaft. Take the shaft and push it through from the straight edge. Bend the protruding end into a U and pull it back so that the small end of the U is imbedded in the prop, then put cement around the hub to hold the shaft firm and strengthen the hub. Holding the whole thing by the shaft, find out whether the two blades balance exactly; if they don't, sand the heavier blade to the proper weight.

You're ready for the final assembly. Insert the prop shaft through the bearing at the front of the fuselage, having the washers in place as shown. Attach the two-strand rubber motor to the shaft hook and the rear hook, passing it through the can. Clip the wing on about two-thirds of the way from the front of the fuselage—

And your Baby R. O. G.'s ready to start flying!

First, though, you'll need to know something about the things that will make it fly most successfully. One is wash-in and wash-out. This is a twisting of the wings to counteract the torque of the propeller. The unwinding propeller, naturally, tends to bank the plane in the direction opposite to its turning. So you twist the left wing so that its leading edge is slightly higher at the tip than at the center—this is wash-in—and the right wing so that its tip is slightly lower, to give it wash-out. Breathe on the cemented joints of the wing to soften the glue slightly, twisting the wing in the right direction as you breathe. When the glue hardens again in a few seconds, the wing will retain its twist.

Aerodynamically you've thus increased the lift of the left wing and decreased that of the right. Thus you will offset the tendency of the prop to twist the plane to the left; properly done, this will perfectly balance the ship in flight.

Now test the model by gliding it. Twist the rudder slightly to the left, hold the plane shoulder-high with its nose pointing downward at an angle of 30 degrees from the vertical, and let it drop. If the wing is properly adjusted, the model will level off and come to the floor in a nice three-point landing, eight feet or more from you. If the wing is too far forward the ship will level off too soon and start to rise, then settle back in a "stall" and "tail slide." If it's too far back, it will dive directly to the floor. Experiment until it glides smoothly and evenly.

Then, holding the ship in your left hand, propeller toward you, wind the propeller with your right fore-finger—give it about 150 turns in a clockwise direction. To launch it, hold it level, shoulder-high, one hand preventing the propeller from turning; release the propeller so that the motor starts unwinding, then give the whole plane a slight push with the other hand—and off she'll soar!

As you get accustomed to flying the model, you can do all kinds of things with it. By setting the rudder you can make it fly in very small circles—small enough to get good flights in your own parlor. By adjustment of the wing you can make it climb rapidly or slowly; you can make it loop; you can work out other stunts with it. And of course it will take off the ground, or the dining room table, and land as beautifully as a Ford tri-motor!

You're going to have a lot of fun with this model. More than that, you're going to learn the fundamental principles of aerodynamics; and you're going to prepare yourself to build the progressively bigger and longer-flying ships to be described to you by THE AMERICAN BOY. You can get an honor certificate too, for flying the ship more than 45 seconds—send ten cents in stamps to League headquarters together with a statement signed by an adult witness that your Baby R. O. G. has accomplished this, and you'll get the certificate.

JOIN THE LEAGUE!

Invite Your Friends to Join

If you're not already a member of the A. M. L. A., send this coupon in to headquarters, properly filled out, with a two-cent stamp, and you'll get your membership card and button which will entitle you to all League privileges. If you are already a member, it's not necessary to renew the membership—League officers have made special arrangements to extend all old memberships indefinitely.

AIRPLANE MODEL LEAGUE OF AMERICA

....., 192..

AIRPLANE MODEL LEAGUE OF AMERICA
American Boy Building
Second and Lafayette Blvds.
Detroit, Michigan.

Gentlemen:

I wish to join the A. M. L. A. in order to have the backing of Commander Byrd and other air-leaders in my airplane model work, to get the help of Merrill Hamburg in building record-smashing models, and to learn about national contests, purchase of kits and other League privileges. Please enroll me as a member. Enclosed is a two-cent stamp to cover postage on my membership card and button.

Full Name .....

Age .....

Street and Number .....

City..... State.....

Reprinted from the November, 1929, American Boy Magazine

He Built a Record-Smashing Model

By Merrill Hamburg

Secretary of the Airplane Model League of America

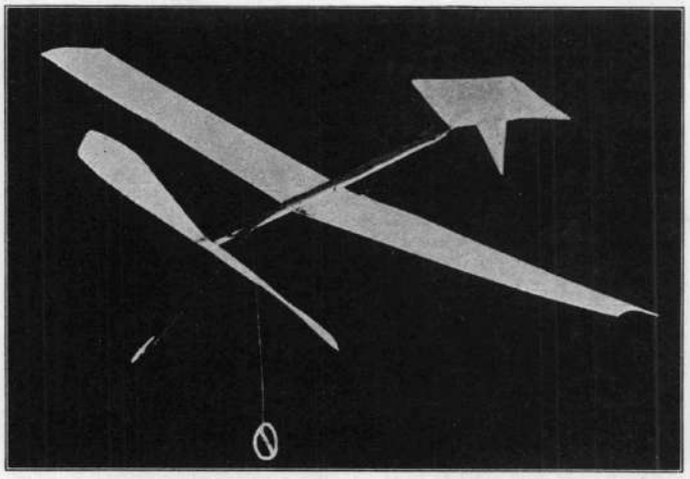
JIMMY SHIELDS wanted to win an airplane model contest.

"My old Baby Rise-Off-the-Ground won't do it," he worried. "No flight of a hundred seconds or so will be good enough. And yet it's a Baby R. O. G. contest. The ship has to be able to rise or land on its own wheels, it can have only 8 inches of rubber and it must be lighter than anything I've ever built. My guess is that it'll have to fly close to three minutes, too. These Detroit R. O. G. builders are good."

Jimmy knew his problems, and he started experimenting. Finally he had a new rise-off-the-ground model—we call it the Senior R. O. G. It weighed less than a tenth of an ounce; it had a tail boom that made its total length 15 inches, though it had only 8 inches of motor; it possessed an inverted rudder that lowered the center of gravity and thus helped to stabilize the model; and it had a cambered or curved surface wing.

He figured it this way:

"Lengthening the model moves the tail farther from center of gravity, hence increases stability. Setting the tail out on a boom, at a decided negative angle of incidence, lessens the ship's tendency to dive—in a glide it will constantly nose up. With a longer fuselage I can use a smaller tail surface, so that will partly compensate for the weight of the boom."



Here's the Senior R. O. G. It's a corking ship for contests.

Jimmy entered the ship in the contest, flew it for 160 seconds and won, hands down. The reason was that he had taken down his textbooks, figured out aerodynamical advantages and incorporated them in the plane. He found the ship very little harder to build than the Improved Baby R. O. G. described to you A. M. L. A. members in THE AMERICAN BOY last month, and capable of much longer duration.

It's the logical ship for a League member to build after he's made the Baby R. O. G. He'll be wise to start with the simpler model (one that will give him more aerial stunts than a Selfridge Field pursuit group!); having built it, he's ready for the Senior.

As last month, the Airplane Model League of America—an organization which, since THE AMERICAN BOY started it two years ago, has enrolled more than 325,000 air-minded boys and girls of America—has prepared a special kit of materials from which to build the model. The kit furnishes, ready to use, everything needed for the model, from model airplane cement to motive power, an extra prop and a rib-bending jig. To get it, send 75 cents in check or money order (the League cannot accept stamps in payment for kits, nor can it fill C.O.D. or charge orders) to the A.M.L.A., American Boy Building, Second and Lafayette Blvds., Detroit, Mich., and ask for the Number 15 Senior R. O. G. kit. The Baby R. O. G. kit, announced last month, is also available, for 50 cents. The League does not handle separate parts.

If you're planning to get materials elsewhere, here's what you'll need—Balsa: propeller block, 5-8 x 3-4 x 7 1-2 in.; wing ribs and fin, six pieces 1-32 x 1-32 x 2 1-4 in.; motor stick, 1-16 x 1-8 x 9 in.; tail boom, 1-16 x 1-32 x 5 in.; stabilizer, 1-16 x 1-32 x 4 1-2 in.; 2 wing spars, 3-64 x 1-16 x 15 in.; wheels, 1-32 in. flat balsa, 2 in. square. Wire parts, of .016 music wire: rear hook, can, propeller shaft, landing gear, 2 wing clips. Thrust bearing. Japanese imperial tissue, 3 x 24 in. 2 brass washers. Cement. Rubber motor, .045 x .045 x 16 in. Thread.

Jimmy Shields started his work with his motor stick or fuselage. The stick itself—the "body" of the model—he selected of firm, straight-grained balsa. He sanded it down to size, taking extra precautions to make it exactly uniform throughout its length. Experience had taught him to do that.

"A motor stick that's a tiny bit thinner one place than another," he knew, "is weak. It's likely to bend when the motor is wound, or to break, or to twist."

His motor stick completed, Jimmy glued on the wire parts. The rear hook shown in the drawing goes directly through the motor stick and is bent back for security. The can is of the open-side type, like those used on outdoor models—it is glued on one side of the motor stick but leaves a small opening at the other side. The thrust bearing is of half-round metal, bent and drilled for the propeller shaft. A flattened brad can be made into a satisfactory thrust bearing; sometimes a fairly heavy music wire is used, though this hasn't the strength to take a lot of pull from the motor.

The landing gear Jimmy made of music wire, without axle. It is bent to shape and glued on to the motor stick. The wheels are made from circles of 1-32 in. flat balsa—their diameter is 3-4 in., and the inner circle is 9-16 in. The center section is 1-16 in. wide, and is carefully bored at the exact center for the wire hub. The two semi-circles are cut out *before* the outside circle is cut, to avoid splitting the wood. An extremely sharp knife is necessary for this.

To hold the wheels in place, Jimmy cut four 1-16 in. square pieces of very thin balsa and cemented them onto the wire hubs, one inside each wheel, one outside.

Now the tail group.

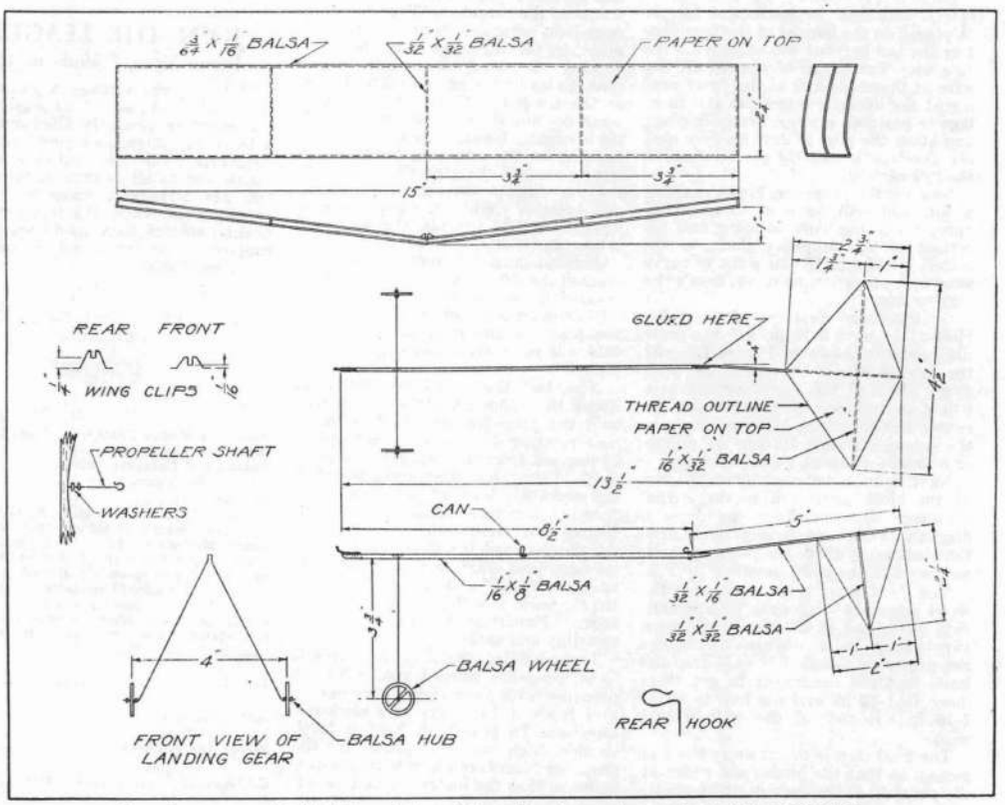
As already pointed out, Jimmy made the tail surface relatively small, because of the over-all length of the ship. The drawings show the dimensions. The best way to construct it is to sand the tail boom and crosspiece exactly to size, then mark the center of the crosspiece and a point 1 inch from the rear of the tail boom and cement them together, the crosspiece above the boom.

The thread outline, of very fine silk, comes next. Glue one end of the thread to the boom at a point 1 3-4 in. in front of the crosspiece, then pass the thread around the ends of the crosspiece and the rear of the boom, cementing it at all points. It should be tight but must not strain the balsa pieces.

The fin upright is glued to the boom at its intersection with the crosspiece, exactly perpendicular. A thread outline is used here, also—follow dimensions on the drawing.

Then apply the tissue paper—stabilizer first. Lay the tissue flat on top of the frame, and cement it in position, making sure it is stretched as tight as possible, without wrinkles. Allow it to dry, then trim it close with a sharp razor blade. Follow the same procedure with the fin—Jimmy put his paper on the right side of the fin, looking at the ship from the front.

NOW study the assembly of motor stick and tail boom carefully. You'll see that Jimmy figured it pretty closely. The boom is set at a 4-degree horizontal angle, to cause the ship to circle to the left; and it is set at a vertical angle which brings the rear end 5-8 in. higher than the front end—thus Jimmy gained that automatic stability. Cement the front end of the boom to the motor stick, just behind the rear hook. You'll need to sand the end of the motor stick off at an



If you know every detail of the article and these drawings, you're ready to start construction.

He Built a Record-Smashing Model

angle, to set the boom at that 4-degree pitch to the left.

And that's the motor stick.

Jimmy used a cambered wing on his ship—that was another advantage. You League members who know your aerodynamics know that there is more lift to a cambered than to a flat wing. Any textbook will tell you the whole story, and it's worth knowing.

The drawing shows just how the Senior R. O. G. wing is made. The two balsa spars should be bent before they are split apart, if you aren't using the League kit. Take a balsa strip 1-16 x 3-32 x 15 in., and mark the bisecting line that will separate it into two strips 3-64 in. wide. Then, holding the exact center in a steam jet like that from the spout of a boiling tea kettle, or over an open flame (taking care not to burn the wood), soften the wood and bend it to the desired dihedral angle—the diagram shows that the ends should be 1 in. above the center. When it cools, it will hold this shape. With a razor blade or very sharp knife split the piece into two spars.

You can make the curved balsa ribs in the same way. Take balsa 1-32 x 5-32 x 2 1-4 in., mark it into five strips of 1-32 in. each, and bend it so that the top of the arc is just 1-8 in. above the ends, and about 3-4 in. from the front or leading edge. The drawing at the right of the wing gives an idea of the shape of these ribs—it shows half of the wing, seen from the end.

Cement wing clips to the wing frame as shown, then apply the paper covering on top—it's a good idea, Jimmy Shields found, to start cementing at the center spar and work toward the ends. This helps to keep the covering smooth and even.

Now carve the propeller. It is made from a block 5-8 x 3-4 x 7 1-2 in., according to the plans described in THE AMERICAN BOY last month or in the 1928 A. M. L. A. Manual, which is available at League headquarters for 5 cents. Jimmy's propeller was .033 in. thick at the hub, .020 at the widest part of the blade (about two-thirds of the distance from hub to tip) and only .015 (the thickness of an ordinary postcard) at the tip. Be sure that the prop is sanded smoothly and evenly, and that the two blades balance.

If you've followed Jimmy's plans carefully, you'll have completed the parts of an excellent little ship—one that weighs only seven-hundredths of an ounce. Jimmy found his motor stick, landing gear and tail group to weigh .025 of an ounce, propeller shaft and washers .008, wing .017 and rubber motor .022.

YOU'RE ready, now, to hook all the parts together. Knot the 16-inch rubber, insert the propeller shaft through the thrust bearing with the washers in place, and hook up the motor. Attach the wing, and try gliding the model. If it dives, move the wing forward a little; if it stalls, move the wing back. When you've found the position for an easy glide, wind the motor a little and sail the ship off.

Remember that you can give the wing "wash-in" and "wash-out" by breathing on it and bending it to the position you desire. Wash-in means bending the outer end of the leading edge of the wing upward so that the air strikes its lower side more strongly; wash-out means the opposite. You may need to do this to prevent the torque, or twisting force, of the propeller and motor from turning the model over on its side. You fellows who built the Baby R. O. G. last month know all about this.

You can change the direction—enlarge or decrease the circle—in which the model flies, too, by bending the tail boom slightly. Breathing on the boom will aid you to do this—your warm breath makes it possible to bend balsa.

The League will award an honor certificate for flights of 75 seconds or better with the Senior R. O. G. To get a certificate, you need to make the flight before an adult witness and send in his signed statement, together with 10 cents in stamps to cover issuing and mailing, to League headquarters.

Thousands of certificates have been issued in the past two years, for other models. Who's going to get the first for the Senior R. O. G.?

Join the League—invite your friends to join. Use this coupon.

AIRPLANE MODEL LEAGUE OF AMERICA

AIRPLANE MODEL LEAGUE OF AMERICA
American Boy Building
Second and Lafayette Blvds.
Detroit, Michigan.
Gentlemen:

Please enroll me as a member in the A. M. L. A. I enclose a two-cent stamp to cover the cost of mailing my membership card and button.

Full Name .....

Age.....

Street and Number.....

City..... State.....

A. M. L. A. Chat

About Doings of the 325,000 Airplane League of America Members

IF William T. Moran, League member in White Plains, N. Y., ever gets wealthy, the A. M. L. A. will start giving kits away and answering letters by the most de luxe kind of radio message! Moran owes the League ten million dollars, less two cents—here's the way he figures it:

Benefit of League membership	$10,000,000.00
Cost of membership	.02
Balance (I. O. U.)	$ 9,999,999.98

But Moran's chances of endowing the League seem limited. "The only way I can pay this," he reports, "is to spread the news and get new members for the A. M. L. A."

A pretty good way!

Other fellows write to tell what the League means to them, too. "Your organization aroused in me so much interest in aviation that I am taking instructions in flying," says Ralph H. Lewis, Peoria, Ill. "I am just about ready to take my first solo flight."

And John M. Carman, Elizabeth, N. J., thinks that "Colonel Lindbergh and the A. M. L. A. have popularized aviation among American youth." Carman speaks of the "helpful attitude" of the League and makes interesting suggestions for airplane model articles in THE AMERICAN BOY. He also reports a 17-minute outdoor flight with a ship like that of Lynn Sullivan's described not long ago in the Chat.

League members are getting plenty of good flights. From Frank Matyac, Columbus, Ohio, comes word of a 500-second record with a 17-inch single pusher with 18-inch wing span, wing and elevator of the sweepback type and a 6 1-2 inch prop. "On a day with a slow, steady breeze I gave the motor 1,000 turns and launched the ship directly into the wind," he writes. "Instantly it nosed up and went into a perfect vertical climb of more than 50 feet without stalling (the sweepback gave it stability). Then it leveled out and climbed for more than 100 feet. The prop ran down after about three minutes, but the breeze kept lifting the plane just the same."

And E. W. Stevenson, of Towson, Md., describes a flight of one hour and twenty minutes with a model of his own design! The ship was an indoor tractor of 15-inch motor stick, a 20-inch wing, 9-inch prop, and rudder and stabilizer frames of No. 20 piano wire. As in Matyac's flight, the motor unwound in some three minutes, but air currents were just right to keep the ship up. It circled overhead for 15 minutes, then moved very slowly away at a considerable altitude; and 65 minutes later it went out of sight a mile away!

A High-climb R. O. G. launched by Frank Hallett, Jr., of Castle Rock, Wash., in his front yard, not only made a 407-second flight but also joined a flock of swallows and withstood several flank attacks and nose-dives they made at it!

David L. Davies, Maywood, Ill., wasn't so lucky. When a blue-jay swooped on his model—it was of the same type—it suffered a broken wing spar and empennage. "This unprecedented hostility on the part of the blue-jay," worries Davies, "adds another source of trouble, besides cats and dogs, to owners of models."

George C. Taylor, Taunton, Mass., flew a 16-inch cockpit monoplane with a propeller-less R. O. G. tied behind on a 3-yard thread—and both made beautiful three-point landings.

League members who attended the Second National A. M. L. A. Contests held in Detroit by THE AMERICAN BOY last June will recall that Frank Nekimken, a Chicago entry, developed a similar idea. Nekimken towed a balsa glider behind an indoor model, and the two took off, circled and landed perfectly.

Here's the LaPorte flag.

Meantime, while some members are busy with record flights and the like, others are developing their own methods of simplifying construction. Peter Johnson, Ashland, Mass., bends bamboo in a simple and effective manner. He soaks his bamboo, split to the desired thickness, in water to make it supple; while it is soaking he draws on cardboard lines showing the curves he desires, covers the line smoothly with hot candle wax or melted paraffin, and lays the softened bamboo in the wax on the pencil lines. He then places weights on the bamboo, held in place by the wax, and when he removes the strips two hours later and scrapes off the wax he has his rudder frames, wing tips and other parts bent exactly to shape.

ROBERT STUMPF, Barberton, O., uses music wire axles on his bamboo landing gear, and prevents wheels from coming off with drops of cement. Russell Roetger, Larchmont, N. Y., also using a wire axle, has devised pontoons and snow or ice skids for his flying Stinson-Detroiter, in addition to the regulation wheels, and employs them interchangeably.

A. M. L. A. chapters are flourishing in almost every city and town in the country. The League is establishing headquarters through department stores and newspapers in many cities—official League supplies are to be available at such headquarters.

One of the most active chapters is that at LaPorte, Ind. On this page you see a picture of the chapter's official ensign—it flew at the chapter camp at Bass Lake, Ind., during August, and now decorates the wall of the chapter's club rooms. Fifty-two boys make up the club, under the direction of F. C. Copp, and their activities are many and various—contests, the summer camp, a regular course in model building for members, social meetings, a system of grading for members and so on.

Most clubs have their own aeronautical libraries, as have hundreds of individual League members. Such libraries include Professor Alexander Klemin's "If You Want to Fly," Merrill Hamburg's "Beginning to Fly," Charles Monteith's "Simple Aerodynamics," Department of Commerce aeronautical pamphlets, THE AMERICAN BOY, and other magazines such as *Aero Digest* and *Aviation*, and dozens of additional publications.

The League continues to grow. Born a little more than two years ago, it now has membership rolls exceeding 325,000. League officers have made special arrangements so that it is no longer necessary for members once enrolled to renew their registration—their membership continues regardless of the date they joined.

But there are thousands of boys who haven't yet sent in their application blanks. If you haven't, use the blank on this page; and if you have, give it to a friend!

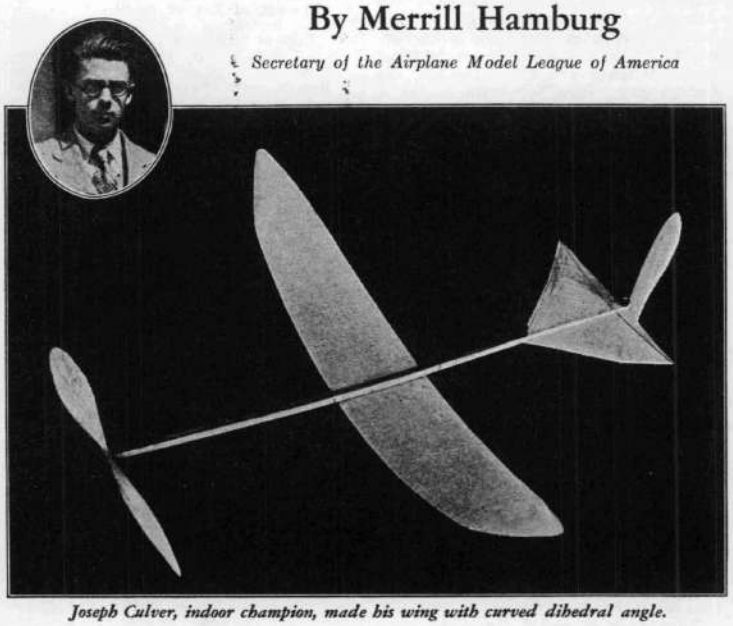
Reprinted from The American Boy Magazine, December, 1929

This Model Flew Eight Minutes

The Culver Indoor Tractor Holds the World's Record

By Merrill Hamburg

Secretary of the Airplane Model League of America



Joseph Culver, indoor champion, made his wing with curved dihedral angle.

JOE CULVER *knows* his airplane models.

Culver is the Oakland, California, boy whose indoor airplane model made history at the Second National Airplane Model League of America Contests last June. Climbing in steady unvarying circles in the big Detroit auditorium, it flew to the unheard-of record of 8 minutes 33 seconds; it won for Culver the William B. Stout trophy, cash prizes, a gold medal, a huge silver cup and a trip to Europe offered by THE AMERICAN BOY, organizer and sponsor of the League.

The best indoor airplane models in the world were in that contest. There were pushers and tractors, cambered and flat-wing models; there were planes of a dozen designs. There were expert fliers, too: Aram Abgarian, ex-world's champion; Ernest McCoy, designer of the "mystery ship" that served as a model for many of the planes; Albert Mott, second-place winner in 1928; Lawrence Hankammer, Edward Petruska, Glenn Reichman, Albert Schwarzkopf, scores of others.

But Culver's ship, unorthodox though it was, took first place by more than half a minute. And the reason was that Culver knew his aerodynamics—he knew how to build a ship that flew slowly, climbed steadily, lost altitude gradually when the power ran down; he knew how to wind it, how to adjust it, how to fly it. He had put into it some ideas of his own; and he *knew* their soundness.

Look at the photograph of the model, and the diagrams. Notice the curved wing in place of the conventional dihedral-angled surface; notice the shape and placing of the rudder, the long propeller, the form of the tail surface, the extra length. The tail group, you'll see, is on a boom somewhat similar to that in the Senior R. O. G. you built last month. The wing has no washin or washout.

All of these out-of-the-ordinary features Culver put there on purpose. The curved dihedral in the wing gives stability and steadiness; though it sacrifices some lift, it more than compensates for it, Culver says. The tail surface is slightly curved—stability again. The length of the tail boom means fore-and-aft balance. The 14-inch, high-pitch propeller — slower motion, slower unwinding of the rubber.

And the lack of washin and washout, a feature most airplane model builders give to every ship they construct? Let Culver tell you why.

"This ship turns against the torque," he points out. "That is, its circle is clockwise rather than counterclockwise. Thus it tends to bank with the right wing down. The propeller torque, however, tends to twist the ship in the opposite direction. Consequently the two forces can be made to balance each other.

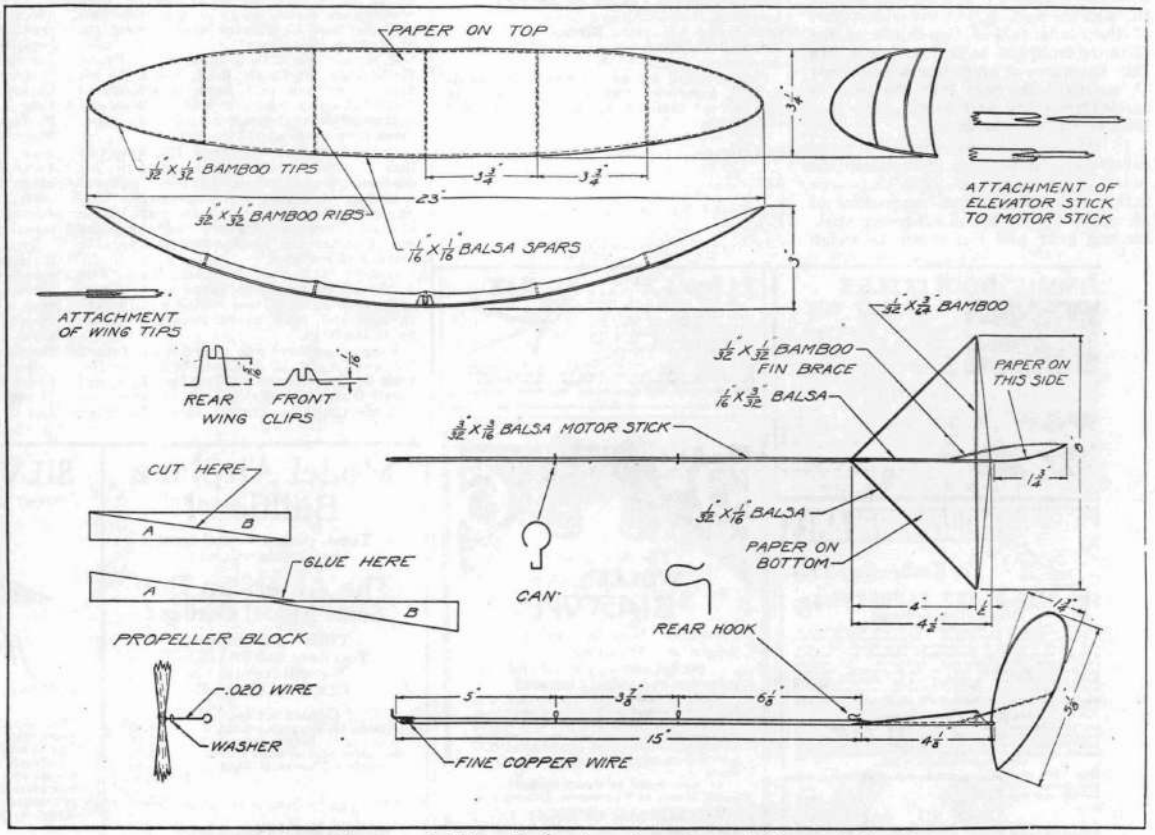
"This has several advantages. By eliminating washin and washout (necessary when a ship turns with the propeller torque), I decrease the drag; the ship offers less resistance to the air ahead of it. By turning against the torque, also, the ship can describe a circle of more constant radius than in the old method, which depended on torque, a variable quantity, for the turning effect.

"Fellows may not find this method satisfactory the first times they try it. Credit for it in Oakland goes to Herbie Owbridge, of the Mariposa Airplane Model Club; but it took us all, working together, a year to get it to suit us.

"As a matter of fact, lots of fellows prefer the other kind of ship. A chap ought to decide which type he likes best, then learn *everything* there is to know about it."

So that you members of the League can build just the kind of contest model you desire, the A. M. L. A. supply department has arranged a special kit that gives you materials for either of two models—the Culver model, or the Mott tractor that was second only to Culver's ship at the June contests (it flew 7 minutes 51 seconds). The kit will contain complete instructions for both ships, and you can construct either one from it. To get the kit, send a check or money order for 85 cents to the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., and ask for number 16 (the third in the League's new series). Don't ask for separate parts, as the League cannot supply them; and don't ask for C. O. D. or charge orders.

IN this article I want to tell you about the important steps in the construction of the Culver ship. First, materials—in case you're not buying the two-way kit. You'll need a strip of flat balsa 1-16 x 1 x 16 inches for spars and small balsa parts; a balsa propeller block 1 1-4 x 1 x 7 1-4 inches; a balsa motor stick or fuselage, 3-32 x 3-16 x 15 1-4 inches; bamboo 1-16 x 1-4 x 12 inches; .020 music wire 12 inches long; thrust bearing; two brass or bronze washers; rubber motor, 1-8 x 1-32 x 30 inches; model



You're ready to start building when you know instructions and diagram by heart!

airplane cement; banana oil; Japanese tissue, 10 x 15 inches.

You all know, from your previous model-building, that the first thing is to study photograph and drawings, and read the instructions carefully. Know exactly what you're going to do. When you have every step in mind—

Start work on your motor stick.

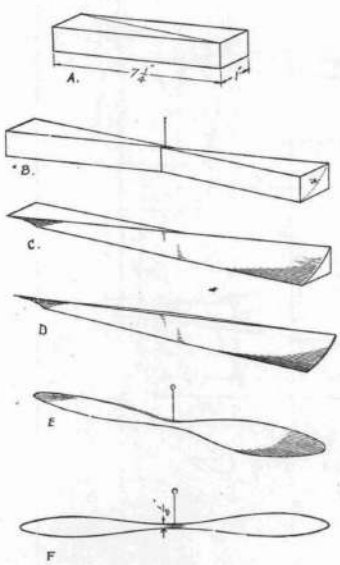
Culver used a hollow or built-up stick in his ship. This is optional; some fellows like the built-up stick, even though it's a lot of work, because it has both lightness and strength. The walls of a stick of this kind are of 1-16-inch balsa sanded down to 1-32 inch; the two side walls should be 3-16 x 15 1-4 inches, the top and bottom 1-32 x 15 1-4. Interior bulkheads, spaced an inch apart, should be 1-32 x 1-16 x 1-8. Two end plugs, 1-32 x 1-8 x 1-2, close the ends of the tube. Extreme care must be taken with this job; the cementing must be carefully handled, and the whole stick should be sanded smooth after the cement is dry.

The kit contains a solid motor stick of the right proportions that needs only to be sanded. Note that, while the distance between the front of the stick and the rear hook is exactly 15 inches, the stick protrudes 1-4 inch at the rear, for fastening the tail boom.

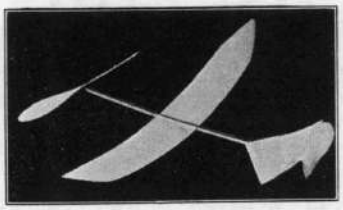
This boom or elevator stick is of balsa, 1-16 x 3-32 x 4 1-8 inches. It tapers slightly to the rear, so that the back end is 1-16 inch square. Culver attached it to his motor stick, as the drawing shows, by sanding the forward end into a V and cementing it into a similar V cut into the end of the stick.

The stabilizer crosspiece, of 1-32 x 3-64 x 8 1-4 inch bamboo, is bent—over the steam jet from a teakettle or over an open candle or gas flame—into an arc in which the ends are about 3-8 inch above the center. It is cemented flush into a groove cut in the boom 1-2 inch from the end. Two "slivers" of balsa, 1-16 x 1-32 x 5 5-8 inches, are then cemented to join the ends of the bamboo crosspiece and the motor stick. Now the whole stabilizer can be covered—on the bottom—with Japanese Imperial tissue. Model airplane cement or banana oil may be used as the adhesive.

The rudder frame is of one piece of 1-32 inch square bamboo, 12 inches long. Bend the bamboo over steam or flame to a shape approximating that shown in the drawing—it isn't necessary to duplicate it exactly—and cement the ends together. Split the end of the tail boom and set the frame into the notch about 1-16 inch; then cover the frame, on the side shown in the drawing, with paper.



Follow these steps in prop-carving.


The finished ship looks like this.

Culver's final touch was the little strip of 1-32 x 1-32 bamboo labeled "fin brace" on the drawing. By the use of this brace, cemented to the rear edge of the rudder and the tail boom, he warped the rudder to the right to make the plane circle against the torque. Moreover, by bending this brace slightly with his fingers after it was in place, he was able to increase or decrease the turning effect.

YOU'RE ready for wire parts. Culver used two open-side cans like those in the diagram, and a rear hook protruding through the motor stick. Cement this hook firmly in place. The thrust bearing—a flattened, bent and drilled brad if you're making it yourself—is cemented at the front, and bound with two inches of silk thread for strength. This last step is optional—many builders don't think the additional reinforcement necessary.

Now the wing.

The wing, as every model builder knows, has a "curved dihedral." The two balsa spars, 1-16 x 1-16 inch at the center and 13 inches long, are tapered slightly toward the ends, "to put the wood where it is most needed," explains Culver. The spars can be bent over heat—very little is needed.

The ribs are 1-32 inch square bamboo, curved in a perfect arc with the top of the arc 1-4 inch above the ends. The three center ribs are 3 5-16 inches long, the two nearest the ends 2 7-8. Cement them in place, then bend 1-32 x 1-32 bamboo into elliptical tips and cement them. As League members know, elliptical tips are more efficient than square tips—they cause fewer eddies in the air passing them, consequently the drag is less.

Note that the tips are set into notches in the spars, just as you set the tail boom into the motor stick.

Cover the completed wing frame with tissue—start cementing at the center rib and work toward the ends, so as to keep the paper tight and smooth. Add the wing clips, and this part of the job is complete.

Last, the propeller. This s constructed differently from any described by the League heretofore, for it requires only a half-size block, split in two (the main drawing shows the block from the top). By using a small block in this manner, Culver was able to insure having the same wood texture in each blade.

The detail drawing shows the steps in carving the prop. (The kit gives you a block 1 1-4 x 1 x 7 1-4 inches; Culver used a block 1 1-4 x 1 x 7 3-4. You can vary your propeller dimensions in any way you choose.) The first step is to cut the block diagonally, then glue the small ends together to make a block 13 3-4 to 14 inches long. With a pin make the hole for the propeller shaft.

Next, with a very sharp knife, cut away the faces of the prop—see the curved diagonal on one end of the block? This diagonal is your guide. Get the blades down to about 3-32 inch with the knife, then start sanding. Use the knife to cut away the square corners and the hub. Sand the two blades carefully until they are as thin as a postcard. Put the propeller shaft in, and balance the prop—be sure that the blades are of even weight. Finally, when the propeller is finished, turn back the end of the propeller shaft into a U and imbed it in the hub; cement the entire hub for strength.

Hook the prop shaft through the thrust bearing, attach the 15-inch loop of rubber, clip on the wing. The ship's ready to test.

First, glide it from shoulder height to the floor. It should glide smoothly and easily, without stalling or swooping. If it dives, move the wing forward; if it stalls, move it backward. When the glide is satisfactory, try giving the motor a few turns and letting it fly.

REMEMBER that this ship starts from right to left across your body, instead of from left to right as have most of the other models you have built. Adjust the rudder so that the ship rides on an even keel—so that it doesn't bank too far to the inside of the circle because of its turning, or too far to the outside because of propeller torque.

When it seems to behave satisfactorily, take it to a big hall—a gymnasium, an auditorium, a theater. Get out your eggbeater winder, and after prewinding the rubber once or twice, give it 1200 turns. Then launch the ship as you've learned to do, and—if you've built well—go and find an easy chair to watch a regular flight!

Don't be discouraged if your luck at first isn't all you desire. "No one who hasn't had considerable experience with this type of ship will have too much success with it at the start," warns Culver. Keep on flying it. Try readjustment of rudder and wing. Try different propellers if you wish. You may care to change the angle of the thrust bearing, so that the propeller shaft will be set at a slight downward angle instead of exactly in line with the motor stick. This will tend to give the ship a little less climb. Set the wing forward a bit to compensate for this; then, when the motor has unwound, your glide should be slower.

And, when it's flying well, try for a League honor certificate. A flight of 180 seconds, properly attested by an adult and reported to League headquarters with ten cents in stamps, will win you the certificate.

Experiment, too. It was experiment that led Culver and his club-mates into development of this ship. What can *you* develop?

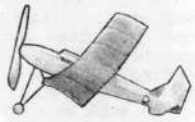
AIRPLANE MODEL LEAGUE OF AMERICA
American Boy Building
Second and Lafayette Blvds.
Detroit, Michigan.

Gentlemen:

I wish to join 325,000 other American boys in the work of the Airplane Model League of America, to increase my own aeronautical knowledge, to learn how to build and fly record-breaking models, to enjoy League privileges and to do my share in the promotion of American aviation. Please enroll me as a member. I understand there are no dues or obligations of any sort. Enclosed is a two-cent stamp to cover postage on my membership card and button.

Who'll Make a Fuselage Record?

Here's a Chance for a Championship, and a Ship That Will Win It



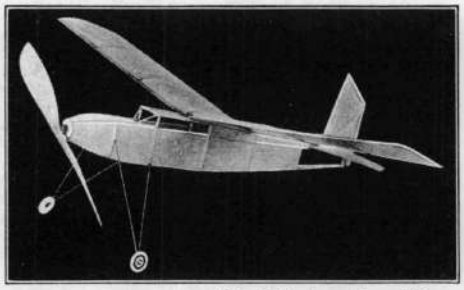
By Merrill Hamburg

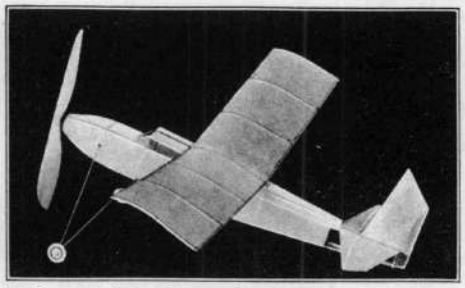
Secretary of the Airplane Model League of America

THERE are blank spaces in the record books, and some of you League members are going to fill them with smashing fuselage model marks within the next month. Here's the plane—who'll be the builder?

As many A. M. L. A. enthusiasts know, there are no official indoor marks for this type of model. One reason is that most builders have devoted their time exclusively to the "flying stick." But from everywhere have come queries like these:

"What's the indoor fuselage record? Why not make built-up jobs? Aren't they just as much fun, when you've learned a lot about flying sticks? Can't we have a fuselage model in THE AMERICAN BOY?"





The C-4 looks well and flies well. Decorate it to suit yourself.

Here's the model! It's called the C-4—the C stands for William Chaffee, its designer. And, well-constructed, it will fly for three minutes and more indoors—a record better than the indoor world's mark of 173 seconds which Chaffee himself held less than two years ago.

True, a fuselage model is a bit tougher to build than a flying stick. But any fellow who has built flying stick models—especially if they are the first three in this year's A. M. L. A. series—is well prepared for the job. And the finished model, a beautiful little plane, would look well on anybody's mantel.

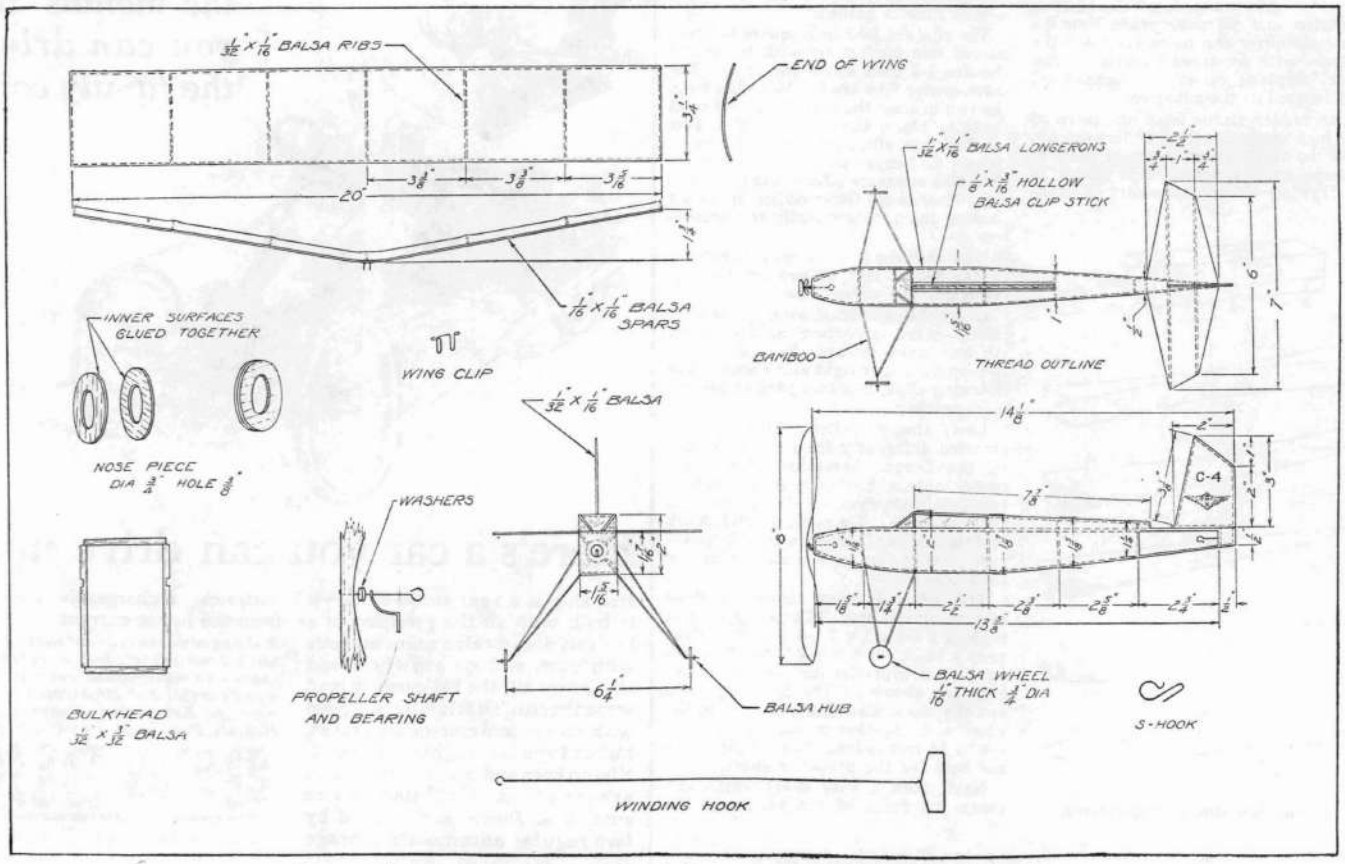
The model described here has slightly more than 65 square inches of wing area, so that it officially ranks in Class C (by N. A. A. ruling, Class C is for models of 65 to 125 square inches in wing area; Class B 20 to 65; Class A less than 20). Thus it's right at the bottom of Class C. If you want to keep it at the top of Class B, where its chances of making a record are better, make the wing chord 3 1-8 inches instead of the 3 1-4 shown.

As it has for other models described in THE AMERICAN BOY, the League is furnishing a complete kit of materials to build it—a kit that contains balsa, paper, rubber, wire, cement and simplified instructions. You may obtain this kit, Number 17, from League headquarters, American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., for $1.50 in check or money order (the A. M. L. A. cannot accept stamps for kits, nor fill charge or C O. D. orders). Or if you want to obtain the parts elsewhere, here's what you'll need—the League does not have bulk materials or separate parts:

Two balsa wing spars, 1-16 x 1-16 x 20 1-8 inches; seven balsa wing ribs, 1-32 x 1-16 x 3 1-4 inches; four balsa longerons, 1-32 x 1-16 x 14 3-8 inches; two balsa longerons, 1-32 x 1-16 x 7 7-8 inches; flat balsa, 1-32 inch thick, for fuselage bulkheads, clip stick, tail parts, etc.; flat balsa, 1-16 inch thick, for wheels and nose piece; propeller block, 5-8 x 1 x 8 inches; one small piece balsa for rear motor support, 1-8 x 3-32 x 5-8 inches; Japanese tissue, 10 x 21 inches; cellophane for windows; rubber motor, 1-8 x 1-32 x 28 inches; thrust bearing as shown; propeller shaft; rear hook as shown; two wing clips; two S-hooks; .016 music wire for wheel hubs; two brass washers; bamboo, 1-8 x 1-4 x 5 inches; cement; thread for stabilizer outline.

Before you start building, notice the snappy lines of the model. Study the diagrams and the photographs in detail; read these instructions thoroughly. Note, too, that the ship employs no motor stick. Instead, the fuselage construction is sturdy enough—though it is very light—to withstand the stress of the tightly-wound motor.

Start with the fuselage. (*Continued on page 34*)



Here are all the steps, from wing to winding hook. Study every detail of article and drawing.

Who'll Make a Fuselage Model? (*Continued from page 16*)

And, to start the fuselage, make the five bulkheads first.

These bulkheads are of varying sizes. For convenience, better number them on the diagram, in pencil, from front to rear—1, 2, 3, 4, and 5. They are made of balsa strips 1-32 x 3-32 inches in cross section, and the dimensions and locations of each are shown in the diagrams. Make Number 1 first. The diagrams show you that it is 1 5-16 inches square; note, however, that the top and bottom members must be 1-16 inch short, to allow 1-32 inch at each corner for the longerons. Moreover, the side members must be 3-16 inch short, because the top and bottom members add 3-32 inch each to the bulkhead size. For Number 1, therefore, you'll need two strips 1 1-4 inches long, and two 1 1-8 inches long. Cement them carefully together.

The remaining bulkheads are made in the same manner, but must have grooves 1-16 inch long and 1-32 deep cut in the side members to take the longerons. In Number 2, cut these grooves just 1-2 inch below the *top* of the bulkhead; in Number 3, 3-8 inch; in Number 4, 5-16 inch; and in Number 5, 1-4 inch. Lay the bulkheads flat on your work table and cut the grooves out with a safety razor blade.

Make the nose piece from 1-32 flat balsa. First draw the two balsa washers, 3-4 inch in diameter. Cut out the center holes with a razor blade, or—better—with a hollow metal tube 3-8 inch in diameter (an empty cartridge shell is excellent for this), using it like a cooky cutter. Cut out the outer circles next, and glue the two washers together so that the grain in the pieces runs at right angles. Finally cut out four right-angled grooves, two at the top 3-8 inch apart and two at the bottom 3-8 inch apart, in which you'll later set the ends of the four longerons.

Sand the finished washer down smoothly, and cement to it the thrust bearing—the shank of the bearing inside the washer, the curved part extending through the hole. You'll have to line up the hole in the bearing very carefully with the exact center of the washer.

The final vertical member of the fuselage is the rear post, a piece of balsa 3-32 x 1-8 x 1-2 inch. The rear hook passes through this post and its end, bent into a U, is imbedded and cemented in place, just as you have learned to do with a propeller shaft.

NOW the four main longerons. Cut these of 1-32 x 1-16 balsa, about 14 1-4 inches long. Cement all four to the nose piece grooves, after marking on the upper pair the positions for bulkheads. Number 1 is placed 1 11-16 inches from the nose—1-16 inch more than the diagram shows, to allow for curve. The other four are spaced as the drawing shows. Cement Number 1 bulkhead to all four longerons, then cement 2, 3, 4, and 5 *to the upper longerons only*. When the cement is firm, finish this part of the job by cementing the lower longerons into place. Be very careful in doing this—the shape of your fuselage depends on your exactness.

Now trim the rear ends of the longerons off properly, and cement them to the rear post—two at the upper corners, two at the lower. This tapers the fuselage off.

The roof of the cabin and the top of the ship is formed by two shorter longerons, 1-32 x 1-16 x 7 7-8 inches. Cement them into the corner grooves in the four bulkheads; they will protrude 1-2 inch behind Number 5. Join their rear ends with 1-32 x 1-16 balsa cut to fit, and attach them to the upper main longerons with shorter 1-32 x 1-16 pieces, also cut to fit.

Chaffee used for his clip stick a hollow balsa spar—the walls are only 1-64 inch thick! He put in no bulkheads, as the stick suffers no twisting strain—its only purpose is to furnish a surface to which to clip the wing. You may use solid balsa if you wish—the advantage of the hollow stick is a slight decrease in weight. To make a hollow stick follow the procedure you used in building the hollow fuselage stick of the Culver indoor endurance model (described in THE AMERICAN BOY in December.) It is butt-jointed to the upper members of bulkheads 2 and 4, with a groove cut from its upper surface to permit the upper member of bulkhead 3 to fit into it. When in place, its top surface is flush with the tops of the bulkheads.

It is very important to have the clip stick uniform in thickness and perfectly rigid, so that the wing clips will grip it properly. In flight it carries the weight of the ship.

The landing gear is of bamboo, 1-32 inch square. The two front struts are 4 3-8 inches long, the two rear 4 1-16. Cement them to the bulkheads as shown, at the same time cementing the lower ends together. The short wire axles, two pieces of .016 music wire bent to L-shape, are cemented to these ends.

Wheels are cut from 1-16 flat balsa, with a diameter of 3-4 inch. Chaffee reinforced his wheels with small brass washers, one on each side of each wheel. Thus he formed hard bearing surfaces for the axles.

Finally complete the front windows. Fit a balsa crosspiece between the two upper main longerons, 5-8 inch in front of Number 2 bulkhead. Cut two braces of the proper length; cement them into place with their forward ends at the crosspiece 7-16 inch inside each longeron and the other ends at the junction of bulkhead 2 and the same longerons. Sloping up from the same points on the crosspiece, add two more strips, with their upper ends at the corners of the bulkhead. (The first two strips do not show in the drawings—they are directly under the second pair of strips in the top view, and directly behind the upper main longerons in the side view.)

Cover the entire ship with Japanese tissue, with the exception of the three small front windows, the two side windows (between bulkheads 2 and 3), and the sides of the ship between bulkhead 5 and the rear post. With a safety razor blade cut away the paper above the clip stick, leaving 1-16 inch on each side so that the wing clips will fit in easily.

The windows are covered with cellophane—the light glassy paper used on sanitary food packages. Use model airplane cement or banana oil as the adhesive.

Next, the stabilizer. Two 1-32 x 1-16 balsa spars, one 6 and the other 7 inches long, are cemented into grooves cut in the upper main longerons. Use a thread outline around the spars to form the shape shown in the drawing, and cover the whole with tissue.

Follow the drawings in making the rudder, using balsa strips of the same cross section. It is a good idea to draw the shape of the rudder on paper, then fit the balsa strips exactly to the drawing. Make the rear edge 2 1-2 inches long, so that it protrudes 1-2 inch below the bottom member.

Cement the frame into position, attaching it to the two stabilizer crosspieces and the top of the rear post. It should be set at an angle so that its forward edge is 1-16 to 1-8 inch to the right of center. This will cause the plane, in flight, to circle to the left.

Attach the bottom of the rear member to the rear post with a small strip of balsa, cut to fit. Then cover the frame, on either side, with tissue.

The fuselage is finished, and the hardest part of the job is done!

MAKING the wing is an old story to model builders. The wing ribs should be marked off on balsa 3 1-4 inches wide (3 1-8 inches to keep the plane in Class B) and 1-32 thick, then bent in steam to the desired camber before splitting. The wing spars may be marked on balsa and bent to the right dihedral angle, or they may be cut at the center and butt-jointed to form the angle. Note that, though the overall length of the angular wing is 20 inches, each half is 10 1-16 inches; therefore the full-length spar must be 20 1-8 inches.

Attach the two wing clips—they are identical—and apply the Japanese tissue covering on top. And that's the wing.

The propeller is carved from a block 5-8 x 1 x 8 inches. If you're an experienced model builder, you know just how to go about this operation; if you're new, you can obtain an A. M. L. A. Manual from the League supply department for five cents in stamps, and learn! Making a prop is a little difficult at first, but it rapidly becomes second nature to the fellows who have built three or four miniature planes.

The motor is a strand of rubber of the size known as 1-8 x 30, 27 1-2 inches long. It should be carefully knotted, and will just fit.

Now clip on the wing, hook up motor to prop shaft—and the ship is ready for its maiden glide! A few trials will show you the best adjustment for the wing. Give the motor a few winds, and see how it behaves under power.

Been wondering about that "winding hook" shown in the drawing? That's something new. And any fuselage model builder who has had a nearly-wound rubber motor snap inside his finished ship will see its virtue—for a breaking motor means a wrecked ship.

Two S-hooks are used with this model, one at each end of the motor. Remove the front hook from the prop shaft and catch it with the winding hook. Remove the rear S-hook and attach it to your egg-beater winder. Then holding the winding hook handle, pull the motor from front to rear through the ship, and catch the front S-hook with a pair of pliers.

Now stretch the rubber to three times its ordinary length (if you're an expert builder, you'll have prewound it a couple of times, six or seven hundred turns) and wind it 1000 to 1200 times. Attach the front S-hook to the winding hook again, and pull the motor back through the fuselage. Catch the two S-hooks, one in the prop shaft and the other in the rear hook.

If your work has been careful, if the ship is adjusted properly, if the hall where you're flying it is big enough, you ought to get a three-minute flight after half a dozen trials!

You doubtless know the tricks of model-flying. You know that washin on the left wing and washout on the right (that is, a slight upward angle to the front corner of the left and the opposite to the right) will help to overcome the torque or twist of the propeller. Breathing on the wing will enable you to bend it. You know that the rudder's angle can be changed in the same way. You know, too, that the angle of incidence of the stabilizer can be altered—if the ship climbs too steeply, a tiny downward tilt to the stabilizer will help.

And you know how to set the wing—back for less climb, forward for more.

Your trials over, you're ready to try for that official record. Remember that, by reducing the wing area slightly, you'll keep the ship in Class B, and thereby stand a better chance of becoming the record holder. If you think your best flight is good enough for a record, send details in to League headquarters; you'll be sent official record application blanks if you qualify. Remember that, for an N. A. A. record, your flight must be timed by three stop-watches.

And you can win a League Honor Certificate by making a flight of 45 seconds or more in the presence of an adult witness, then sending his signed statement that he saw the flight together with ten cents in stamps to the A. M. L. A. League headquarters will mail the Certificate right back to you!

NEXT MONTH—

How a Champion Works!

Louis Proctor, Pacific coast boy, won a national championship with his miniature Vought Corsair last June. Merrill Hamburg is going to tell, in February, how he did it—all the expert devices Proctor used to make his model the best ever entered in a contest. Watch for these Scale Model Tips

Plans for another corking scale model will be announced, too—a fighting ship!

Join the League—invite your friends to join. Use this coupon.

AIRPLANE MODEL LEAGUE OF AMERICA

AIRPLANE MODEL LEAGUE OF AMERICA
American Boy Building
Second and Lafayette Blvds.
Detroit, Michigan

Gentlemen:

I am interested in learning about aeronautics through the building and flying of airplane models. I also wish to become eligible for official national airplane model contests and to enjoy other League privileges. Will you, therefore, please enroll me as a member? I enclose a two-cent stamp for postage on my membership card and button.

Full Name .....

Age .....

Street and Number .....

City.. ..... State.....

A. M. L. A. CHAT

About the Activities of the 350,000 Members of the Airplane Model League of America.

FUSELAGE MODELS!

Everybody's building 'em. From every corner of the country League headquarters is receiving word of flying scale models, built-up commercial planes, indoor and outdoor jobs. Ernest McCoy, Detroit, the boy who successfully introduced the cambered wing on indoor models, predicts that fuselage contests will before long become as popular as flying stick contests.

Lindenberger and his fleet.

"We've got the flying stick down to a fine point now," he points out. "League members will want to turn to something new soon."

That doesn't mean that flying sticks are passe. Not at all! The official N. A. A. contests are for flying sticks, and this type of model will always be better for endurance. But the time isn't far away when two minute fuselage records will seem as small as they do for the lighter type of model today.

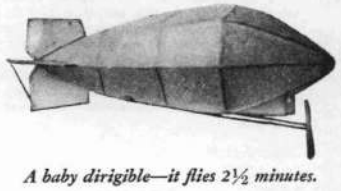
League members are reading, in this month's AMERICAN BOY, of the corking fuselage model designed by William Chaffee, one-time indoor record holder. Meanwhile other fellows are flying the same model-airway.

Isadore Gruber, Dallas, Texas, reports a flying model of a Vought Corsair, following League scale model plans except that the prop was 7½ inches long. The fuselage of the plane is hollow, with balsa bulkheads; the complete job weighs 2½ ounces!

Philip Hatton, West Palm Beach, Fla., constructed a fuselage plane with 10-inch overall length and 16-inch wing. Gleason Jewett, of Gardner, Mass., reports a highly successful flying model of an Eaglerock biplane, 8 inches long and 12 inches in wing span. "I made a 3-inch prop, but I'd make the next at least 5 inches," Jewett states.

And R. Unzueta, president of the "Hawks of the A. M. L. A." in Mexico City, has just won an Honor Certificate for a flight of 155 seconds—nearly four times that of any other reported to League headquarters—with a flying Stinson-Detroiter.

Alex Schmidt, South Milwaukee, Wis., not only builds fuselage models but thinks up trick ideas for contests. "Why not have a meet for outdoor fuselage planes of, say, 3-inch wing span and make them 'fly the Atlantic?' The Atlantic could be a measured distance of about 100 yards; and the planes that don't make the distance would be all wet!"



A baby dirigible—it flies 2½ minutes.

Not a bad idea. Why not try it out?

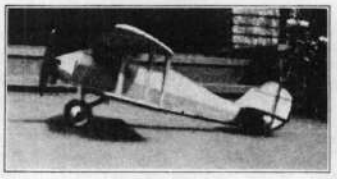
Turning his model-building ability into cash, Stuart T. Lindenberger of Redlands, Cal., made and sold as party favors a whole fleet of tiny monoplanes. The fuselage and wings were of carved balsa, aluminum-painted; the wheels were cardboard, and the tail skid light wire. Lindenberger is a model builder of experience; he claims a unique world's record, for, he says, a ship he made went up two years ago and hasn't been seen since!

"Pushers," writes Arnold Sims, Pittsburgh, "give me more kick than tractors, indoors or outdoors. Seems to me a fellow learns more aerodynamics from them—their problems are different." The League has available a few No. 2 indoor pusher kits at 65 cents, and No. 4 outdoor twin pusher kits at $3.00—a check or money order sent to headquarters with your order will bring the kit to you. Who's going to try out Sims' theories?

The hard luck champion of the month is Robert Gussman, Wenatchee, Wash. Gussman reports that his New Baby R. O. G. "sure went pretty the first time. But the next time she looped and lit under a sprinkler that was going. When the wing dried the tissue paper shrank, and warped the wing all out of shape. When I tried to steam it back into shape I snapped the wing in three places. I tried to glue it but it didn't do any good. The next time I'll turn the sprinkler off first!" And he bought two more kits to make sure there'd be a next time.

Charles D. Hall, Beloit, O., writes that he faced parental lack of enthusiasm when he started to build a similar model. "My folks didn't see any sense in it. But when they watched it fly they all wanted to know how I did it. I told them, 'It wasn't by accident'."

Experimentation with a biplane Baby R. O. G. yielded Charles G. Lawley, Tamaqua, Pa., lift, stability and longer flights. He used a sweep-back leading edge on his main wing, and a small secondary wing, about half the length of the main wing, fastened one inch below the motor stick and just ahead of the main wing, its leading edge cemented to the landing gear.



Gruber's flying Corsair looks real.

Automatic stability combined with the ability to do everything from barrel rolls to vertical climbs was attained by Fred Aldrich, Whitinsville, Mass., in his "Baby Bee." The Bee is a 6-inch indoor tractor with an 8-inch sweep-back, dihedral wing and a 3½-inch propeller. No matter what position the plane may assume in flight, it always lands right side up!

The first successful model dirigible is reported by Louis Pierce, Cleveland. The photograph shows the ship, a 22-inch structure of balsa frame and tissue covering. Pierce inflates a regulation toy balloon inside the main framework, and has attained 2½-minute flights with it indoors. Outdoors he tried it only once, and that time found it crushed and broken half a mile away! When the motor has run down in indoor flights, the ship glides smoothly to the floor.

The ship is a model of the blimp *Plymouth*.

To Fred Jacques, Portland, Ore., goes the double honor of winning the first Honor Certificate for a Senior R. O. G., with a flight of 85 seconds—10 seconds above the necessary minimum. And Vicente B. Dialogo, whose impressive address is Maagnas, Lagonoy, Camarines Sur, Philippine Islands, is the month's most distant new League member.

League memberships continue to pour in. The total membership is now past the 350,000 mark. Better join now and get started building, if you haven't already. A membership coupon is on Page 34.

FROM government officials to leaders in aviation, from airplane model manufacturers to civic organizations, America is back of the work of the Airplane Model League of America. The Second National A. M. L. A. Contests, conducted in Detroit last June by THE AMERICAN BOY, were made possible by the generous support given the magazine from all parts of the country.

Chief among the backers of the contests was the Detroit Board of Commerce, which helped to make them possible by financial support. Mr. Edsel Ford, president of the Ford Motor Company, entertained contestants with a dinner at the Ford Airport. Frank A. Tichenor, publisher of *Aero Digest*, contributed a trip to Europe for the scale model winner.

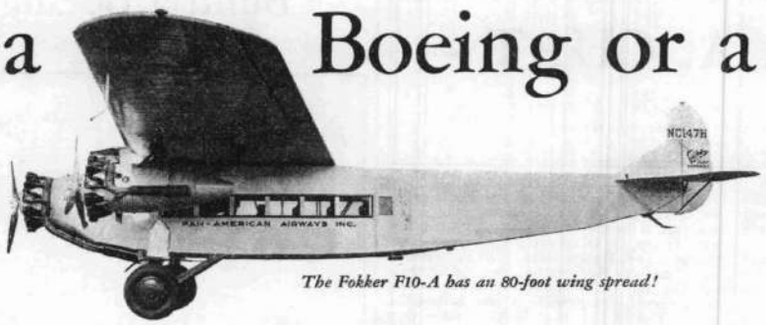
Other individuals and organizations whose help was invaluable are Col. Harry H. Blee, of the Department of Commerce; the Canadian Pacific Railway; George R. Wallace, Jr., Fitchburg Paper Co.; the Detroit public schools; Fred L. Black, advertising manager of the Ford Motor Company; S. E. Loughner of the Michigan Model Airplane Supply Company; Col. C. H. Danforth, Selfridge Field; George F. McLaughlin, editor of *Aero Digest;* William Heaslip, magazine illustrator; the Weyhing Brothers Manufacturing Company; the Hotels Statler, Inc.; Camp Penn Loch, Interlaken, Mich.; Camp Crosley, Tippecanoe Lake, Ind.; the Aviation Institute of the U. S. A.; and the Broadfield Aeroplane Company.

The S. L. Bird Company, Detroit, furnished each of the three champions with clothing, and programs were provided by P. W. A. Fitzsimmons, president of the Michigan Mutual Liability Company.

Financial aid for the contests, in addition to that supplied by the Detroit Board of Commerce and THE AMERICAN BOY, came from the following:

Arthur Nutt, Curtiss Aeroplane & Motor Company; C. Roy Keys, Curtiss Aeroplane & Motor Company; G. S. Ireland, Curtiss Flying Service; W. E. Boeing, Boeing Airplane Company; Steele Morris, American Airports Corporation; G. I. Stich, Aero Supply Manufacturing Company; J. F. Prince, Wright Aeronautical Corporation; G. W. Vaughan, Wright Aeronautical Corporation; Charles L. Lawrence, Wright Aeronautical Corporation; I. M. Uppercu, New York City; Chester Cuthell, Cuthell, Hotchkiss & Mills; D. L. Chick, American Eagle Aircraft Corporation; W. C. Wildes, Rome Wire Company; A. G. Spalding & Brothers, New York City; Harold Kondolf, Fairchild Aviation Corporation; J. F. Roche, Binks Manufacturing Company; D. A. Luscombe, Mono Aircraft; Great Lakes Aircraft Corporation, Cleveland, Ohio; S. L. Gabel, Summerill Tubing Company; N. H. Gilman, Allison Engineering Company; Aero Model Company, Chicago, Illinois; E. A. Johnson, Johnson Airplane & Supply Company; Harry Schwarzschild, "Airports"; Earl D. Osborn, Aviation Publishing Company; Howard Beazley, Nicholas-Beazley Airplane Company, Inc.; James T. Downey, The Balsa Wood Company, Inc.; Wilbur Neely, The Derby Oil Company; Otto Koch, Kendall Refining Company; H. H. Greene, Kendall Refining Company; Radiomarine Corporation of America, New York City; E. R. Armstrong, Armstrong Seadrome Development Company; A. Sandow, U. S. Hammered Piston Ring Company; National Aviation Corporation, New York City; Grover Loening, Loening Aeronautical Engineering Corp.; J. T. Trippe, President Pan American Airways, Inc.; H. A. Kraeling, Standard Steel Propeller Company; Richard F. Hoyt, Hayden, Stone & Company; Horace E. Thorn, John A. Roeling's Sons Company; Clarence O. Prest, Prest Airplanes & Motors; Paul Becker, Chance Vought Corporation; Charles Marcus, Eclipse Machine Company; Lawrence H. Armour, Aviation Securities Corporation; Roland Lord O'Brien, Marine Trust Company of Buffalo; Norman Allerdice, Pittsburgh, Pennsylvania; F. L. Morse, Thomas Morse Aircraft Corporation; C. J. Bruckner, Advance Aircraft Company; John R. Cautley, Bendix Brake Company; Reed M. Chambers, United States Aviation Underwriters; Earl N. Findley, United States Air Services; R. H. Fleet, Consolidated Aircraft Corporation; Edgar N. Gott, Keystone Aircraft Corporation; Allan Jackson, Standard Oil Company; Charles F. Kettering, Dayton, O.; O. W. Mott, Kelsey-Hayes Wheel Corporation; J. Brooks B. Parker, Parker & Company; Harold F. Pitcairn, Pitcairn Aviation, Inc.; R. Sanford Saltus, Philadelphia, Pennsylvania; George D. Wanner, George D. Wanner & Company; F. E. Wellington, Wyman-Gordon Company.

Build a Boeing or a Fokker



The Fokker F10-A has an 80-foot wing spread!

Here Are Scale Model Plans to Help You Make Exact Reproductions of Modern Airplanes

By Merrill Hamburg

Secretary of the Airplane Model League of America

GOOD news for you scale model builders!

For two years thousands of League members have been building cracking good miniatures of big airplanes. They started even before the League was organized; they got to serious, careful work when the League prepared 24-inch plans for the great Ford tri-motor and the Curtiss Hawk. And they've been improving every day—greater accuracy, more detail, better finish.

When the First National A. M. L. A. Contests came along, in 1928, the Hawk submitted by W. Lofton Dennis of Miami, Florida, was a marvel of workmanship, and deservedly won first prize. But even so good a model as Dennis's paled into the background when another year had passed, and Louis Proctor, Vancouver, Washington, won the Second National Scale Model Contest with his beautiful Vought Navy Corsair. Model builders had learned new tricks; and the plans furnished by the League offered more detail and more hints.

Now, in the third year, the League is giving you workmen a new set of plans that surpass any heretofore prepared. They're plans for corking models—the Fokker F10-A, a big tri-motor transport, and the snappy Boeing fighter, a speedy, racy Army plane. Details of interior and exterior construction, landing gear, tail-skids, control systems—these and scores of other points are covered by diagram and photograph in the full-size plans now available, for 20 cents each, at A. M. L. A. Headquarters, American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan. Send in your order for either plan, or for both, with your money order and the drawings will be mailed to you at once.

Building a scale model is a man-size job. Though such a model is not made to fly, many more hours are required to build a first-class miniature of a big plane than to construct a fine flying-stick model. So you fellows who expect to enter the scale model division of the Third National A. M. L. A. Contests should give yourselves plenty of time to complete your jobs. Watch THE AMERICAN BOY for further details of the contest.

The chief rule for eligibility in official scale model contests is that a model must have a wing spread of exactly 24 inches. The League plans are drawn to just this scale—they show you exact size on all parts. Keep in mind at all times two things: first, that your model must be one hundred per cent accurate in measurement; second, that it must resemble its big counterpart in every possible detail, and that the more detail you can build into it, so long as it is accurate, the higher your score.

Scale models are judged on these two counts — accuracy to scale, excellence of workmanship and detail. Judging a scale model is a job all by itself, for each model must be measured some fifty different places, checked from nose to tail for accuracy, rechecked and then scored for detail and workmanship. Proctor's prize-winning model in 1929 was almost a one hundred per cent job in accuracy; and he added enough detail, such as beautifully constructed motor, fine steel propeller, careful covering and decoration, movable controls, and so on, to bring his score to 94—an exceptionally high mark in the face of stiff competition.

Materials may be anything you choose. Pattern pine is recommended by William Chaffee, Detroit, 1929 second place winner, for struts, longerons and ribs if the job is to be a built-up one of wood. Proctor advises maple; spruce is often used. Many builders like balsa, because it is easily shaped; some prefer solid fuselages, and wings, properly covered, while others use the built-up type. It should be remembered that, accuracy and other points being equal, the excellent built-up job is likely to score higher than the solid model, because of superiority in detail.

Some big planes use wooden framework for their fuselages; others, like the big Fokker, use metal tubing. Model builders have used either very fine brass tubing or heavy wire to make built-up frames, soldering the joints; and either makes a good job. But remember that the built-up fuselage is optional—Proctor's first-place model had a fuselage of solid wood, hollowed out.

Here are tips from Proctor on scale model building—tips that ought to help every contestant. They're not the only good suggestions, by any means—every fellow has his own pet devices and methods. But they'll be worth considering:

"The plane should be built in jigs accurate to one sixty-fourth of an inch." This means that a form or mold should be built in which to set the wing ribs and spars while the cement or solder is being applied and hardened, and another for the fuselage.

"Templates of ribs, fuselage cross sections and such parts should be made of 1-16 inch three-ply wood." But some builders prefer sheet brass for templates. The templates are a vital necessity—they may be made direct from League drawings, and insure accuracy of finished parts.

"Most of the shaping (of templates, brass parts, and so forth) should be done with a file.

"The finest grade of China silk makes the best covering for a fabric job. Plain airplane dope is best for shrinking the fabric." Airplane dope may be obtained from model supply houses or airplane dealers.

"The model should be painted with a paint spray-gun if possible, after it is assembled; otherwise wing and fuselage should be painted separately before they are assembled. It is not necessary to glue the covering to every rib or longeron; it will shrink better and lie smoother on a wing if it is glued only to leading and trailing edges and to end and center ribs.

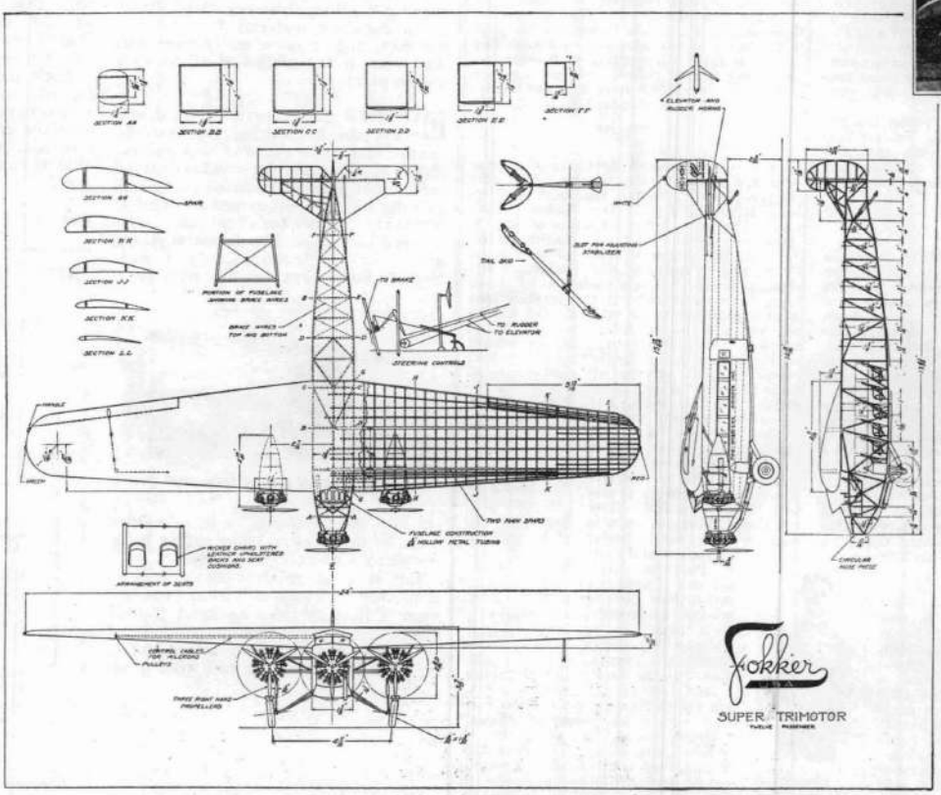
"Brass is an excellent material to use for interplane and landing gear struts."

Proctor's suggestions are worth consideration—his skill not only won the 1929 contest for him, but also led the Boeing Airplane Company, Seattle, to employ him as official builder of exhibition and wind tunnel experimental models. But there may be plenty of other excellent methods. Work out your own!

Louis Proctor knows models!

MAKING a motor is one of the tough jobs you will face. Some boys have carved excellent motors from wood; others make cylinders from small bolts or screws, with alternate large and small washers to represent the air-cooling flanges. From P. E. Piper, Sumner, Ill., comes this suggestion: "I take a big handful of stiff red clay, flatten it out and make my mold in it. A 13-32 inch bolt with deep threads I use for a base for the cylinders, and a hex nut for the center (if it's six cylinders; an octagonal nut for eight, and so on). Next I melt Babbitt metal or lead in a ladle, which in my case is a tomato can (it doesn't fall to pieces as soon as you think!), and pour the metal into the mold. A small drill can be used to drill the propeller shaft hole; on each side of it a tack is placed, to hold the motor in place. It works for me, and makes a

(Cont. on page 57)



Here's the Fokker drawing. The full-size plan contains photographs and construction hints.

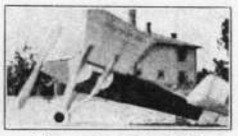
A. M. L. A. CHAT

About the Activities of the 375,000 Members of the Airplane Model League of America.

MAURICE COOPER, A. M. L. A. member in Little Rock, Ark., has a sad story. He built too good a scale model!

Cooper made a model of a Vought Corsair last spring and entered it in the junior division of the scale model contest at the Second National A. M. L. A. Meet held in Detroit by THE AMERICAN BOY. It was a good model, and it won him fourteenth place.

Then came the Arkansas state fair in October, with a scale model contest, and Cooper entered the same model. Read his tale of woe: "The judges did not award me the prize because they said the model was factory-made. They believed it was impossible to build a plane so accurate by hand. I considered it a compliment, as I made every part of it myself!"



Gregory's scale model looks mighty real!

Scale models are being built by thousands this year. Scale model contests were inaugurated only two years ago by THE AMERICAN BOY and the League; now they're being held all over the nation. Most builders are using the League plans for 24-inch models, moreover—plans obtainable at League headquarters for 20 cents each. The ships for which plans are now on hand are the Lockheed Vega, the Vought Corsair, the Stinson-Detroiter, the Fokker F10-A, the Boeing Fighter and the *Spirit of St. Louis.*

Ed Sanders, Jr., reports success with his flying model of the Fokker *North Pole* monoplane used by Commander Byrd—he took second prize at the recent Nashville, Tenn., Hobby Show. But, strictly speaking, scale models are non-flying. They are built strictly to scale, and it's usually impossible to balance and power such a model properly for flight.

Some League members are building hangars-full of planes. From Paul W. Nemeth, New York City, comes word that he and the "male members" of his family have built four Curtiss Hawks of 5 3-4 inch wing span, an 11-inch Curtiss racing seaplane and two 9 7-16 inch models of Lieut. Al Williams' racer.

And Billy Kee, Twin Falls, Idaho, has his own miniature airdrome. It has landing field, search light, hangar with standard sliding doors, wind cone and all the other accessories, as well as planes to go inside the hangar.

Edwin O'Donovan.

Jack Bateman, Haddonfield, N. J., plans on better if not bigger things. "I entered the 1928 national scale model contest, and my Curtiss Hawk looked about as much like a Hawk as a dirigible does," he writes. "I didn't enter this year—but next year, just watch me!"

He'll have plenty of competition. Quan Gue Cheong, San Francisco entrant in 1929—the boy who sent his scale model box to Detroit padlocked, with the combination to the lock safely inside the box!—is planning a model that will far outshine the plane that won him eleventh place. Incidentally, Cheong has recently taken up flying models, and his records are all above 60 seconds.

Richard Russell, Mineola, N. Y., won first place at the Mineola Fair contest. Rolfe Gregory, Petersburg, Va., reports a Curtiss Robin built from his own plans. John Winter, Windsor, Ontario, graduated from the model that took a bronze medal for him at the 1929 national contests to making scale models for the DeHaviland Aircraft Company of Canada. And Louis Proctor, 1929 champion, is employed by the Boeing Airplane Company of Seattle, building exhibition and wind tunnel models.

Ernest Marcouiller.

While all this scale model work is going on, there's plenty of experiment with flying models. A brand-new record for sustained time in the air is reported by Hubert Harrington, Fort Dodge, Iowa. "At the present time," asserts Harrington, "my indoor tractor has all marks smashed; it's been up forty-three days now, in a tree across the street." And that was in the fall—every day the record grows!

"My Baby R. O. G. flies just like that new self-guiding government plane," writes Frank J. Rudebock, Three Bridges, N. J. "I launched it in the parlor; it flew through the door into the dining room, headed directly for a large electric bowl in the center, swerved around it, continued through more doors into the kitchen and hall, and ended up in the parlor again."

Beat that if you can!

From far-away Hawaii comes word of four-bladed 18-inch propellers on an outdoor twin pusher. Kiyoshi Uzawa of Wahiawa was the builder. "We wound the motors only to 150 turns, so we wouldn't lose the model," he writes. "But after a 2 1-2 minute flight a gust of wind took it scooting, and even a $15 reward we posted didn't bring it back."

Forehanded League members are getting their outdoor twin pusher or outdoor twin tractor kits now, so as to be ready for good weather when it arrives. Both kits are available at League headquarters, the first for $3.00 and the second for $2.25. The League asks members to send check or money order with requests for kits.

Kee has his own model airdrome.

As far as is now known, Kent Bulfinch of Suncook, N. H., is the Improved Baby R. O. G. champ of the universe. Bulfinch flew his model for 3 1-2 minutes—210 seconds—and that's a real record. Harold LaClair, Detroit, made a 201.8 second record with a modification of the standard R. O. G.

Trick ideas demand space in the Chat column. Ernest Roose, Omaha, Neb., uses peanut shells to make pontoons for his Baby R. O. G. J. V. Mann, Newton, Kan., waxes the skis on his ice-plane so that it rises from a polished floor. Marlin Baker, Atlanta, Ill., makes skis out of bent pins! Frank Foster, Berkeley, Cal., declares firmly that his brother made a model out of stockings, "painted it and put the joystick into it so it could move the tail." But he doesn't say which is the tail of a stocking! Domer Ridings, Kingsport, Tenn., makes a bomber of his indoor model by letting his rubber motor entwine strings attached to small balsa "bombs;" when the motor unwinds, the strings are released and the bombs plunge to earth, wreaking dreadful havoc.

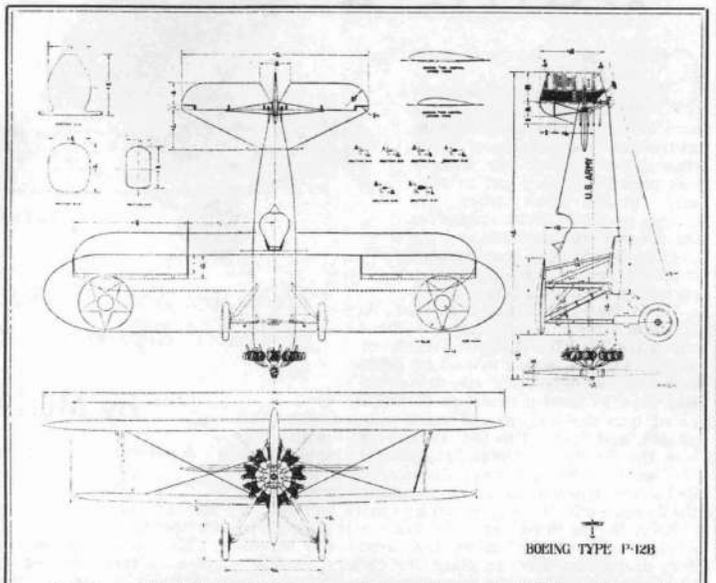
Two League members made the two best records at the Third Annual Playground Miniature Aircraft Tournament held in Louisville, Ky., in the fall. They are Ernest Marcouiller, who became all-round senior champion, and Henry Pacevitz, whose outdoor fuselage model flew for 14 minutes 38 seconds. Both boys live in Chicago. Edwin O'Donovan, Topeka, Kans., is the new junior champion.

Henry Pacevitz.

And last but not least should be mentioned Sammy Wolf, New York City, who didn't know the League's address and so sent his letter to Washington, D. C. The Postoffice Department is air-minded, it seems, for it sent the letter promptly to Detroit. Now Wolf is a member.

Build a Boeing or a Fokker

(*Continued from page 15*)



You'll need the full-size drawings, exact-size and more detailed than this small reproduction, to build the Boeing scale model.

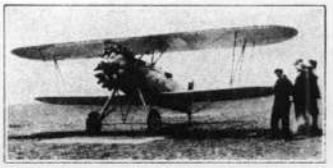
mighty lifelike motor."

Chaffee prefers lead to Babbitt, makes his mold of plaster of Paris, and carves his model cylinder of wood.

Wire or 3-32 inch brass tubing may be used for exhaust pipes. Proctor suggests filling tubing with solder before heating and bending it, as it helps to prevent the tubing from flattening or kinking; the solder can then be melted out of the tube. Sand can be used in the same way. Other metal parts of the motor may be made from wood, wire, lead or whatever material is best suited to the particular job.

Proctor made his propeller from steel, turning it out on an emery wheel. Brass is an excellent material for this job, however, and is more easily workable. And wood is the easiest of all to work and to paint.

EXPERTS use all sorts of incidental materials in making fine models. Leather for headrests and seat covers; glass or cellophane for windows; wood carved and painted for small parts such as wing lights, wind generators and so forth; thin rubber for tires; tubes, wire or wood for tail skids—almost anything under the sun may go into a scale model! Some boys put tiny map pockets into their cockpits, with miniature maps in them; some make safety belts, some tiny seat-pack parachutes.



The Boeing pursuit ship is trim and speedy.

But it is of greatest importance to remember that such details as these are more a liability than an asset if they aren't exactly right in scale, placing and so forth. Both Proctor and Chaffee, on their 1929 Corsairs, had wind generators, and both lost points—Proctor's was too big, Chaffee's too small!

Remember that you must make all parts of your plane, from nose to tail. This really is an advantage, for properly proportioned parts can rarely be bought.

Get to work now! You can get Fokker or Boeing plans from the League; there is also available at headquarters a limited supply of plans for the three planes in last year's series, the Lockheed Vega, the Stinson-Detroiter and the Vought Corsair, at 20 cents each. The League hopes to issue, also, plans for the famous Travel Air "mystery ship" that made so outstanding a record at last year's National Air Races. Watch future issues of THE AMERICAN BOY for news of this plan.

Scale model building is hard work, but it's good work. It helps you League members to understand the principles of airplane construction, and it may win you valuable prizes. It will improve your skill at handicraft, too. So get to work now!

Join the League—invite your friends to join. Use this coupon.

Reprinted from The American Boy Magazine, March, 1930

Here's a Wakefield Cup Plane

Build This Sturdy Outdoor Fuselage Model, Designed by a National Champion

William Heaslip, noted artist, sketched Don Burnham at the 1929 National Contests.

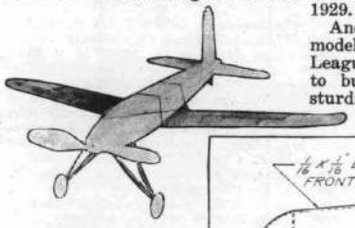
By Merrill Hamburg

Secretary of the Airplane Model League of America

WHEN America's 1929 airplane model champions went to Europe as guests of THE AMERICAN BOY and *Aero Digest* last year, they found out there was a lot they didn't know about flying fuselage models. They competed with English model builders at Halton Airdrome for the cup offered by Sir Charles Wakefield, and they failed to win a place!

"I *know* we can do better than that," said Donald Burnham, West Lafayette, Indiana, national outdoor champion. "Our models are too light and we don't know enough about flying outdoors with this type of ship. But we can learn."

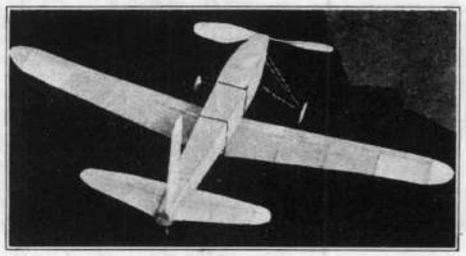
So, on Burnham's return, he set to work. He built a model, cracked it up, built another. He experimented in all kinds of weather, tried all kinds of wing-settings and adjustments and designs. At length he developed a big fuselage model that averaged 90 seconds in 35 different flights, made in sun and mist, wind and calm. A 70-second flight won the Wakefield Cup in 1929.



And here's the model, for you League members to build. It's of sturdier construction than any other the League has described to you; and it's an unusually big fuselage model. Its wing is almost three feet in span; its fuselage length is more than two feet. Like the Chaffee C-4, described in THE AMERICAN BOY in January, it has no motor stick — the fuselage itself bears the strain of the rubber motor. It is of the low-wing monoplane type — the wing fits under the fuselage. It's exceptionally strong, yet it retains the lightness that is typical of American model-building.

Moreover, the model conforms to rules for the Wakefield competition and for the brand-new William B. Stout event for outdoor fuselage models — you'll get plans for this event in a later AMERICAN BOY. Plans are being made, too, for American competition in the 1930 Wakefield contest. Watch THE AMERICAN BOY for details.

Briefly, the two events demand that models have a maximum cross-section at least equal to the square of the fuselage length divided by ten. This model has a maximum cross-section of nearly seven inches, and L over ten squared is about 6⅛. Planes must r. o. g. — a seven-foot board platform is usually supplied for the take-off. And, for the Stout event—a separate event from the Stout indoor contest, remember, though the prizes are supplied by William B. Stout, A.M.L.A. president—models must have a minimum wing area of 125 square inches, and must use built-up double surface wings. Fuselages must be entirely enclosed, too.



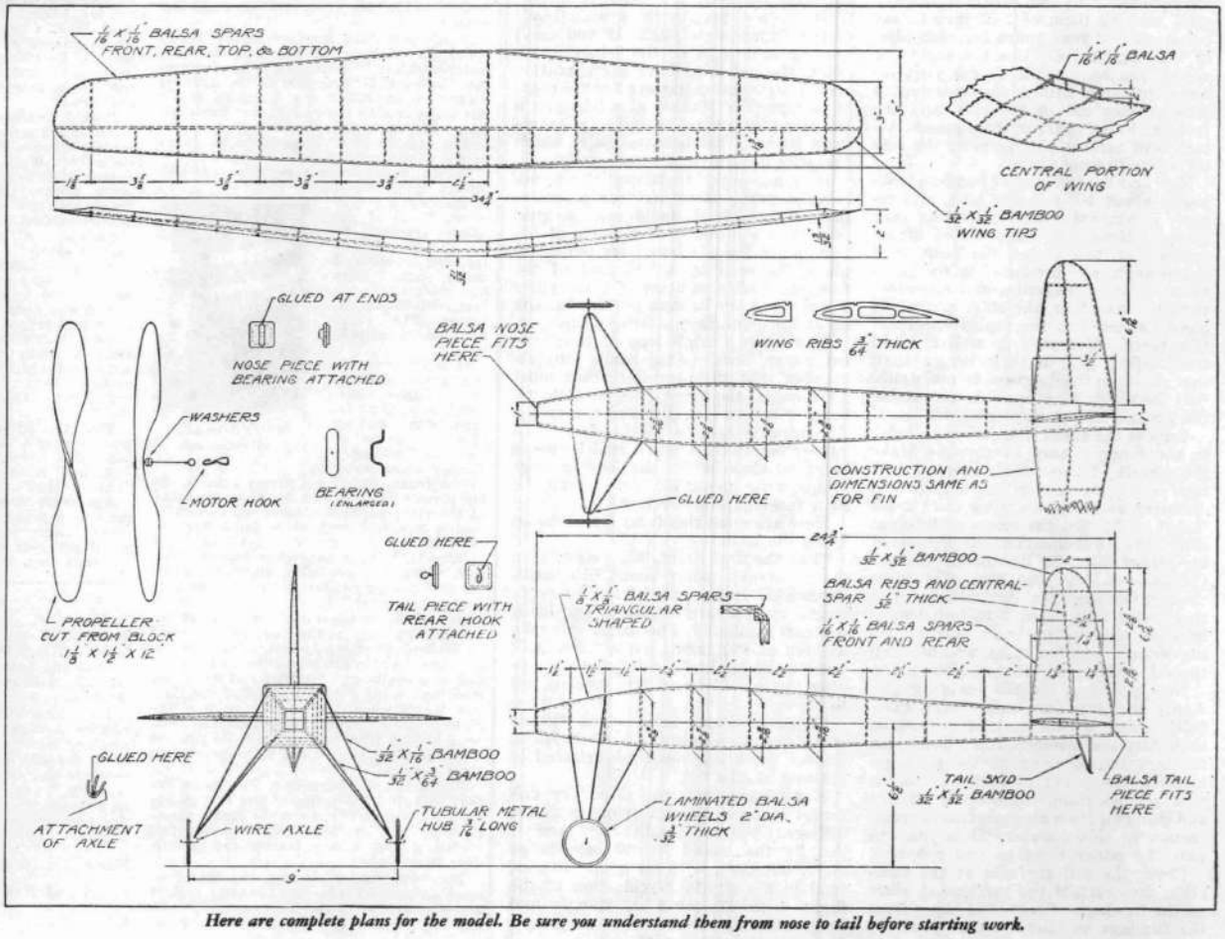
The rear view shows the ship's details.

The League has prepared for you builders, as for past models in the series, a compact kit containing everything you'll need to build this Burnham ship, as well as instructions and construction hints. If you use the kit, you're sure to have your model exactly right, for a lot of the parts, including wing ribs, are cut to size. To get the kit, No. 18, send $2.00 in check or money order to the A.M.L.A., American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan, and the kit will come to you postpaid. The League does not supply separate parts.

The materials you'll need for these: balsa propeller block, 1 1-8 x 1 1-2 x 12 inches; 4 balsa longerons, 1-8 x 1-8 x 26 inches; 2 pieces of 1-16 inch flat balsa, 3 x 18 inches, for ribs, spars, fuselage members, wheels, etc.; 1 strip balsa, 1-8 x 1-8 x 10 inches, for nose and tail of fuselage; bamboo; .016 music wire for wire parts; 2 brass washers; small piece of tin for thrust bearing; 12 1-2 feet 1-8 inch flat rubber for motor; large rubber band; two beads or metal tubes 3-16 inch long for wheel hubs; cement; Japanese Imperial tissue, 21 x 31 inches, for covering.

Start work by studying drawings and photographs in detail; read the article all through. Then, on large sheets of paper, draw out full-size, accurate sketches of fuselage, wing, tail surfaces, landing gear and wheels. You'll need these sketches to check dimensions, and to guide you in your work.

Make your fuselage first. The longerons are cut from 1-8 inch balsa—you can plane or sand them to the near-triangular shape shown in the diagram after the whole fuselage is cemented together. The two



Here are complete plans for the model. Be sure you understand them from nose to tail before starting work.

Here's a Wakefield Cup Plane

(*Continued from page 25*)

cemented together. The two end cross-sections are 1 inch square, of balsa of the same size. Start the job by cementing the four front cross-section members to the four longerons, setting the longerons at slight angles to allow for their curve. When the cement is dry, set in the next set of cross-section members—their size is 1-8 x 1-8 x 1 1-2 inches. Follow this procedure with all the succeeding members, allowing each set to become firm before adding another.

The next set will be 2 inches long; dimensions of the next four sets are given on the drawing. The succeeding five sets will be 2 1-16, 1 13-16, 1 1-2, 1 1-4 and 1 1-16 inches square—all are of 1-16 inch balsa. The last three sets have spacing of 2 and 1 1-2 inches separating them. Finally set in the last cross-section, which is just like the first.

NOW make the front and rear plugs, of 1-16 inch flat balsa. Each plug consists of two squares, one 1 1-4 inches, the other 1 inch, cemented together with the grain at right angles. Thus the smaller square fits snugly into the opening in the end of the fuselage. Make holes in the exact centers; in the rear plug cement the rear hook as shown.

The thrust bearing, to be cemented to the front plug or nose piece, is a small strip of steel or other thin metal, bent as shown in the drawing marked "bearing." In cementing it to the plug, be sure that the hole is exactly lined up with the hole in the plug.

Next, the tail surfaces. Note that the two stabilizer surfaces and the rudder are identical—make all three exactly alike. For each one make three 1-32 inch balsa ribs of the shape shown in the top view of the rudder, of the proper dimensions. Cut two center spars for each, making them of 1-32 inch balsa; cut front and rear spars for each also, of 1-16 inch balsa. Use the exact-size sketch you have made to get your dimensions exact. Cement the center spars into grooves cut in the ribs, and the front and rear spars in their places. Attach bent bamboo tips, bending the center spars to meet them.

Now add the tail skid of bamboo, making it about 1 3-4 inches long, and cement in place the bamboo landing gear struts. Note that each set of struts consists of *two* pieces, one bent to a sharp angle and cemented to the junctions of lower longerons and cross-sections two and four, the other a straight piece cemented to the top of cross-section three. You may do well to build the landing gear a little longer than that shown in the diagram, to make sure that the revolving propeller won't strike the ground as the ship takes off.

Cement the shock absorber wire axles to the landing gear as shown. Make the wheels of three discs each of 1-32 inch balsa, the center disc 2 inches in diameter and the two outer discs 1 3-4 inches each. Set the grain in different directions. Burnham cut out sections of his center disc, for lightness. Cement the hub—a long slim bead like those used on dresses for decorations, or a tiny metal tube about 3-16 inch long—into the hole in the exact center; slip the wheels onto the axles, and bend up the axle ends to hold the wheels in place.

Now you may do the covering job. Apply the Japanese tissue very carefully, using a thin coat of cement on each fuselage member. It's a good idea to start the covering at the nose, cementing the paper at first only to the first cross-section, allowing it to dry and going on from cross-section to cross-section in this manner. Thus you can pull the paper tight as you progress.

Cover the tail surfaces at the same time, then cement the surfaces in place on the fuselage. Scrape the paper from the fuselage members so that you'll be cementing wood to wood, not wood to paper. Note that the rudder is placed at an angle, to aid the plane in circling.

Your fuselage is finished!

THE wing comes next. First cut out your ribs. You better make cardboard templates as models. The two center ribs are 5 inches long, the next pair 4 3-8, the next 3 7-8, the next 3 3-8 and the end ribs 3. Cut out the nine half-ribs at the same time; that for the center should be 1 5-8 inches long and the four pairs respectively 1 1-2, 1 3-8, 1 1-4, and 1 1-8. Cut four strips of balsa 2 1-2 x 1-16 x 1-16 for leading and trailing edges and center spars of the center section, and assemble this section, cementing the two 5 inch ribs, the 1 5-8 inch half-rib and the four strips accurately in place.

Then cut four long center spars 1-16 x 1-16 x 16 1-8 inches, and four leading and trailing edges approximately 1-16 x 1-16 x 14 3-4 inches. Now assemble each half of the wing separately, adding curved bamboo tips at the ends.

Finally, cut the inside ends of the top center spars off enough so that, when they are cemented to the center section, the whole wing will have the dihedral angle shown—the tips should be 2 inches above the base at the center. Cement all three sections together.

Cover the whole with Japanese tissue, and add the small superstructure shown in the upper right-hand corner of the diagram. This goes above the trailing edge of the center section, and serves to give the wing positive angle of incidence when the ship is put together.

The last job is the propeller. Most of you League members know how to carve the prop, given the size of the block—in this case it's 1 1-8 x 1 1-2 x 12 inches. This gives a prop with a wide blade and a fairly high pitch. If you don't know just how to do the job, you can get a Manual describing the operation from League headquarters for five cents in stamps. The Manual also tells you a lot about other model-building operations such as bamboo and balsa bending, wire bending and wing covering.

It is necessary to "dope" the paper covered parts of an outdoor plane, to protect them from dampness. A good dope is a solution of five parts of banana oil to one of acetone for the entire plane, followed by a redoping of the fuselage with a solution of three parts acetone and one banana oil. Get banana oil and acetone from a drug store.

Now make a triple loop of your rubber motor, hook up the whole job (remember that the propeller shaft must go through the front plug and thrust bearing before it is glued to the prop). The wing is held to the fuselage by a rubber band; Burnham's model was so balanced that he set the leading edge of his wing about 1-2 inch behind the fifth fuselage cross-section.

Here are some tips from Burnham on flying the model:

"For the first flight, it's well to give the six-strand motor about 650 turns. Stretch the rubber to 2 1-2 to 3 times its length as you start winding, and let it contract gradually. The motor will take as high as 850 turns, but a fellow will want to be mighty careful, for a snapping motor will smash his fuselage all to pieces.

"It's a good idea to use eight strands of rubber on particularly windy days. Rubber must be properly lubricated to get best results."

Experiment with the ship. Try different motors, different wing settings, different weather conditions. And if you fly the model for 60 seconds or more, outdoors, with an adult witness, send in his signed certification of the flight with 10 cents in stamps and League headquarters will issue you an Honor Certificate for it!

A. M. L. A. CHAT

About the Activities of the 375,000 Members of the Airplane Model League of America.

FLYING a model airplane in the wind is a science all by itself, as America's 1929 model champions found when they competed in the Wakefield Cup contests in England last summer. League members building the Burnham fuselage model described in last month's AMERICAN BOY are going to want to know a lot about wind-flying, and these tips from David Richardson, Oshkosh, Wis., will be valuable:

Bradley's model looks real.

"After experimenting with R. O. G.'s for a while," writes Richardson, "I discovered that my planes fly better if I head them about 45 degrees off the wind opposite to the direction the planes naturally turn. In a very light wind they go well heading into the wind, but when it's medium this heading, nine times out of ten, will make them stall or dive, depending on how the wind catches the wing. When they are heading off, however, they will come around into the wind, and the wind will help them to gain altitude.

"Planes will tack across the wind a little before coming into it, and my experience is that they balance themselves after I let go of them. Of course in a heavy wind a light plane won't fly at all unless it gets a lucky break.

"I don't guarantee all this—but it is my own experience."

A three-bladed propeller is a feature of the flying Stinson-Detroiter built from AMERICAN BOY plans by John H. Black, Geneseo, N. Y. "The blades radiate from the spinner cap at 120-degree intervals, and though their total area does not exceed 3 3-4 square inches the ship is capable of 70-second flights, r. o. g.," Black reports. "Four strands of rubber make the air hot for a few seconds. Hand-launched flights average better than 150 seconds; I might get longer records, I figure, with lighter models, so I'm now using more care and less wood."

In his miniature fuselage model Wesley Hawk, East Akron, O., has used the same motor-stickless construction that features the Chaffee C-4 (described in the January AMERICAN BOY) and the Burnham model. His plane is nine inches long and has a 12-inch wing span, uses a five-inch propeller and is capable of 50 seconds' flight. Hawk uses a winder with it.

Robert Waterstradt reports a blue-and-orange flying model of the Cessna monoplane. "It is of all-balsa frame," he writes, "with detachable motor and motor stick. I have had flights of 100 feet, with 75-foot altitude. The plane has an adjustable wing."

Here's Simcox's pusher-tractor.

"I build true flying scale models," says Charles Knierim, Hollis, Long Island, "by making the tail assembly light and adding a dummy balsa motor at the front; thus I get pretty close to the big plane's balance, and can place the wing at the right position. One of my successful models has 1-20 inch sheet balsa for the sides of the fuselage with 1-4 inch balsa bulkheads, bamboo paper for top and bottom, white pine propeller, aluminum cowling and a wing similar to that on the outdoor twin pusher."

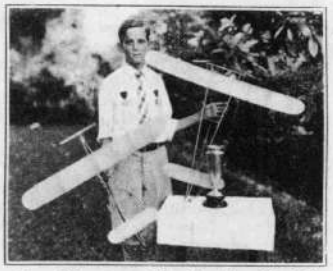
One of the smallest scale models yet reported is pictured on this page—it was built by Ballard Bradley, Andover, Mass. Bradley says the ship's construction was the result of a challenge. "A friend of mine said I couldn't make a decent model of the Curtiss Hawk when I was showing him the plans in the February, 1928, AMERICAN BOY. So I had to take him up, and I built the model just the size of the plans printed in the magazine."

Ray Hites, St. Augustine, Fla., is an expert on both hand-launched and r. o. g. flying stick models. Hites won the junior championship of Florida in 1928 with his two models, a large r. o. g. tractor and an outdoor twin pusher.

The twin pusher remains the holder of most outdoor records, and League members are still writing to the League for the official kit, Number 4, which is offered by the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., for $3.00. The League also has the outdoor twin tractor, at $2.25; both are good contest models.

One of the most interesting experimental models is the combination pusher-tractor developed by Burton Simcox, Knoxville, Tenn. Simcox's plane is pictured on this page. Plans for it, however, are not available.

A lot of fellows have been writing to the League for information about gliders. The best place to get this is from the National



Ray Hites won a Florida championship with these models.

Glider Association, Union Trust Bldg., Detroit, Mich. Individual membership in the Association costs $5.00; there is a $5.00 charter fee for a local club, but individual membership where there is such a club costs only $1.35 if the membership is 25 or more.

Plenty of reports on the splendid performance of new League planes are coming in. "When I ordered the four Senior R. O. G. kits two of them went to fellows whose fingers were all thumbs," says Edward Hill, Champaign, Ill. "They had never built model planes. Yet all four of the planes flew as well as anybody could ask."

Harold Denison, Marion, Ind., made a mark of 178 seconds with an R. O. G. in a contest between Marion and Anderson, Ind., clubs. Dick Webb, Pasadena, Cal., made his Senior R. O. G. into a stunt-plane by using spruce for spars, motor stick and tail group frame and bamboo for wing ribs. He uses heavier rubber, also, than that suggested for the plane. "All the adjusting you have to do," he says, "is to put the wing into the slight-climb position. The air currents outdoors do the rest. Several times my ship has climbed twice as high as our house, looped and come down in a power dive to zoom just before it hit the ground."

Boys in Paw Paw, Mich., are fans for the Improved Baby R. O. G. "All my friends," writes Edward Brennan, "think it's hard to make the Senior R. O. G. fly any better than that Baby. Which do *you* think is the better?"

Well, the Senior has a high record—witness Denison's flight. But they're both corking indoor models, the Baby for stunting and small rooms, the Senior for contests. Why not build 'em both?

And don't forget to join the League. A coupon is printed below, and if you send it to League headquarters with a stamp you'll get your membership card and button back in a hurry. Don't delay!

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American Boy Building
Second and Lafayette Blvds.
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Gentlemen:

I am interested in learning about aeronautics through the building and flying of airplane models. I also wish to become eligible for official national airplane model contests and to enjoy other League privileges. Will you, therefore, please enroll me as a member? I enclose a two-cent stamp for postage on my membership card and button.

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When Champions Meet--Records Fall

And Hundreds Will Meet at the Third National A. M. L. A. Contests, Detroit, June 30--July 1

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Special Awards

All at the
THIRD NATIONAL
A. M. L. A. CONTESTS
Detroit, June 30--July 1.

WHEN airplane model champions get together, you can count on new model records.

That was proved at the First National Airplane Model League of America Contests held by THE AMERICAN BOY in Detroit in 1928, when Aram Abgarian flew his indoor tractor to the then unheard-of record of 353.6 seconds. It was proved again in 1929, when both Joseph Culver and Donald Burnham smashed records.

Griffith Ogden Ellis, American Boy editor, is general chairman of the contests.

And League members from every corner of the country are prophesying that the 1929 records—513 seconds indoors, 10 minutes 30 seconds outdoors—will look second-rate when the Third National Contests, to be held in Detroit by THE AMERICAN BOY for the third successive year, are over. The dates set are Monday and Tuesday, June 30 and July 1.

What a contest it will be! What prizes—everything from trips to Europe to handsome bronze medals! What fun for contestants—not only the contests, but also banquets, sightseeing, special airplane exhibitions, meetings with famous flyers. There will be a visit to the famous Ford Airport and to the Ford Motor Company's adjacent plant, if contestants wish it; there will be free bus transportation to Selfridge Field, where the outdoor contest will be held, and to Grosse Ile, where the great dirigible hangar will house the indoor event.

"We had more than 400 participants at the 1929 contests," says Griffith Ogden Ellis, editor of THE AMERICAN BOY and League vice-president, who is general chairman for the contests, "and we expect to have more than 500 this year. Plans are already under way for a boy to come from Hawaii, and others will be registered from every state between there and Maine!"

As in the past two years, the Hotel Statler, on Detroit's famous Grand Circus Park, will be contest headquarters. There official registration will take place; there scale models will be displayed; there contestants will find a special workshop; and there the final banquet, with award of prizes, will be held. There, too, contestants will stay during their time in Detroit, at special low convention rates.

Every League member knows of the three standard events in the national contests, which are conducted under National Aeronautic Association sponsorship and rules—the competition for the Stout indoor trophy and the Mulvihill trophy, and the scale model contest. This year there is to be a fourth event—a competition for another cup offered by William B. Stout, League president and designer of the Ford all-metal tri-motor transport. This contest will be for outdoor fuselage models designed to be eligible in the English Wakefield Cup competition—rules for the contest were given in the March AMERICAN BOY. They will be repeated in next month's magazine.

For two days—three if bad weather should interfere with the outdoor contests—the battle of the models will be waged. Then the national trophies, the 48 glistening silver cups, the bronze medals, the scholarships and other awards, as well as certificates of merit, will be presented, and the two winners of the indoor and outdoor titles will get ready to leave for Europe!

Their prize trips to Europe will be under the guidance of Mark L. Haas of the staff of THE AMERICAN BOY—the magazine is presenting the trips. The boys will sail from Montreal on July 5, aboard the big Canadian Pacific liner *Montcalm*. Reaching London July 12, they will have a week to see the age-old sights of the world's greatest city; they will enter the models which make the best records in the Stout fuselage contest at Detroit in the Wakefield competition, meeting the best British model builders have to offer. They will go to Paris, and spend another week there—a week full of Paris's theaters and parks, cafes and boulevards, museums and monuments, lovely buildings and history-colored cathedrals, palaces, arches. Then—after the fullest two weeks any boys ever spent!—aboard another liner bound from Cherbourg to Montreal, and home again!

Start making your plans now, you model plane experts, to attend the contests. Perhaps there's an A. M. L. A. Chapter in your own city that is planning to hold local elimination contests and send a champion to the contests. You'll know about it if there is. Perhaps you're planning to pay your own expenses—it will cost you about $20 in addition to railroad fares (at the special convention rate granted to members of the League) and Pullman. Or perhaps you're going to enter the scale model competition "by express"—by sending your model in for the judges' examination without coming yourself.

Here are six of the eight cups awarded in each division of indoor, outdoor and scale contests.

In any case, watch the May and June AMERICAN BOYS for more details of the contest. In May you'll get a resumé of the rules for all the contests, as well as complete instructions for entering the scale model event. In June you'll get final instructions on how to get entry blanks, reduced fares and so on, and on the definite program for the two days' events. *Don't write* for such information until you've seen the magazines—you'll only waste your own time and that of League officials if you do!

Spend your time, instead, in perfecting your models. Get that indoor model trimmed down to the lowest weight consistent with strength; develop your fuselage model as suggested in the March AMERICAN BOY; learn all about flying your outdoor twin pusher in any kind of weather. Put the final touches on your scale model—League rules, as most of you know, require a 24-inch wing span for all scale models entered.

If you're entering a scale model, spend some time in figuring out the best kind of carrying case for it. At the 1929 contests some of the scale models arrived in damaged condition, due to faulty packing; and although judges made allowances, it was not always possible to reconstruct models completely. So be sure that the case in which you ship your model is husky enough to stand express handling, and that the model is fastened inside so that it will not rattle, get marred nor be crushed.

Remember the dates. Start making plans now. Plan on having a whale of a good time.

And get ready to make your best record when you get to Detroit. It's going to be an assembly of champions, and your best record will be none too good!

Detroit at night is a glittering picture of skyscrapers, searchlights, brilliant streets. Contestants will see the great red neon ball shown between searchlight rays at the left, an airplane beacon visible for sixty miles.

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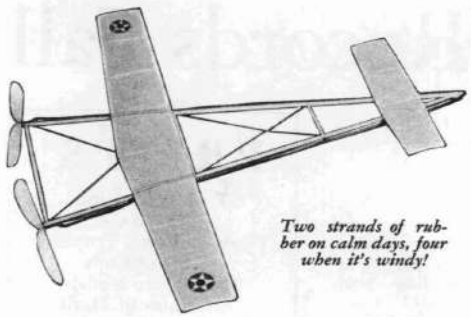


Two strands of rubber on calm days, four when it's windy!

Try This Twin Pusher

Expertly Designed, It Is Simple to Construct and a Dandy Flyer

By Merrill Hamburg

Secretary of the Airplane Model League of America

KNOW the League member who has shown the most consistent work in the two national airplane model contests conducted in Detroit by THE AMERICAN BOY?

It's Albert Mott, Detroit expert who placed second in both Stout contests—the highest two-year record of any A. M. L. A. member in America. Mott is an all-round builder. His pusher placed second to Aram Abgarian in 1928. His tractor was just behind Joseph Culver's in 1929. And he won the special outdoor contest held at Ford Airport when the National Air Tour started last fall with a little outdoor twin pusher—his plane flew out of sight after five minutes.

Here's that same model—a simplification of the big pusher that many boys are going to build for the Third National A. M. L. A. Outdoor Contest to be held in Detroit by THE AMERICAN BOY, June 30-July 2. It's not eligible for the national contest, for its wing area is less than the required 125 square inches. But, with its single-surface wing and elevator, it's a little easier to build. It fills the need that so many of you League members have been feeling for a small twin pusher to start on—a model that will prepare you for the larger contest plane.

The League is *not furnishing a kit* for this model. You'll need to get materials yourself, from the nearest model supply house—a department or sporting goods store, or some other source you'll find available. Get your materials, build the model, find out how to handle a twin pusher. Then you can get the famous No. 4 kit from the League, to build the big championship model. To get this big kit, send $3.00 in check or money order to the A. M. L. A., American Boy Building, 550 Lafayette Boulevard, Detroit, Michigan, asking for Kit No. 4.

To build the Mott pusher you'll need: Two balsa propeller blocks, 7-8 x 7-8 x 9 inches; two balsa motor sticks, 1-8 x 1-4 x 30; four balsa wing spars, 3-16 x 3-32 x 15; four balsa stabilizer spars, 3-32 x 5-32 x 5; balsa for ribs and fuselage cross members; .016 music wire for cans, .030 wire for front hook or nose piece, propeller shafts and S-hooks; two thrust bearings; rubber motor; thread; four washers; Japanese tissue paper, 8 x 31; model airplane cement.

Start by building the fuselage. Sand the two motor sticks evenly, tapering their forward ends to join them. Cut the crosspieces, the rear one 9 1-8 inches long and the others to the right length to fit. Mark the motor stick where the crosspieces are to join them, then assemble all five pieces by cementing them together. The wire nose piece reinforces the front; cement it, the four cans and the two thrust bearings in place, then use thread windings as shown in the drawings to strengthen them. Add the four thread cross braces, putting drops of cement at their intersections, and it's done!

The wing is made in the same manner as most of your indoor wings. Trim and sand the four spars, tapering them toward the outer ends. Bend the balsa ribs to the camber shown in the upper left corner of the drawing; then—by laying the spars in the proper position on a table—get the exact lengths of the ribs. Assemble the halves separately, cementing the ribs onto the spars. Butt-joint the two halves so that they form the dihedral angle indicated, then add the center rib.

Now cover the wing with Japanese tissue, starting at the center rib and working toward the ends. Model airplane cement diluted with acetone—you can get it at any drug store—is an excellent adhesive for this purpose.

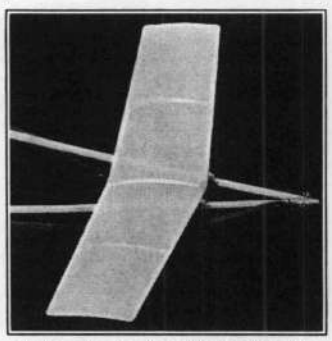
Next, the elevator. This is constructed in exactly the same manner as the wing, except that the ribs are not set into the spars, and the spars are not tapered. The camber is a flat arc, as shown at the lower right of the drawing. Once the elevator is complete, it should be cemented to the fuselage. Mott put 3-16 inch balsa blocks under its leading edge, to give it a slight positive angle of incidence.

The last job is carving the

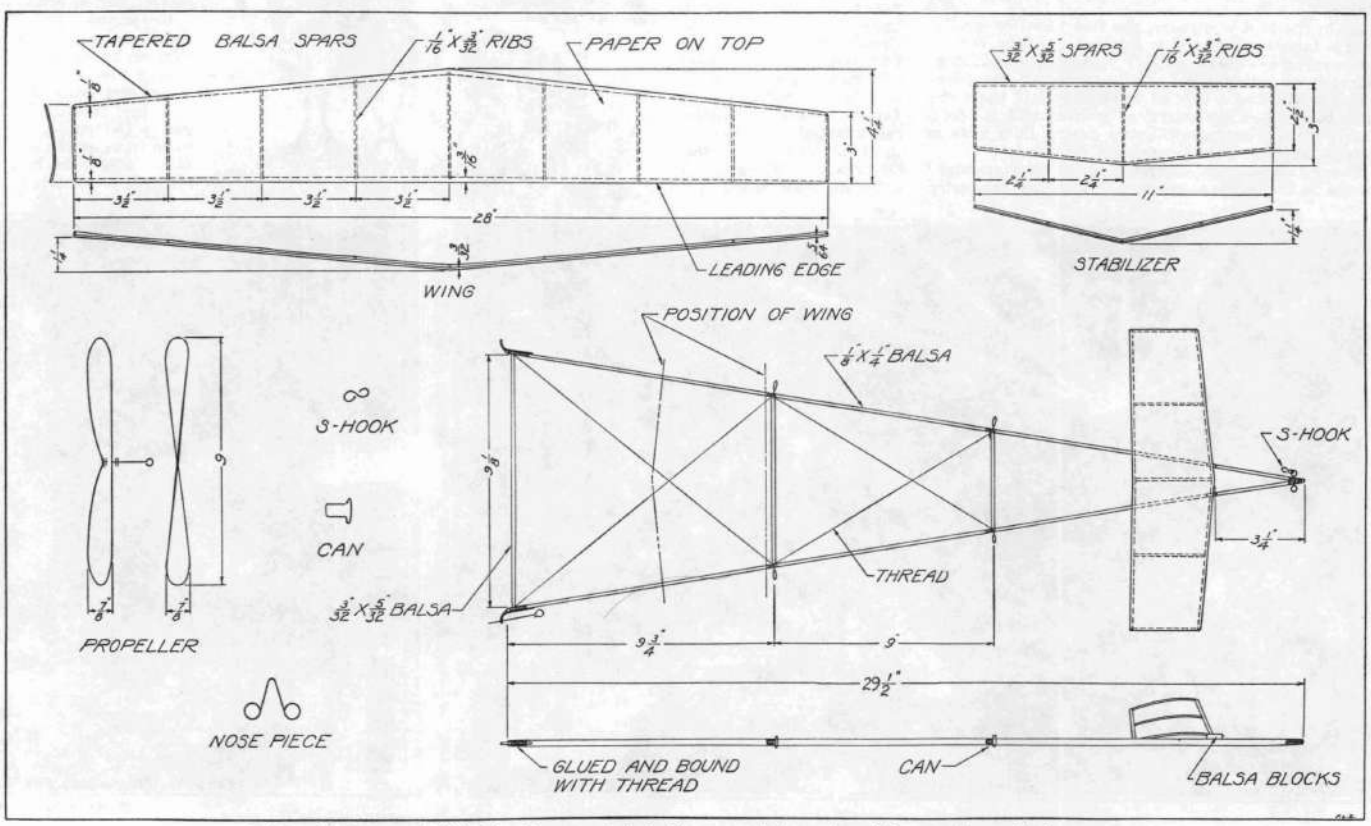
(*Continued on page 71*)

The League Supplies No Kit

for the model described in this article. But it has kits for two outdoor planes whose dimensions make them eligible for the national outdoor contests—the No. 4 Outdoor Twin Pusher, at $3.00, and the No. 13 Outdoor Twin Tractor, at $2.25. Send your check or money order for either—or both—of these to the League, and it will be mailed to you, postpaid, at once.



Blocks raise the elevator's leading edge.



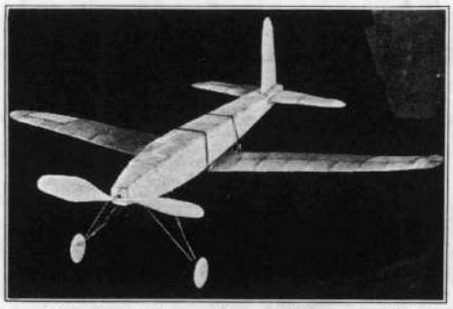
The model is easy to build. It's wise to study both diagram and instructions before starting work, however.

Here Are Your Contest Rules!

Be Sure You Know Them--National Airplane Model Events Come June 30-July 1

HUNDREDS of Airplane Model League of America members are getting ready for the Third National A. M. L. A. Contests to be conducted by THE AMERICAN BOY in Detroit, June 30-July 1—and none of them wants to be in the sad state of one of last year's would-be contestants.

The boy was an expert scale model builder, and he had built a beautiful model of a Waco biplane. But he had a 30-inch wing span—rules call specifically for ships built to a 24-inch scale—and his model could not be entered when it reached Detroit!



Most of the flying models are likely to resemble the three shown here—the indoor (left), the fuselage (above) and the outdoor (right). But you may change them any way you please, if you conform to rules!

Here are the rules for the 1930 events. Be sure you know all of them, so that, when you get to Detroit, you'll be eligible not only for the contests you expect to enter, but also for the banquets, the exhibitions, all the special entertainment being prepared for contestants. You won't want to be ruled out on a minor point, so don't make any errors.

First, remember that all contestants must be members of the A.M.L.A. (a coupon to obtain membership is on this page), and must be less than 21 years old on June 30. If you were born before July 1, 1909, you're too old!

In the Stout indoor contest, the national outdoor contest and the scale model contest there will be two classes. Entrants less than 16 years old will be juniors, others seniors. Identical cash prizes, cups and medals are offered in each class.

All models — indoor, outdoor and scale model — must be built completely by the contestant entering them, with the exception of the propeller bearings and washers used in flying models. Flying models may be either pushers or tractors, and may have one or more motors and propellers. Models which drop any of their parts while in flight will not be permitted.

Prizes for Paint Jobs!

Good news for you scale model builders who take pride in the way you paint your scale models! One of the big manufacturers of airplane paints has promised a $25 cash prize, two sets of framed pictures of airplanes and 66 other prizes to the fellows who do the best jobs in selecting their color schemes and applying the finish. Any model builder, junior or senior, is eligible for these prizes. So pay special attention to your paint jobs.

MODELS in this contest must be rubber-motored and must have a distance between rear hook and propeller bearing no greater than 15 inches. The winner will receive a trip to Europe as well as the Stout Trophy, $200 in cash, a first place cup and other awards. Most model builders know contest procedure. Each contestant is allowed three official trials, but three unofficial trials (less than 10 seconds) or delayed flights (failure to fly when called) constitute an official trial.

In this contest a model must have a minimum wing area of at least 125 square inches, and must weigh at least one ounce for every 50 square inches. Thus, if the plane has a wing surface of 175 inches, it must weigh 3½ ounces. In no case may it weigh less than 2½ ounces. These rules have been adopted by the National Aeronautic Association to make it impossible for contestants to enter "freak planes" or small models that are really of the indoor variety. A model must be of the true outdoor type. Like the indoor model, it must be rubber motored. Contest procedure follows that in the Stout contest. Prizes are similar, also, except that the Mulvihill Trophy goes to the contestant under seventeen years of age who makes the best record.

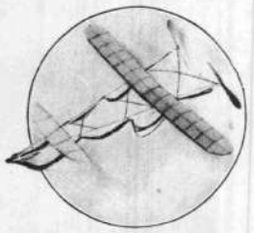
Scale models are non-flying planes built to represent standard big planes. Such a model must have a wing span of exactly 24 inches, and all other parts must be scaled accordingly. If models are not built from plans supplied by the A. M. L. A., they must be accompanied by scale plans which have been approved by the manufacturer of the full-size plane.

Prizes include sixteen silver cups, $1,000 in cash, fifty bronze medals, special prizes for excellent finish, and other awards. It is expected that judgment on scale models will be completed by the time contestants reach Detroit.

The Stout outdoor fuselage contest is the new event sponsored—like the indoor contest—by William B. Stout, designer of the Ford tri-motor all-metal transport and president of the League. It is intended to develop models for competition in the international Wakefield Cup contest in England, and is open to any League member under 21. To enter the contest, a model must closely resemble a real airplane, having a built-up fuselage completely enclosing the rubber motor; it must have a double surface wing, and the maximum cross-section of the fuselage must have an area at least equal to the length of the fuselage divided by ten and squared. The March AMERICAN BOY gave details of this contest. Models must rise off the ground. Prizes include a special trophy and $175 in cash.

ALL details of the contests—final plans, reduced railroad fares and so on—will be announced in the June AMERICAN BOY. Model builders wishing to enter the flying events, of course, must come to Detroit. Scale model builders, however, may enter their models without coming to the contests—here is the procedure:

Complete every detail of the model; then make a strong, baggage-proof container into which the model fits snugly and without possibility of crushing or rattling. Put the model into this container, and enclose approved plans (as mentioned above) if the model is not built from League plans.



Write to the Scale Model Director, A. M. L. A., American Boy Building, Second and Lafayette Boulevards, Detroit, Michigan, for an official contest entry blank and other material. This will be sent by return mail. Return it with the $1 fee for cost of handling and repacking your model, then ship the model, *express prepaid*, to the address above. It must reach headquarters by June 14—models arriving late cannot be considered. It will be necessary to enforce this rule strictly because of the time required for judging models. Models will be returned in their original containers after the contest, express collect.

A number of League members have written to League headquarters asking about the entry of "professionals" in the contests. The League does not recognize a "professional" class; but officials of the contests will follow the policy that no boy who has been so employed as to gain a special advantage in any division of the contests will be permitted to enter that division. Thus a boy who has been employed in an airplane factory will not be allowed to submit a scale model of a plane built by his employers. Every case will be considered strictly as an individual case, on its own merits, and final decision will rest with Griffith Ogden Ellis, AMERICAN BOY editor who is general chairman of the contests, and his assistants.

There are the rules! Be sure you and your models come within all of them—then plan on winning a first prize!

Try This Pusher

(Continued from page 28)

propellers. Remember that the props must turn in opposite directions, so that the torque or twisting motion produced by one will balance that produced by the other. Therefore one must be a left-hand prop, the other a right-handed. This means that, when placed side by side, their blades will be pitched in opposite directions.

Most League members know how to carve propellers. If you aren't familiar with all the steps, send 5 cents in stamps to the A. M. L. A. for the Model Builders' Manual—it tells how to do the whole job.

Now the rubber motor. Mott gives this advice:

"If you're flying the ship on a windy day, use four strands of 1-8 inch flat rubber on each motor stick, wind her to 400 turns or so and let her go. You'll need a strong, sharp climb on such a day. If there's not much breeze, though, two strands of 3-16 inch rubber on each stick will take the model up in a flatter climb.

"I've found it a good idea to put tiny balsa blocks under the *trailing edge* of the wing, to increase its incidence. The wing is held on by rubber bands, so this is easy to do. Blocks 1-8 inch high are enough.

"Some fellows like to add a rudder to the plane. The rudder should have half the area of the elevator, and it should be placed above the center rib of the wing. Make its base the width of the wing at that point, and slope its leading edge backward. A simple balsa frame, covered on one side, will do the job if the rudder seems desirable."

It's an easy ship to build, and a particularly good one for the beginner with outdoor models. It leads directly to the big twin pusher, and makes construction and flying of the larger plane simple. Get your materials now—remember that the League has no kit for the smaller ship, and that there is no honor certificate for it—and you'll be launching this splendid model in a few days!

The Wakefield Cup.

Crown the New Model Kings!

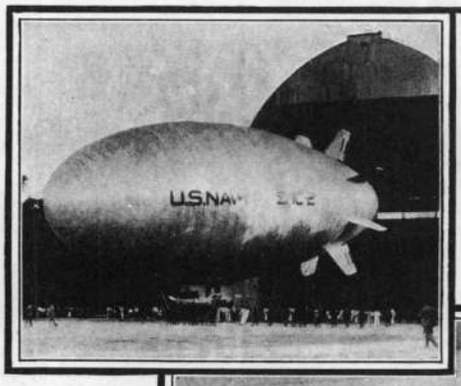
They'll Be Selected at Third National A. M. L. A. Contests, When Crown Princes of Modeldom Meet

SOMEWHERE in the United States, three future model airplane kings are getting their regal raiment ready.

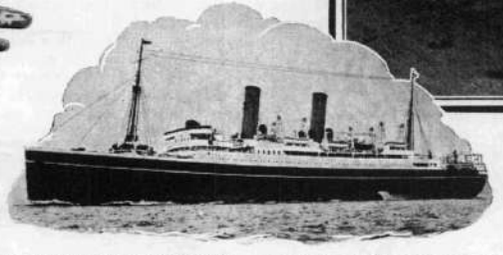
Their royal robes won't be purple—you can count on that. They'll look very much like ordinary coats and trousers and sweaters, and they'll be carried in ordinary traveling bags. Their owners' badges of office will be Airplane Model League of America insignia, their scepters egg-beater winders.

And they'll gain their thrones by winning the three major events of the Third National A. M. L. A. Contests, to be held at Detroit June 30-July 1 by THE AMERICAN BOY.

Actually there are more than 500 "crown princes" from every corner of the country—one of them from Honolulu!—grooming the models that will compete at Detroit. And every one of them is a potential winner. The 1928 outdoor champion, Tom Hill, was new at model building. His 1929 successor, Don Burnham, was a junior competing in his first big contest. The 1930 kings—successors to Burnham, Joe Culver in the indoor contest, and Louis Proctor in the scale model—are pretty sure to be dark horses.



As in 1928 and 1929, the contests are officially sanctioned by the National Aeronautic Association and backed by the Detroit Board of Commerce. The famous Stout indoor trophy, the Mulvihill outdoor trophy and the scale model prize will be awarded. A new Stout trophy for outdoor flying fuselage models, will be presented. And the champions in the major contests, in addition to their cash prizes, cups and other awards, will win trips to Europe—all three of them!

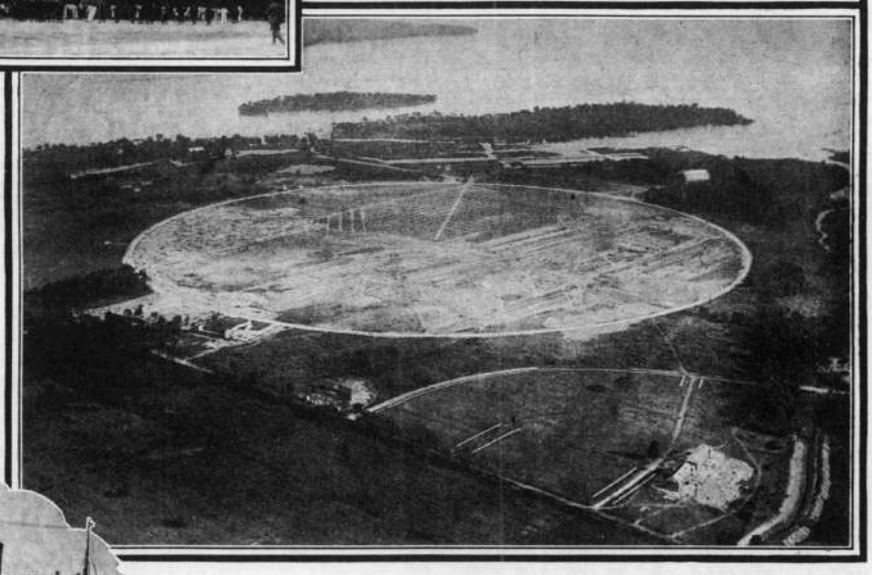


A TRIP TO EUROPE

For a Scale Model Builder

It's offered by the Stinson Aircraft Corporation as top prize in the Third National Scale Model Contest. Read about it on this page.

And here's more good news! New, completely up-to-date scale model plans of the Stinson-Lycoming, drawn to League 24-inch specifications, are now available. They're the best yet! You scale model builders can get them by sending 20 cents in coin or money order to the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich.



Here's the great Grosse Ile Airport, where the outdoor contest will be held. The big hangar, the scene of the indoor meet, is at the upper right; the close-up shows that it's big enough for a full-sized dirigible balloon. (This is the famous "tin ship," the ZMC-2, built in the hangar.) Left, the Canadian Pacific liner Montcalm which will take the champions to Europe.

You League members already know that the indoor and outdoor champions are to be guests of THE AMERICAN BOY on a European tour. But Eddie Stinson, one of America's most famous fliers, president of the Stinson Aircraft Corporation and a vice-president of the League, thought the scale model champion should go too.

"The scale model contest is every bit as important as the others," he said, "and the winner needs every bit as much skill. The Stinson Aircraft Corporation would like him to be its guest on the trip!"

So the three champions will leave Detroit on July 4, and sail from Montreal on July 5, on the Canadian Pacific liner *Montcalm* for Southampton. More about the trip later.

The contests will open June 30. So you League members who are planning to compete should write to the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., as soon as you get this magazine, for official entry blanks, "parents' consent blanks," and other forms. They will be sent you at once—enclose a stamp for return postage—and you can go ahead with your arrangements.

The first thing to do is fill in the entry blank and mail it back to Detroit. With it send the hotel reservation card. Next, obtain a copy of your birth certificate from the clerk of the county in which you were born—this is necessary, as you doubtless know, to get a passport in case you win a trip to Europe. Third, have your parents fill in and sign the "parents' consent blanks."

Now—if your models are all tuned up, and carefully packed for the trip—you're prepared to go to the station. Figure out your railroad schedule so that you will arrive in Detroit not later than Sunday, June 29. When you buy your ticket—a one-way ticket to Detroit unless you live in the Rocky Mountain or Pacific Coast regions—ask the ticket agent for a *reduced fare certificate*. Be very sure you get this; it will entitle you to half fare on the return trip. Moreover, unless you get it, you may prevent not only yourself but also all other entrants from obtaining the reduced fare privilege.

Here's what you'll have in your pocket when you step on the train: your birth certificate, your "parents' consent blanks," your reduced fare certificate, your railroad and Pullman tickets, your money, (the cost of your three days in Detroit should be not more than $20).

And in your traveling hangar you'll have your contest models—plenty of them, in case some break in early trials; your spare parts and materials; and your repair tools.

You'll arrive in Detroit June 29, and go direct to the Hotel Statler. Contest headquarters will be open there the morning of June 29, and as soon as you have been assigned your room you'll go to register. There you'll get your official A. M. L. A. arm band, your book of tickets (free to contestants) for events of the contest program, and all the information you want! You'll spend the rest of the day in seeing some of the sights of Detroit, and in putting last-minute touches on your models.

Early Monday morning—you'll have to have breakfast before 7:30!—you'll embark in one of the fleet of big yellow busses for the trip to Grosse Ile Airport, the big field belonging to the Detroit Aircraft Corporation. An hour's ride along the sparkling Detroit River and over the bridge onto the island will take you there. If the weather is good, the outdoor contest will be started at once. Along with it will be run off the contest for the Stout outdoor fuselage trophy. As League members know, the winning models in this contest are to be taken to Europe to compete in the international Wakefield (*Continued on page 51*)

A whole fleet of big yellow busses will take contestants to Grosse Ile, where they'll compete for the Stout and Mulvihill trophies, shown above.

Crown the New Model Kings!

(*Continued from page 27*)

contest to be held in England.

There'll be lunch for you, and the contests will continue through the afternoon. When they're ended, and a new outdoor king is selected, you'll get in the busses again and travel to another air field—the famous Ford Airport. There, in the Ford hangar, with the wings of historic planes towering over the tables, you'll be guests of Mr. Edsel Ford at a banquet. Mr. Ford entertained A. M. L. A. contestants at the 1928 and 1929 contests, and he informed Griffith Ogden Ellis, AMERICAN BOY editor and general chairman of the contests, that he isn't going to get out of the habit!

Here's the Stinson-Lycoming monoplane for which the League is supplying crackerjack scale model plans, and Eddie Stinson, League vice-president.

"Boys who become experts in airplane models are doing as much for the future of aviation as adult designers and pilots," he explained, "and the aviation industry appreciates their work."

Fliers and leaders in aviation will be seated at the tables with contestants, and the names of winners of the scale model contest will be announced. Then the busses will take you back to the Statler, for a night of well-earned rest.

A. Peter Thurston, London host of the champions.

Back to Grosse Ile the next morning! For the indoor contest is to be held in the great hangar there, the hangar in which the all-metal dirigible ZMC-2 was built. The hangar has a ceiling of more than 100 feet, and model experts say that old records will be left far behind before the day is over. (In case Monday's weather is too bad for outdoor flying, the order of contests will be reversed.)

Then back to the Statler for the final banquet. There'll be award of prizes, brief talks by Mr. Ellis, William B. Stout, the League president, and other air notables, skits and entertainment—things that you won't forget as long as you live! Then the new kings will be crowned, and the contests will be all over.

But the champions — successors to Burnham and Culver and Proctor — will be more than busy. They'll have final passport arrangements to make; final purchases to attend to; and a train to Montreal to catch! Mark L. Haas of THE AMERICAN BOY will be in charge of the European party. They'll live on the *Montcalm* for a week, then go to London, where Dr. A. Peter Thurston of the Society of Model Aeronautical Engineers will be in charge of their program. They'll take part in the Wakefield Contest at Halton Airdrome. On July 20, they'll go across the channel to Ostend and Brussels; they'll tour the battle fields of Belgium and northern France, then go to Paris for a last glorious week. And finally, on July 30, they'll sail from Cherbourg for Montreal and home!

League members read in the May AMERICAN BOY the rules for the contest. Briefly, they require a motor-length of not more than 15 inches for indoor models, a wing area of at least 125 square inches and a weight of one ounce for each 50 such inches for outdoor models, a wing span of exactly 24 inches for scale models and a maximum fuselage cross-section in Wakefield (outdoor fuselage) models whose area is at least as large as the square of the fuselage length divided by 10. Boys must build the models themselves, but may buy metal fittings and, in the outdoor models, propellers and wing ribs, if they wish. Models built from A. M. L. A. kits are eligible.

Prizes in addition to the European trips and the Stout and Mulvihill trophies include $3,200 in cash, 48 silver cups, 150 bronze medals, three scholarships in the Aviation Institute of the U. S. A., merit certificates and other awards. The former winners of the trips to Europe will not be eligible to repeat!

Scale models, of course, may be entered "by express." Models so entered must arrive, *express prepaid*, at League headquarters by June 14, and must be accompanied by scale plans approved by the manufacturer of the plane copied if they are not built from League plans. Entry blanks and the fee of $1 for packing should be sent separately by mail to headquarters.

A. M. L. A. CHAT

About the Activities of the 400,000 Members of the Airplane Model League of America.

CONTESTANTS at the Third National A. M. L. A. Contests will miss a familiar face. Al Mott, one of the most skillful model builders in America, died in Detroit, March 16, the victim of a ruptured appendix.

Al's smile, like his amazing consistency with indoor models, were features of both 1928 and 1929 national contests. In 1928 he was second only to Aram Abgarian, national champion, when his pusher flew for 341 seconds. His name as senior indoor champion was the first ever written on an A. M. L. A. prize check.

Al Mott.

He followed his 1928 success with a flight of 471 seconds, a record surpassed only by that of Champion Joe Culver. He used a tractor of unusual design in the 1929 contests—the League furnishes plans for it in Kit No. 16. In preparation for the 1930 contests Al had already made records of more than nine minutes—better than the official world's record. He designed the unusual outdoor twin pusher described in the April AMERICAN BOY; his death came just before the magazine appeared, so that he never saw his plans in print.

Word has also been received at League headquarters of the death in an automobile accident of Kenneth Lee Mantz, Frederick, Md., on March 15. Kenneth was another League member who competed in the 1929 contests and was preparing for this year's events. He was an expert model builder—his skill had won him four official League honor certificates and a special autographed Clarence Chamberlin photograph.

Scale model enthusiasts are history makers, according to William Heaslip, famed aviation artist and illustrator who acted as a judge at the 1929 contest and who bought several scale models himself. "Some day these scale models built by League members are going to find their way into museums, just like models of old ships and stagecoaches," Mr. Heaslip explains. "They are better representations of present-day airplanes than any picture I could paint or any photograph the best camera in the world could make."

William Fishback, Fairhaven, Massachusetts, wants to know whether airplane models can be made to drop "bombs," and in the mail with his query is a letter from James E. Throckmorton, Atlantic City, New Jersey, saying that he has a method all his own. Throckmorton sets his balsa bomb in piano wire clips on the motor stick of his model; while the model is nosed up the bomb remains in place, but it falls off the instant the plane turns downward!

And Charles Hammel, Dundalk, Maryland, wants information about a model powered with a phonograph motor. Maybe Hammel is going to make his model broadcast when it's in the air!

Aram Abgarian won a contest in Detroit recently between Detroit and Chicago A. M. L. A. chapters with a mark of 430 seconds. Henry Pacevitz, Chicago, won the fuselage contest, however, with a 239-second flight, one second ahead of Abgarian.

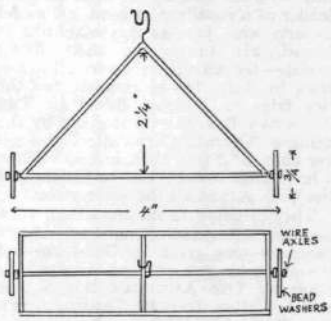
Reports on the success of the C-4, the indoor fuselage model described in the January AMERICAN BOY, pour in. George S. Schairer, Summit, New Jersey, built one that weighs .27 ounce, and says he can cut it down to less than 1-10 ounce. William Hoffman, Lemoyne, Pennsylvania, likes the advanced aeronautical tips in the C-4 kit—builders can get this kit by sending money order or check for $1.50 to the A. M. L. A., American Boy Building, Second and Lafayette Boulevards, Detroit, and asking for No. 17. Bob Wilkinson, DesMoines, Iowa, made his C-4 weigh less than 1-4 ounce, and it glides 24 feet.

"Have you still the Outdoor Twin Pusher kit?" writes Engis Borden, Hackensack, New Jersey. The answer is yes—the League has the kit, No. 4, available at its original price, $3.00. The League also carries two other kits of earlier series, the No. 2 Indoor Pusher at 65 cents and the No. 13 Outdoor Twin Tractor at $2.25—none of these has been replaced by newer models. Members can get them by sending their checks or money orders to League headquarters.

While individuals are going at top speed, airplane model clubs are doing interesting things too. The Miami, Florida, High Model Club has 60 members competing for four cups donated by Miami business men—the cups will be awarded on a point system this spring. Several members, according to Henry Noyer, Jr., secretary, have successful autogiro models (the League has no plans for them, so don't write us!). Arthur Winterstella, of the Allenhurst, New Jersey club, writes of five-minute flights and plans for a contest with another club. And the active LaPorte, Indiana, club—remember the picture of its flag in the Chat in December? —now has felt A. M. L. A. arm bands.

One of the best ideas of the month is described by Bob Manley, of the Miami club. Manley puts a wing 1 1-4 x 4 inches between the wheels of his detachable Baby R. O. G. landing gear, tilts it to a decided angle of incidence, and it makes his plane climb almost straight to the ceiling, then level off and fly smoothly.

Scale model builders are busy with their Fokkers, Boeings and other models, preparing for the 1930 national contests to be conducted by THE AMERICAN BOY. And more than one has written to say he's going to build a double-strength, smashless carrying case this year. That's important. A number of models reached the judges last year in damaged condition because of faulty packing. One small break may undo hours of careful work, so it's vitally necessary for you fellows to make sure that your case is husky enough to stand handling by expressmen, and that the plane itself is securely fastened inside it so that no amount of juggling and jouncing will jar it loose.



Try Manley's extra R.O.G. wing.

There are enough letters to fill a dozen columns of Chat. Unfortunately you can't stretch an AMERICAN BOY column as you can a rubber motor. But you ought to know of two more letters in this month's batch. Harold Saylor, Chicago, makes his R.O.G. do outside loops and barrel rolls by removing landing gear, turning his wing backward and using a lot of tightly wound rubber.

And Boyd Hopkins, Ogden, Utah, makes a sad suggestion: "Instead of having a model in THE AMERICAN BOY next month, why not describe a tree-climbing device to get down unfortunate planes?"

Join the League—invite your friends to join. Use this coupon.

AIRPLANE MODEL LEAGUE OF AMERICA
American Boy Building
Second and Lafayette Blvds.
Detroit, Michigan.
Gentlemen:

Please enroll me as a member in the A. M. L. A. I enclose a two-cent stamp to cover the cost of mailing my membership card and button.

Name..... Age....

Street and Number .....

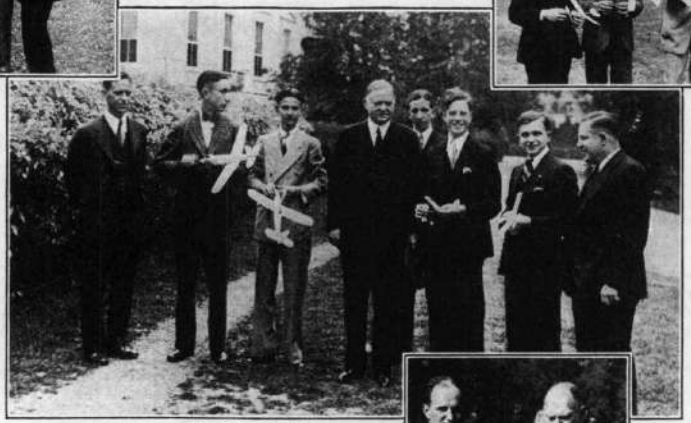
City.. ..... State.....

A. M. L. A. CHAT

About the Activities of the 400,000 Members of the Airplane Model League of America

The Contests Are Coming!

Vice-President Curtis (left), Senator Hiram Bingham (right), President Hoover and Assistant Secretary of War Davison and General Fechet (below) all met the group of model champions in Washington.



TO Jack Dumas, Seattle, goes the distinction of being the first entrant in the Third National Airplane Model League of America Contests.

Dumas, a scale model builder who entered a Curtiss Hawk in the 1929 contests, built another scale model to send to Detroit for the 1930 meet, which is to be held by THE AMERICAN BOY on June 30-July 1. And he's the leader of a squadron of some 500 model experts who, just as this magazine is issued, are tuning up their flying models—the scale models were all in Detroit by June 14—to compete for the two trips to Europe offered by THE AMERICAN BOY, the third given by the Stinson Aircraft Corporation, the silver cups, $3,200 in cash, bronze medals, scholarships in the Aviation Institute of the U. S. A. and all the other prizes!

They're going to do more than compete for prizes, too. They'll attend two banquets—one given by Edsel Ford at the great hangar at Ford Airport, the other by THE AMERICAN BOY at the Hotel Statler (contest headquarters). They'll see not only the Ford Airport but also Grosse Ile Airport, with its giant dirigible hangar—the use of the field and the hangar has been offered the League by the Detroit Aircraft Corporation for the flying contests.

And they'll meet air notables by the dozen. William B. Stout, League president, will be there. So will Eddie Stinson, vice-president. So will Griffith Ogden Ellis, AMERICAN BOY editor; George McLaughlin, editor of *Aero Digest*, who is chief scale model judge; Merrill Hamburg, League secretary; pilots from the First Pursuit Group of Selfridge Field, who will put on an air circus for contestants; W. Irving Glover, assistant postmaster general in charge of air mail, who is to speak at the Ford banquet; lots of others.

What's more, favorite AMERICAN BOY writers of air stories have promised to be on hand. Laurie York Erskine, author of the Renfrew tales, will be there. Frederic N. Litten, "veteran" of the 1928 and 1929 contests, will be present to tell new stories of Jimmie Rhodes. Thomson Burtis, whose Russ Farrell is a friend of every League member, is expected.

With the President you see (left to right) F. M. Reck of The American Boy, Burnham, Marcouiller, R. T. Walker of the Ford Motor Company, Gardner, Mudie and Merrill Hamburg.

All are fliers, and all are top-notch yarn spinners.

Still more notables! One of America's heroes of the air, Lieut. Al Williams—he is now designing and building a seaplane with which he hopes to fly some six miles a minute and win the coveted Schneider Cup from Great Britain—became so interested in models when he talked to a group of model champions in Washington (more about them later) that he promised to be on hand. Lieut. Ralph Rhudy, the original "Jimmie Rhodes," will be present. And many more!

The April, May and June issues of the magazine told all about contest plans. But there are still some surprises on tap for contestants. Lots of you League members who read this will be in Detroit to enjoy them, and all the rest may read about them in the September magazine.

* * *

As in 1928 and 1929, a group of airplane model champions have flown to Washington to exhibit their aircraft and their skill to President Hoover and government officials, and to invite them to attend the contests. The boys flew from Detroit to Washington and back, in May, in a giant Ford all-metal transport, powered with three Wasp motors, lent them for the trip by Mr. Ford—another indication of his great interest in model plane building and in the work of the League.

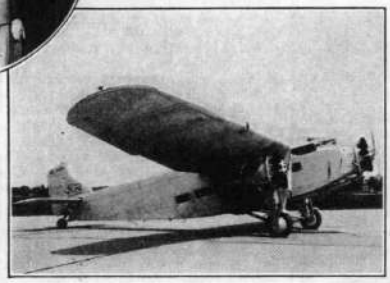
The 1930 party included Donald Burnham, West Lafayette, Ind., national outdoor champion; Kenneth Mudie, Detroit, national junior scale model champion; Ernest Marcouiller, Chicago, national playgrounds champion; and Don Gardner, Detroit, model expert. Accompanying them were Mr. Hamburg; Franklin M. Reck and Mitchell V. Charnley of THE AMERICAN BOY; and Robert T. Walker of the Ford Motor Company. Bill Griffiths, who learned to fly during the World War, was the pilot, and Jimmy Rice was his assistant.

Landing at Bolling Field, the chief Army Air Service station, on May 5, the boys went at once to dinner with Lieutenant Williams. On Tuesday they flew their models for the President and Senator Hiram Bingham, president of the National Aeronautic Association, on the White House grounds, and found Mr. Hoover keenly interested in their progress. Burnham's fuselage model went sailing away to collide with the White House wall, and Mudie left a Baby R. O. G. high in a tree top!

The boys also met Major General James E. Fechet, chief of the Army Air Service, and Trubee Davison, acting secretary of war; Ernest Lee Jahncke, assistant secretary of the navy; Secretary Lamont of the department of commerce; Secretary Wilbur of the department of the interior; Senator James Couzens of Michigan; Vice-President Charles Curtis, who watched their models fly in front of the Capitol. And—at Mr. Jahncke's invitation—they went to Annapolis, where they saw how Uncle Sam makes navy officers. They inspected Lindbergh's *Spirit of St. Louis*, hanging in Smithsonian Institution; they visited Arlington Cemetery, the Lincoln Memorial, and other famous Washington sights. And they missed a ride in a silvery blimp when a storm sent it chasing for cover!

* * *

Members of the Model Aircraft League of Canada are to hold their first annual contests in Ottawa on July 4 and 5, and contestants from all over the Dominion are expected. The contest program is much like that of A. M. L. A. contests. There will be indoor and outdoor flying-stick and fuselage events, and a scale model contest. Only members of the M. A. L. C. are eligible. Further information may be obtained from the Secretary, M. A. L. C., 306 Journal Building, Ottawa, Canada. Prizes include $2,000 in cash and eight trophies, one contributed by Sir Charles Wakefield, donor of the famous Wakefield Cup in Great Britain.



Burnham, Mudie, Marcouiller and Gardner rode from Detroit to Washington in this great Ford plane, piloted it part of the way, and stood beside it for a snapshot.

A. M. L. A. Chat

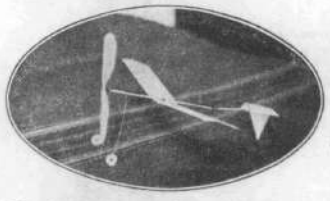
(*Continued from page 30*)

A. M. L. A. CHAT

About the Activities of the 375,000 Members of the Airplane Model League of America

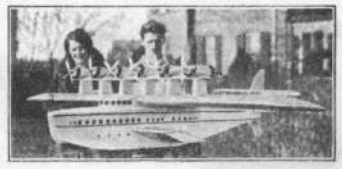
OUT in the great Northwest, where trees grow tall and airplane models have mountains to climb, they build their planes out of grass—believe it or not!

A League member in Colfax, Washington, who signs himself "H.M.," says that "dry, hollow grass stems are unexcelled for such parts as ribs," and sends on a sample to prove it! Moreover, he points out, any model builder has a complete stock of grasses in all sizes at the nearest clump of uncut tall grass at the roadside. . . . Next they'll be making the motor stick from an imaginary line! Robert Bruning, San Leandro, California, came pretty close to it when he made the tail frame for his new Baby R. O. G. from paper-thin sheet aluminum instead of wire. It made a lighter tail than one with a wire frame, Bruning says.



The League's mail this month is bulging with suggestions of unusual model-making stunts. Here are a few of them:

Quan Gue Cheong, San Francisco, colors his Japanese tissue paper with Velox transparent water color dyes. . . . Edward Moore, Savanna, Illinois, made a 200-second outdoor flight with a Baby R. O. G. constructed entirely of bamboo. . . . Edward Malm, Philadelphia, makes his rudder detachable—he uses a wire clip to hook it to the motor stick. Thus the rudder may come off instead of crushing in a smash-up, and Malm can change the rudder setting at will. . . . Ray Shepherd, Hilo, Hawaii, expert, is



growing his own balsa! He lives in the tropical climate that is necessary for balsa, and seeds he planted a few months ago have already blossomed into "trees" two feet or more in height. Balsa seed cannot be purchased in this country.

Winton Hoose, Atlanta, Illinois, found that his Senior R. O. G. wing attached to his Baby R. O. G. fuselage gave him better results than either standard ship! Hoose uses bamboo skids on his model, in place of wheels. Different design on his Senior R. O. G. wing—12-inch span and a chord of 2 inches at the center tapered to 1 at each end—yielded a 75-second flight to Joseph N. Hettel, Jr., Merchantville, New Jersey.

Reginald Keniston, Littleton, New Hampshire, has skis, wheels and pontoons available for his Baby R. O. G., so that it becomes an R. O. S. or an R. O. W. on occasion. . . . Five members of the club at Somerset, Massachusetts have exhibited their models in a local hardware store, according to Russell Spindler, one of the builders. Spindler designed and built a successful two-foot model . . . J. Purcell, Chicago, writes of a racing model, the P-1, of small but heavy design, with both pusher and tractor propellers.

On this page you see a picture of the Senior R. O. G. built and flown by Harold Denison, Marion, Indiana, to a 178-second record. There's also a photo of a scale model of the great Dornier flying boat with its twelve motors. The model was built by Theodore E. Mead, Chicago.

A. M. L. A. CHAT

About the Activities of the 400,000 Members of the Airplane Model League of America.

MOST of the A. M. L. A. Chat around League headquarters these days—just before the Third National Contests—is about weight restrictions, rubber lubricant and whether Joe Culver, 1929 indoor champion, is going to repeat. The last one is easy—Culver isn't to defend his championship, for he was defeated by Herbert Owbridge in the Oakland, California, preliminaries, and Owbridge took his place as Oakland representative.

Culver, like true champions, is generous. "Look out for Owbridge," he wrote to headquarters. "He taught our club all we know about flying models against the torque, and he's good!"

By the time this issue of THE AMERICAN BOY reaches you League members, the Contests will be all over. You'll read about them in next month's magazine.

Meantime, contests or no contests, model builders keep busy, and model-hints continue

De Weese, his model and the photo from which he made it.

to flood into the office. From Bruce Helvie, of Akron, Ohio, comes word of a model flight that would make Lindbergh envious. "I launched my R. O. G. from my hand," says Helvie, "and it circled around Akron a couple of times, did a sharp bank north and, passing over Cleveland, Lake Erie, Canada, Hudson Bay and the Arctic Circle, suddenly suffered a failing motor. It started to glide back to civilization, but crashed on the northernmost shore of Greenland, and for all I know it is still freezing there.

"Believe it? Well, the world is a giant electric map at the end of Goodyear Gym where the contest was held, and the R. O. G. is still perched 'on top of the world'."

There's not so much geography but a lot of skill in some other flights recently reported. Roy C. Harbert of Shinnston, West Virginia, made a sustained outdoor flight of 74 minutes 33 seconds with a Senior R. O. G. And Carl Helman, Denver, flew his twin pusher for 29 minutes 27 seconds—a more remarkable flight than Harbert's, for Helman's model was more nearly the true outdoor type. Neither would be eligible for record under the new N. A. A. rules, however, which require 125 square inches of wing area and one ounce of weight for each 50 square inches.

Elmer Windrow, Indianapolis, promises class-A flights with his outdoor twin tractor, built from League Kit No. 13. "It's an out-of-the-ordinary model," writes Windrow, "and that makes it more fun to fly it. I'm going to make some very slight changes in it, so that it will be eligible for an outdoor record. Then watch out!" The kit is waiting for League members who want it—send $2.25 in check or money order to the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, and it will come to you postpaid. You can get the favorite Indoor Pusher for 65 cents, too.

Lynwood Stapleton, Decatur, Georgia, qualifies his brother Code in the unusual flight class. "Code had a 24-inch tractor with a 12-inch prop," writes Stapleton, "and half the prop snapped off on the first outdoor trial. Disgusted, Code launched the model again, and she flew for 50 seconds with only one prop blade! I think she owed her endurance to her wing flapping properties!"

Construction tips by the dozen! Marshall C. Wood, Jr., Cortland, New York, makes props a blade at a time, then cements two blades to a tiny aluminum tube which serves as a hub. Laminated wood—scraps of balsa carefully cemented together—makes a prop block better for carving, says Roger Carpenter, Bellflower, California, than a solid block.

Aydlett's Fokker D-7 is a model of a Richthofen plane.

"I make my thrust bearing," writes Ernest Hutton, Fairmont, West Virginia, "of heavy music wire. I loop it once around a nail set in a board, bring the shanks together and bend them back to lie along the motor stick, and bend tiny spurs at the end to stick into the wood. One set behind the other seems the strongest arrangement."

Another trick use for wire is described by Robert Armstrong, Youngstown, Ohio. Armstrong makes his can for his indoor models simply an extension of his wing clip. The idea can be worked out in a number of ways.

Roy Merritt, Missoula, Montana, has found toothpicks satisfactory substitutes for balsa slivers in built-up fuselage jobs. "Recently," Merritt adds, "I built a model of a Bellanca, and it held together very well until a chair fell on it."

Camber in the wing has increased the R. O. G. flights made by J. Manard, New Orleans, Louisiana, by 4 to 7 seconds. Norman F. Blubaugh, Taft, California, has developed an automatic stabilizer—a pendulum-like weight which, hanging below a model, swings back when the model zooms and pulls the elevator down through a system of control wires. It works just opposite when the model dives. "It's too heavy for endurance models," Blubaugh writes, "but it's good on other planes."

This month's pictures show models built by Eugene De Weese, Cincinnati; Clarence Sharp, Kansas City; and Guy D. Aydlett, Norfolk, Virginia. De Weese built his scale model of a cabin monoplane from a photograph—the photo, enlarged, is seen above the picture of De Weese's model. Sharp's Lockheed is one of several he has built. Aydlett's model is the famous Fokker used by the German air forces.

Lots of other pictures have come from model builders—we'd have to use the whole magazine to publish them all! Tobie Schneider, Panama City, Florida, sends snapshots of his scale model seaplane. The Curtiss Hawk built by Leslie Callahan, York, Ne-

Sharp's Lockheed looks real.

braska, looks—in the picture taken on a lawn—like a real ship.

Milan Fiske, Beloit, Wisconsin, makes ribs for built-up flying models by tracing the airfoil section on the end of a balsa block, cutting it out carefully with a coping saw, and finally sawing off individual ribs. Some builders slice ribs off with a razor blade. . . . More lift and stability are obtained, according to Robert Johnstone, Syracuse, New York, in his Baby R. O. G. by adding a lower wing, something like the upper wing but smaller and without dihedral.

One of the interesting ideas of the month comes from Charles Anderson, Peoria, Illinois. Anderson keeps a daily record of his R. O. G. flights on a graph, which keeps him informed of his progress. And Russell Curtis, Abilene, Texas, has discovered that setting his wing backward and a bit of experiment with winding and launching will make his R. O. G. barrel roll, do loops and otherwise perform like a bat.

Here's positively the last word on bomb dropping—a subject that Chat letters have covered backward, forward and inside out in the last two months. Houston Buchanan, Cambridge, Massachusetts, ties a tiny firecracker to a model, a piece of cotton string attached to the fuse holding it on. Just before launching the model he lights the fuse; the sparks burn through the string as the model gets altitude, the firecracker drops, and explodes with great gusto in the air!

Griffith Ogden Ellis
American Boy Editor
Contest Chairman.

Again They Set New Records!

America's 1930 Model Champions Smash Former Marks in Third A. M. L. A. Contests

HOW high will next year's records rise? That is the question that the more than 400 model builders who took part in the Third National Airplane Model League of America Contests in Detroit June 30-July 1, and the more than 400,000 League members they represent, are asking. And there's good reason.

For the skillful young model fliers at the Contests—conducted this year as in 1928 and 1929 by THE AMERICAN BOY—shattered official N. A. A. records right and left, and in a manner that left no doubt that the League's model builders are getting better and better. Here's what happened:

Ray Thompson, Detroit, flew his indoor model for the amazing time of 11 minutes 47 seconds—194 seconds longer than the 1929 mark of Joe Culver.

Joseph Ehrhardt, St. Louis, kept his outdoor twin pusher—a weighted model, as required by the new N. A. A. rules—aloft for 6 minutes 25 seconds, more than four minutes longer than the best previously reported time under the new rules.

This same Ehrhardt flew his outdoor fuselage monoplane, also a weighted job, for 2 minutes 4 seconds, a record 54 seconds above the winning time in last year's Wakefield Cup Contest in Great Britain.

And William Chaffee, Dayton, Ohio, scored 97 points with his near-perfect scale model of the Boeing P-12B Fighter—four points ahead of Proctor's 1929 score.

But all of that is ahead of the story. For the contests really began early in June, when scale models started arriving at THE AMERICAN BOY office. And what models they were!

There were Boeing Fighters, Stinson monoplanes, Ford tri-motors. There were the familiar Curtiss Hawks, Vought Corsairs, Fokkers, Lockheeds, Ryans. There were sea-planes and land planes; there were Fleets, a Curtiss Tanager, an American Eagle, a Lockheed Sirius.

The workmanship on the models was superb, far surpassing the general quality of those in previous contests. Built-up metal fuselages, complete control systems, carefully cast motors; beautiful paint jobs, extra detail inside cockpit and cabin—they were models of which a professional might have been proud.

And they arrived, for the most part, well-packed and in good shape. So, even before June 14, the final date for entry in the contest, the preliminary judging was under way. Every properly entered model (some unfortunately arrived too late) was scored on nearly one hundred individual points; each one was gone over with calipers, ruler and a fine-tooth comb!

Right on the heels of the first scale models, two weeks before the actual contest dates, arrived the first contestants. They were Ted Jacques and Jack Sanderson, and they came all the way from Portland, Oregon, in a 1918 Ford! They came early to have a chance to put final touches on their models—and what touches they put! Their best records indoors, before they left Portland, had been less than five minutes. Read on to learn of their contest records.

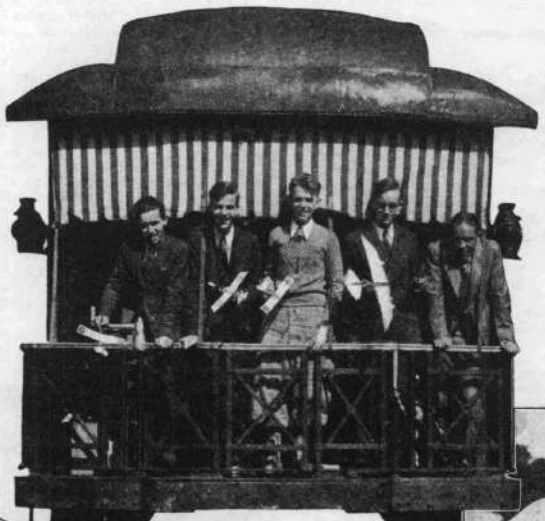
Contestants began to arrive in quantity during the week before June 30. By plane, by train, by auto and boat and road they came. And they brought tales of records that made new marks a certainty.

There were more than 400 contestants by Sunday, June 29, when contest registration opened at the Hotel Statler. The workroom on the fourteenth floor was busy from early morning until 1 a. m. There were whisperings over mystery ships, there were hundreds of test flights at the Michigan State Fair Coliseum, there were furious preparations for the outdoor contests the next day.

And there were speculations: "Will Don Burnham, outdoor champion, be able to repeat?" "Who's going to win the indoor event? No former champion is entered." "What will the weight rules do to the outdoor contest?" and "Who will be the new scale model champion?"

That last question was the first answered. Early Monday morning judges had completed final tabulations, and Chaffee, second to Proctor in

(*Cont. on page 58*)



Left to right—Thompson, Chaffee and Ehrhardt, the champions; Schairer, who went with them; and Mr. Haas, chaperon—their grins mean the train is starting them Europe-ward!

Charles Tong Nap, Chinese boy, came all the way from Hawaii for the contests.

Below, one of the outdoor judges' squads weighing fuselage models.

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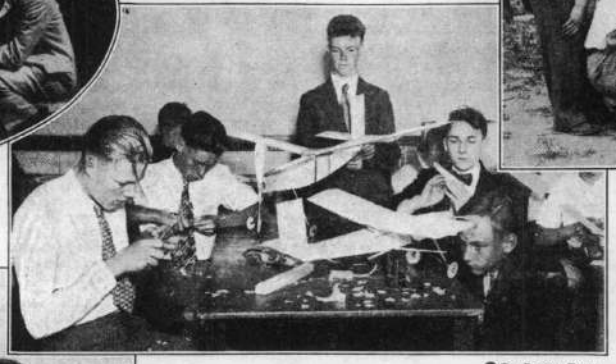
Mudie and Chaffee, junior and senior scale model winners, showed their Lockheed and Boeing to Mr. Pierrot and Mr. Charnley, of the American Boy staff, on the Statler roof. (Left to right—Mudie, Pierrot, Chaffee, Charnley).



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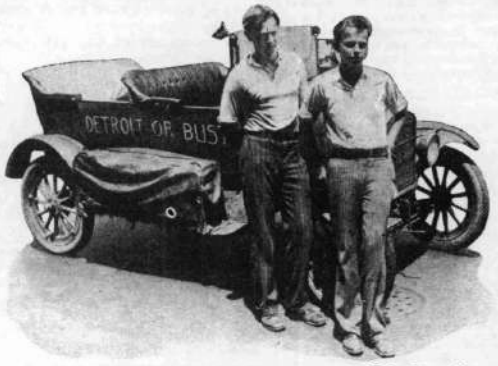
The workroom was open 18 hours a day!

© THE DETROIT TIMES

Lunch was a welcome interlude.



© THE DETROIT NEWS.

Jacques and Sanderson rode from Portland, Oregon, in this iron steed.

Again They Set New Records!

ontinued from page 26)

1929, emerged the victor with his fine 97 score. B. Russell Shaw of the Stout aeronautical laboratories acted as final judge, offering to serve at the last minute when pleurisy prevented the presence of George F. McLaughlin, *Aero Digest* editor who had done the job in 1928 and 1929. Mr. Shaw, a skillful technician himself, felt that the models placing near the top in the contest struck the highest average of workmanship ever achieved by boys in any contest of this nature.

Kenneth Mudie of Detroit, 1929 junior scale model champion, again won the event. He entered a yellow Lockheed Vega, and his victory was the first ever achieved by a former champion. John Roche, Kansas City, won first in the special paint-and-finish contest, the prizes for which were donated by Berry Brothers.

So, with Chaffee grinning like a Cheshire cat and making plans for the trip to Europe offered the scale model winner by the Stinson Aircraft Corporation, the 400 contestants piled into ten big yellow busses and departed for the great Grosse Ile Airport, which the Detroit Aircraft Corporation and the Curtiss-Wright Flying Services had made available for the flying contests. There awaited squads of judges with postal scales to weigh outdoor models, autos to chase them when they got away to good flights, and a wind-sock over the hangar that showed gusty breezes.

Weighing-in was a job. Many of the models had been properly adjusted beforehand, but many more hadn't, and for an hour judges were measuring wings and weighing planes, while contestants were cementing tiny metal weights to fuselages.

THEN the contest started, and it proved that model experts have mastered the art of flying heavier planes in windy weather. True, there were plenty of crack-ups. But flights went off nevertheless, and judges chased models across the big field, and it wasn't long before Ehrhardt had his splendid mark of 6 minutes 25 seconds.

At noon came a slight drizzle that held up the contest for a few moments, and box lunches—furnished by the Cracker Jack Air Corps—that would have stopped it if the rain hadn't. Then flights started again, and all afternoon vain attempts were made to approach Ehrhardt's record. Nobody succeeded, and the St. Louis expert was Mulvihill champion and holder of the new official outdoor record. Don Burnham, junior as well as national champion last year, again topped the junior division with a 202-second flight.

During the day the whole First Pursuit Group from Selfridge Field—42 Army pursuit planes—swooped and swarmed and roared in formation over the field. Lieut. Ralph Rhudy, the original of Jimmie Rhodes, AMERICAN BOY flying character, flew from Selfridge to loop, tail-spin and roll over the field and then to have lunch with the contestants. William B. Stout, League president, flew his own plane to the field and landed to watch the contests. And dozens of the boys took short hops in Curtiss-Wright planes.

MEANTIME two other contests were being held, the new Stout outdoor fuselage event and the first trials in the indoor event. The fuselage contest proved a heart-breaker. The wind was gusty, and dozens of models were caught by the breeze and whipped to pieces. Model-builders need to build fuselage planes more sturdily, the experts said.

The Wakefield Cup Comes to America!

JOE EHRHARDT did it! America's national outdoor champion, winner of both Mulvihill and Stout fuselage trophies at the Third National A. M. L. A. Contests, added a third and equally famous cup to his collection at Halton Aerodrome, London, on July 19. He flew his fuselage model for 155 seconds, and for the first time took the big silver trophy presented by Lord Wakefield of Hythe away from Great Britain.

Competitors from England, Holland, Canada and United States entered the contests. An English entrant took second; the only other American to place was Bill Chaffee, sixth. Ehrhardt's record is the best ever made in the British Isles. The contest was held in "typical British weather"—gusty, keen-edged breezes.

Ehrhardt and the other champions were welcomed to London by His Honor the Lord Mayor, and shown the sights of the British capital by A. Peter Thurston of the Society of Model Aeronautical Engineers.

But there were good flights, nevertheless. Ruick Myers, Chicago, who won the indoor fuselage event held in 1929, led with 56 seconds for a time. Then Ehrhardt got into action again, and proved himself a real champion by making three flights of more than 60 seconds. His best was 124 seconds, and won him a second title and the new Stout trophy.

Over in the great dirigible hangar more history was being made. Boys entered only in the indoor event were having their trials, and it was very early in the day that Joe Culver's 1929 record of 513 seconds was surpassed. For a time Fay Stroud, Detroit, led with a mark just above 11 minutes—664 seconds. But along came Ray Thompson, also a Detroiter, with an astounding flight of 707 seconds. And when, at length, the day's trials were over his mark stood at the top.

Then busses took everybody 25 miles to Ford Airport, where Mr. Edsel Ford gave his annual A. M. L. A. banquet in the hangar. More than 500 contestants, sponsors and guests sat down at the scores of tables. At the speakers' table were such air-notables as Mr. Stout; W. Irving Glover, assistant postmaster general in charge of air mail; William B. Mayo, chief engineer of the Ford Motor Company; Griffith Ogden Ellis, AMERICAN BOY editor, League vice-president and contest chairman; Merrill Hamburg, A. M. L. A. secretary; Ray Cooper, chief of the aircraft bureau of the Detroit Board of Commerce, which backs the contests; Major Gerald E. Brower, commander of the First Pursuit Group of the U. S. Army Aviation Service; and dozens of others. Mr. Stout and Mr. Glover spoke, and nearly every hand in the room went up when Mr. Glover asked how many were planning aeronautical careers. "America's aviation future is safe!" declared Mr. Glover.

The next morning the yellow fleet went to Grosse Ile again, and a determined assault on Thompson's indoor record commenced.

If anybody two years ago had even suggested such flights as were made in that assault, he would have been laughed into oblivion. Nine contestants beat the ten-minute mark; 26 surpassed Culver's 1929 record. Carl Goldberg, New York City, had three flights of better than 10 minutes, two of them better than 11. Herbert Owbridge, Oakland,

(Continued on page 60)

(Continued from page 58)

Calif.—conqueror of Culver in the Oakland preliminaries—flew 647 seconds. Jacques and Sanderson, the Portland boys whose best times at home were under five minutes, made records of 635 and 634.4 seconds! Henry Rainey, New Hudson, Mich., won the junior championship with 588.5 seconds.

But nobody quite reached Thompson's mark. Goldberg made 683 on his last attempt. And Thompson was declared the indoor champion and the winner of the Stout trophy.

THAT evening came the closing banquet given by THE AMERICAN BOY at the Statler—a banquet at which prizes were awarded, Major Norman A. Imrie of Culver Military Academy spoke and members of THE AMERICAN BOY staff entertained with a dozen varieties of stunts. Franklin M. Reck and Gurney Williams did a humorous waiter act and a skit in which Reck impersonated Peter Pellingham von Pratt, the world's greatest riddle guesser; a special award, consisting of a giant two-foot hamburger sandwich prepared in the Statler kitchens, was made to Merrill Hamburg; Laurie York Erskine and Frederic Nelson Litten autographed and presented to lucky-number holders copies of their books of Renfrew and Jimmie Rhodes air stories, familiar to all AMERICAN BOY readers. Mr. Stout told a Swedish story, and Mr. Ellis talked of the League. Reck and Williams, in their now-familiar characters as the blackface Flying Crows, presented a skit detailing the sad state of the business of the Black Hawk Non-Crash Aerial Navigation Incorporation; they were assisted by Mark L. Haas, Mitchell V. Charnley and John D. Morse. George F. Pierrot, managing editor, presided over things.

Through Charles Tong Nap, contestant from Hawaii, the Honolulu *Star-Bulletin* passed out brilliant orange leis to the crowd. At one time the room was darkened and luminous Baby R. O. G.'s and a big model with a shining A. M. L. A. insignia were flown overhead. Don Gardner and Ernest McCoy, Detroit A. M. L. A. members, prepared this stunt.

That ended the program. But it wasn't ended for Chaffee, Thompson and Ehrhardt. These three had won the trips to Europe—the last two as guests of THE AMERICAN BOY—and on Thursday, July 3, they left for Montreal. With them went Mark L. Haas as chaperon. George Schairer, Summit, N. J., boy whose Fleet took second place in the scale model event, was sent with the party by his father.

And so, on Sunday, July 6, they sailed aboard the Canadian Pacific liner *Montcalm*, headed for London, Brussels, Paris. Through the courtesy of William Baird, general passenger traffic manager of the steamship company, they were provided with special staterooms and a special workroom in which to build fuselage models to enter in the Wakefield Cup Contest in Great Britain.

The complete list of prize winners follows:

(NOTE—In the senior and junior divisions of Stout Indoor, Mulvihill outdoor and scale model contests, prizes for the first 33 places were as follows: First eight, silver cups and cash prizes of $200, $100, $75, $50, $30, $20, $15, and $10; next twenty-five, bronze medals. The three champions won trips to Europe; the three senior second-place winners received scholarships in the Aviation Institute of the U. S. A. The winner of the Stout outdoor fuselage event received $100; second, $50; third, $25; fourth, fifth and sixth, Westfield "American Boy" wrist-watches; seventh, eighth and ninth, Peru compressed air motors and tanks. The winner of the Berry Brothers paint prize in the scale model contest received $25; second and third, framed sets of airplane pictures; next 25, special aviation calendars.

Thompson received the Stout indoor trophy to keep for one year, and Ehrhardt the Mulvihill and new Stout outdoor fuselage trophies for one year.)

STOUT INDOOR CONTEST

Senior Division

1st, Ray Thompson, Detroit, 707 seconds; 2nd, Carl Goldberg, New York, 683; 3rd, Fay Stroud, Detroit, 664; 4th, Herbert Owbridge, Oakland, Calif., 647; 5th, Ted Jacques, Portland, Ore., 635; 6th, Jack Sanderson, Portland, Ore., 634.4;

(Continued on page 65)

7th, Jack Kazanjian, Detroit, 630; 8th, Phil Copeland, Detroit, 625; 9th to 33rd, Jack Fisher, Cincinnati, 620; Fred Sawyer, East Providence, R. I., 586.4; Gordon Johnstone, Detroit, 580; Don Gardner, Detroit, 555; Thomas Boland, Brooklyn, 552.6; Charles Laughton, Tulsa, Okla., 550.6; Henry Pacevitz, Chicago, 545; Henry Kessler, Brooklyn, 536.4; Homer Jensen, Cincinnati, 517; Glenn Reichmann, Humberstone, Ont., 515.8; John Dawson, Evanston, Ill., 514; Lawrence E. Hankammer, Des Moines, Ia., 511; Theodore Carpenter, Montclair, N. J., 481; Edward McDonough, Chicago, 475; Daniel Trandel, Chicago, 472.8; Walter Anthony, Cleveland, 471; Samuel A. Balkan, Boston, 464; Michael Roll, Dearborn, Mich., 461.2; William Borst, Chicago, 452; Eldrich Willis, Jr., Auburn, N. Y., 450.4; George McLellan, Jr., Vandegrift, Pa., 443.6; Paul Brown, Gary, Ind., 416; Milton J. Scharff, Memphis, Tenn., 412; Raymond Woychik, Madison, Wis., 408; Edward Russell Guth, Syracuse, N. Y., 403.3.

Junior Division

1st, Henry Rainey, New Hudson, Mich., 588.5 seconds; 2nd, Richard Post, Detroit, Mich., 573; 3rd, Paul Nichols, Oakland, Calif., 556.2; 4th, Julius Wile, New York City, 553; 5th, Jack Kistler, Detroit, Mich., 534.5; 6th, Arthur Boland, Brooklyn, N. Y., 533; 7th, Gordon Christoph, Chicago, Ill., 513.2; 8th, Robert Meagher, New York City, 509; 9th to 33rd, William F. Campbell, Toronto, Canada, 483.4; Richard Balmer, Pontiac, Mich., 478.4; Raymond Barnhard, Detroit, Mich., 477.4; Edward Beshar, New York City, 476; Harold Richardson, Detroit, Mich., 462.5; Melvin Yohe, Parnassus, Penna., 456; Donald Brunton, Boston, Mass., 447; Julius Martini, Providence, R. I., 445; John W. McLaughlin, Brooklyn, N. Y., 429; Edgar Herbst, Detroit, Mich., 421; Frank Nekimken, Chicago, Ill., 400; (second best flight 355.8); Sherwin Post, Detroit, Mich., 400; Fred Burdick, Bay City, Mich., 398.4; William Tarman, Champaign, Ill., 398; Cloyd Smith, South Bend, Ind., 379; Ford E. Ferris, White Plains, N. Y., 377.2; William G. Whitman, Jr., Memphis, Tenn., 377; Robert H. Turcott, Providence, R. I., 365.2; Gene Moritz, Marion, Ind., 363.7; Samuel Taubman, Pontiac, Mich., 359; William A. Coughlin, East Providence, R. I., 357; Carl Fries, Jr., St. Louis, Mo., 349; James Shields, Detroit, Mich., 346.4; Edward Harms, Evanston, Ill., 340; Christian Reischauer, Madison, Wis., 335.5.

MULVIHILL OUTDOOR CONTEST

Senior Division

1st, Joseph Ehrhardt, St. Louis, Mo., 385 seconds; 2nd, Lawrence Hankammer, Des Moines, Ia., 235; (second best flight 110); 3rd, William S. Vilda, Cleveland, Ohio, 235; 4th, Herbert Fish, Akron, Ohio, 220; 5th, Milton J. Scharff, Memphis, Tenn., 180; 6th, Edward Becvar, Chicago, Ill., 157.2; 7th, Edward Guth, Syracuse, New York, 156; 8th, Casimir Leja, Chicago, Ill., 141; (second best flight 140.5); 9th to 33rd, Donald Gardner, Detroit, Mich., 141; Carl Carlson, Chicago, Ill., 140, (second best flight 135); Allen Jackson, Toronto, Canada, 140; Edward W. Miller, Chicago, Ill., 138; Herbert Owbridge, Oakland, Calif., 137; B. Ruick Myers, Chicago, Ill., 131; Allan Loofborrow, Columbus, Ohio, 130.1; George M. Mueller, Chicago, Ill., 123.8; Jack W. Laister, Wyandotte, Mich., 120; Albert Johnson, Cleveland, Ohio, 119.2; Walter Anthony, Cleveland, Ohio, 117.4; Keith Swanson, Champaign, Ill., 115, (second best flight 98); Charles Bullinger, Champaign, Ill., 115; Charles Davis, Albuquerque, New Mexico, 109; G. Oscar Kimmel, Wichita, Kansas, 107.4; Elmer Lueckerath, Ferguson, Mo., 105; Thomas Boland, Brooklyn, N. Y., 102.5; Paul Brown, Gary, Ind., 100; Robert G. Shaw, Detroit, Mich., 99; H. Page Hoggard, Norfolk, Virginia, 98.2; Nick Kalamir, Gary, Ind., 97; Robert Rigg, Chicago, Ill., 94.5; Wayne E. Ferguson, Bakersfield, Calif., 94.1; Emerson Mehlhose, Wyandotte, Mich., 92; Daniel Trandel, Chicago, Ill., 91, (second best flight 76.4).

Junior Division

1st, Donald Burnham, West Lafayette, Ind., 202; 2nd., Andrew Madison, St. Louis, Mo., 201; 3rd, Ralph W. Kummer, St. Louis, Mo., 198.1; 4th, William Campbell, Chicago, Ill., 180; 5th, Edward Beshar, New York City, 145; 6th, Adolph Duda, Rome, N. Y., 141; 7th, James R. Bent, Wilkinsburg, Penna., 136; 8th, Richard Kell, West Lafayette, Ind., 125; 9th to 33rd, Richard E. Huber, Chicago, Ill., 123.4; Kenneth Donzelot, St. Louis, Mo., 119; Leo Valentine, El Paso, Ill., 116; Robert Cahill, Indianapolis, Ind., 115.2; Don Schindehette, Bay City, Mich., 106; Charles Baker, Springville, N. Y., 103.1; Paul Melvin Yohe, Parnassus, Penna., 102, (second best flight 76.4); Robert Berns, Chicago, Ill., 102; Joe Purvis, Toronto, Canada, 96; John W. McLaughlin, Brooklyn, N. Y., 90; J. Ira Fralick, Syracuse, N. Y., 87.2; Gordon Christopher, Chicago, Ill., 86; Robert S. Young, Ann Arbor, Mich., 85. (second best flight 79); Charles Tong Nap, Maui, Hawaii, 85; Albert Schwarzkopf, Norfolk, Va., 84; Norman Fain, Providence, R. I., 83.8; Robert Meagher, New York City, 82; Richard Pfeifer, Indianapolis, Ind., 81.2; William Barry, Evanston, Ill., 80, (second best flight 76); Andrew W. Orr, Jr., Blanchard, Mich., 80; Charles H. Herr, St. Louis, Mo., 79.5; Arthur Jansky, Chicago, Ill., 76.8; John Young, Ann Arbor, Mich., 76; William A. Coughlin, East Providence, R. I., 75; William G. Whitman, Jr., Memphis, Tenn., 73; Howard Scott, Oak Park, Ill., 72.

STOUT OUTDOOR FUSELAGE CONTEST

1st, Joseph Ehrhardt, St. Louis, Mo., 124 seconds; 2nd, Theodore Carpenter, Montclair, N. J., 109; 3rd, John Reeves, Champaign, Ill., 84.8; William Tarman, Champaign, Ill., 63.1; 5th, Bernard Schwartz, Chicago, Ill., 58.8; 6th, B. Ruick Myers, Chicago, Ill., 56; 7th, Edward Miller, Chicago, Ill., 53; 8th, Daniel Trandell, Chicago, Ill., 52.4; 9th, Donald C. Burnham, West Lafayette, Ind., 47.6.

SCALE MODEL CONTEST

Senior Division

1st, William Chaffee, Dayton, Ohio, 97; 2nd, George Schairer, Summit, N. J., 87½; 3rd, John Szewczyk, Easthampton, Mass., 86½; 4th, Chang Ha Kim, Honolulu, Hawaii, 86; 5th, William McCance, Windsor, Ontario, 85½; 6th, Bertrand Trombley, Bay City, Mich., 85; 7th, Robert Willoughby, Kansas City, Mo., 84; 8th, Chalmers Stewart, Akron, Ohio, 82½; 9th to 33rd, Edward L. Rich, Bay City, Mich., 81½; Floyd Kowalak, Buffalo, N. Y., 80½; William

Again They Set New Records!

Grassell, Portland, Ore., 79; Clarence A. Sharp, Kansas City, Mo., 78; Edward J. Foley, St. Paul, Minn., 76; Raymond Krokos, Detroit, Mich., 74½; Maurice Chapelle, Buffalo, N. Y., 74½; Maurice F. Cooper, Little Rock, Ark., 73; George L. Thompson, Minneapolis, Minn., 72; Arthur H. Mott, Detroit, Mich., 71; Harold R. Bonar, El Paso, Ill., 70½; William A. Morris, Portland, Ind., 70; Alexander Dallas, New Dorp, L. I., N. Y., 69½; Owen Cecil, Bellevue, Penna., 69½; Fred Miller, Copley, Ohio, 66½; Fred Marty, Monroe, Wis., 66½; Widmer Hansen, Midwest, Wyo., 66; Carlton Roushkolb, Detroit, Mich., 65½; Lewis Carlson, Naugatuck, Conn., 65; Paul Sullivan, New Brunswick, N. J., 65; Seymour Dunham, Dayton, Ohio, 65; Wilbur E. Boyer, York, Penna., 65; Lysle Jones, Utica, N. Y., 63½; Norman E. E. Ort, Wainfleet, Ontario, 63; Thomas Johnston, Atlanta, Ga., 63.

Junior Division

1st, Kenneth Mudie, Detroit, Mich., 79½; 2nd, Lawrence McClellan, Fletcher, N. C., 77½; 3rd, Louis F. Mahan, Iowa City, Ia., 76½; 4th, Henry J. Obloy, Cleveland, Ohio, 74; 5th, Thomas Shields, Detroit, Mich., 72; 6th, John A. Winter, Windsor, Ontario, 71; 7th, Walter Weiland, Detroit, Mich., 69; Tie for 7th, Melvyn Johansen, Oakland, Calif., 69; 8th, James Shields, Detroit, Mich., 68; 9th to 33rd, James A. Williams, Windsor, Ontario, 67; Howard Ginther, Lansing, Mich., 67; Robert Prybylski, Chicago, Ill., 66; Harold McCracken, Detroit, Mich., 59; Arthur Melford, Detroit, Mich., 58½; Robert Ruckstahl, Pittsburgh, Penna., 57½; Jack Kistler, Detroit, Mich., 53; Edmund Cyrol, Detroit, Mich. 52½; Eloy Trevino, Detroit, Mich., 48½; Tom Major, Wichita, Kans., 45; Cloyd Smith, South Bend, Ind., 43; John Costigan, Cincinnati, Ohio, 43; Thomas Marcuccilli, Pawtucket, R. I., 32½; Howard Scott, Oak Park, Ill., 32; Sam Topous, Detroit, Mich., 31½; Gordon Dixon, Cincinnati, Ohio, 31; Jack Cardon, Washington, D. C., 31; Tony Caronvich, Detroit, Mich., 30½; Everett Weekley, Waterloo, Iowa, 29; Martin Frederick, Detroit, Mich., 28; Robert Knickerbocker, Berlin, N. H., 25½; John H. Russell, Lakeside, Wash., 25; Arthur J. Ricker, Cadillac, Mich., 12½; George Sullivan, Hastings, Penna., 12; Jack Dumas, Seattle, Wash., 10; George Hurd, Great Falls, Mont., 10.

Paint and Finish Prizes

1st, John F. Roche, Kansas City, Mo.; 2nd, Chalmers K. Stewart, Akron, Ohio; 3rd, William Chaffee, Dayton, Ohio; 4th, to 28th, Edward L. Rich, Bay City, Mich.; William Grassell, Portland, Ore.; Clarence A. Sharp, Kansas City, Mo.; Harold Bonar, El Paso, Ill.; Alexander Dallas, Staten Island, N. Y.; Fred A. Miller, Copley, Ohio; Seymour Dunham, Dayton, Ohio; Lysle Jones, Utica, N. Y.; Thomas Johnston, Atlanta, Ga.; Robert G. Shaw, Detroit, Mich.; Arthur Melford, Detroit, Mich.; Harold McCracken, Detroit, Mich.; James A. Williams, Windsor, Ont.; John A. Winter, Windsor, Ont.; Thomas Shields, Detroit, Mich.; Henry J. Obloy, Cleveland, Ohio; Kenneth Mudie, Detroit, Mich.; George Schairer, Summit, N. J.; John Szewczyk, Easthampton, Mass.; Chang Ha Kim, Honolulu, Hawaii; William McCance, Windsor, Ont.; Bertrand Trombley, Bay City, Mich.; Robert Willoughby, Kansas City, Mo.; Tony Stulie, Detroit, Mich.; Gordon Lamb, Oakland, Calif.

A. M. L. A. Chat

DON BURNHAM, 1929 outdoor champion, not only re-established himself as winner of the junior outdoor division at the 1930 National A. M. L. A. Contests. He produced the most interesting outlay of new-type models, and in so doing showed himself one of the League's leading experimenters.

Burnham, whose home is in West Lafayette, Ind., brought to the outdoor contest held by THE AMERICAN BOY in Detroit this year a two-wing, four-propeller pusher-tractor model that obtained a flight of 202 seconds and might have done better, had it not been for a bad break. The ship had two motor sticks of about 40 inches, and two wings of 4-inch chord, one with a 37½-inch span, the other with 31½. Thus his wing loading, (one ounce for each 50 square inches of wing area) was approximately 5½ ounces, and he obtained the weight by heavy construction, heavy motor sticks and four rubber motors.

His first flight was 90 seconds; his second 202. On his third the model, away for a good mark, unfortunately flew into the propeller-wash of one of the Army planes stunting over the field, and one of the wings folded back on itself. He was unable to repair it in time for another attempt.

His indoor model, though unusual, was not so successful. It also was a pusher-tractor, with two wings, one smaller than the other. The smaller rear wing bore two vertical fins, near the wing tips. The motor stick carried two motors. Other experts said that its wing-loading was too heavy; its best flight was 273 seconds, which was below the prize-time in the junior division.

Ernest McCoy, Detroit—the model builder who first used the cambered wing successfully—brought out the most advanced indoor model. McCoy used aluminum paper—one-half the weight of Japanese tissue—on a more conventional type of model. Thus he reduced his wing-loading considerably. On two occasions the model flew for more than 7 minutes, but both times it was caught in the hangar girders, and the difficulty of repairing the extra-fragile paper prevented McCoy from getting further flights. The builder who discovers how to build and fly this model so that it will stay just under the rafters, however, is likely to smash Ray Thompson's record.

The 12-year-old entry from Hawaii, Charles Tong Nap, learned for the first time on June 30, during his trials in the outdoor contest, that indoor models must fly in a circle! Nap's home is on the Island of Maui, and there is no hall big enough for indoor models there; so Maui boys have been building models intended for straight-line flights, and all Nap's indoor planes were constructed on that principle. He had to have a new indoor plane, he decided.

"No Ford Banquet for me!" he told Earl Welty, his sponsor. "I'm going to build a model!"

Ross Farquharson, Vancouver, B. C., won the Model Aircraft League of Canada championship at Ottawa, July 5. Gen. J. H. MacBrien presented him his trophies, to which was added a trip to England. He made five minutes indoors and 16 minutes (under the old rules) outdoors.

So direct to the Statler he went, after the contest, and sat up most of the night building a new plane that would circle.

Every contestant shared in the sorrow felt by the Chicago party when news arrived, early June 29, that Ernest Marcouiller and Eugene Lewandowski, two Chicago entries, had been killed in an automobile accident on the way to Detroit. Marcouiller was national playgrounds champion and generally considered one of the most likely winners of the indoor event; Lewandowski was a model builder well known in Chicago for his skill. The League, through Griffith Ogden Ellis, AMERICAN BOY editor and League vice-president, sent messages of sorrow and sympathy to the boys' parents for the contestants.

Scale model builders, reveling in the beautiful workmanship of the planes built by Chaffee, Schairer, Szewczyk, Chang and the others, are going to be doubly interested in the new type of scale model announced in THE AMERICAN BOY this month by the Fisher Body Craftsman's Guild. The contest calls for as much skill as building a model airplane, and the prizes are extra-good for fellows who want to study aeronautical engineering.

Renewed interest in the outdoor twin tractor and the outdoor fuselage model described in THE AMERICAN BOY by Mr. Hamburg in the last two years became apparent as a result of the new weight rules for outdoor contests. The League can furnish kits for these two models, at $2.25 and $2.00.

How It Soars!

Next month, in The American Boy, you will read how to build a

Balsa-Basswood Glider

modeled on the style of German soaring gliders. It's a dandy model, and it will introduce you to the corking new series of airplane model articles to come in the magazine. They're written by

MERRILL HAMBURG,
A. M. L. A. Secretary

Build It--Watch It Glide!

October, 1930 (*Continued from page 12*)

when they are in this position. If you lay them out in flying position before you start work, you'll avoid making this error. A stronger joint may be obtained between the wings and the fuselage if the wings are left flat at the point of joining. Note the drawing.

You make the elevator and rudder by the same procedure as you've used on the wings. The rudder is just half the elevator. You should not give the standard airfoil section to the rudder, however — you want the two sides of it identical. Make the thickest point about one-third of the way from the leading edge to trailing edge, but stream-line both sides of it alike.

NOW comes the assembly job. It is easy to cement elevator and rudder to the fuselage (you've left the points on their leading edges where they meet the fuselage square, for simplicity in joining). The rudder fits into the groove in the top of the fuselage, and must not be at an angle. If you've built flying models, you're accustomed to angle the rudder in order to turn the model in flight. Don't do it with this model! And don't be sparing with cement. You need plenty of it, for firmness.

Fitting the wings into place is a little harder. First you must find their exact setting. Do this by forcing them into the wing grooves, then balancing them on the points of a pair of shears as shown in the drawing. Draw lines on their lower surfaces parallel to the leading edge and ½ inch from it; these show the points where the shears should support the model. If it tips forward, tail up, move the wings forward; if its nose rises, move the wings backward. It will be properly balanced when the top of the fuselage remains in a horizontal position. Be sure that the wings are evenly set, and mark the right places for them.

Now remove them and squeeze cement into the grooves. Reset the wings in the proper places. Check the model again for balance on the shear-points, and make sure that they have even dihedral in the following manner:

Place the side of the fuselage against the edge of a desk or table, one wing just at the table-top. With a ruler, measure the height of the wing tip above the table-top. Reverse the model, and follow the same procedure with the other wing. If the heights are not exactly even, you may change the angle of one or the other before the cement hardens. While the cement is drying, the glider should be supported on the table in a flying position, tail up, by placing supports under the model. The wings also should be supported to prevent them from sagging. Small blocks, paper weights, books, or any similar objects may be used for this purpose. You will find that your glider is going to be subject to more strains than any flying airplane you have ever built. Don't rush the drying. Let it set overnight if possible. It takes a long time for the cement in the grooves to harden.

There's your glider!

It's ready for action as soon as the cement is set. Take it between thumb and forefinger, holding it just below the wing; launch it directly forward, and be sure that it's horizontal. A few trial launchings, and you'll be an expert. You'll learn to make it loop, glide straight or make a big circle, all through variations in the manner in which you launch it.

If it has a tendency to "hunt"—that is, to dive in a long curve, stall, and dive again—you'll need to add a pin or so, or maybe as much as a thumb tack, to the nose of the fuselage. Your wing is too far forward, and nose-weight will remedy the difficulty. But don't add any more than you have to, for weight will reduce its gliding ability.

Once it's set just right and you know how to handle it, you can do a lot of things with it. You can hold it over your head in a stiff breeze and see it rise right into the wind. You can launch it from a hilltop—remember that the wind should be blowing up the hill, and that you must always launch it against the wind—and watch it soar far above your head. You can hold glider contests with other League members who have built similar models.

And maybe you'll be setting new glider records. Whether you do or not, you'll be learning a lot of things about gliding angles, lift and so on that will help you when you build your flying models.

And that's something you'll be doing mighty soon. Next month THE AMERICAN BOY is going to describe the famous Baby R. O. G., the stunting little monoplane, and tell about a lot of new things to do with it. Don't miss the article!

Build the Glider!

You can get all the materials for this soaring glider for only

25 Cents!

Send check or money order to the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., and ask for Kit 19. It will be sent to you, return mail.

Build It--Watch It Glide!

Here's the First of the League's New Series of Airplane Models

By Merrill Hamburg, *Secretary of the Airplane Model League of America*

IF you want to get results from flying models, start with model gliders!

That's just as true in airplane model work as it is in the development of man-carrying planes. A.M.L.A. members at the 1930 National Contests indoor event, when records were smashed right and left, showed that they realized it, for boys from every corner of the country had built models showing the influence of glider design. They had wings with high aspect ratio —the ratio of wing span to wing chord—and low angle of incidence, just like gliders. They had glider-type empennages, or tail groups, with high rudders and long, slim elevators.

There are few ways the expert model builder can improve his flying model records so efficiently as by learning the secrets the model glider has to tell him. And there's no way the beginner, the new member of the Airplane Model League of America, can get started so well as to build the all-wood soaring glider here described.

There's no better fun than watching this glider perform, either. It will do amazing things. It will rise 30 or 40 feet above its starting point. It will soar for 60 or 70 seconds—longer if the wind is right. It will practically launch itself. It's designed by technical model experts with years of practice, and it has done more tricks than any more complicated, difficult glider I've ever seen.

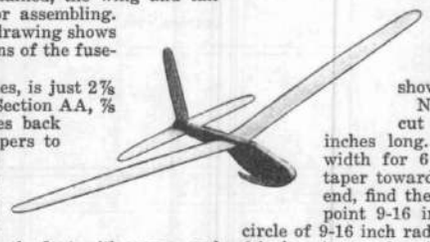
So I'd like to know that every member of the League —and there are 400,000 of them now—has built and flown this glider. I'd know, then, that each member was grounding himself thoroughly in the aerodynamics—the aeronautical properties—of a model, and that he was letting himself in for a lot of fun at the same time!

Just as for models in the past, the League has prepared a special kit of materials and instructions for the construction of the model. It contains balsa, basswood, bamboo, cement and two grades of sandpaper, in addition to full-size drawings — everything you'll need to build your glider. And it costs only 25 cents! To get it, send a quarter in check or money order to the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., and ask for Kit No. 19. It will be sent to you postpaid.

Most League members know that they can get the A. M. L. A. Manual, too, for 5 cents in stamps or coin (be sure the envelope is tightly sealed if you send a coin!). The Manual, with its tips on all the fundamentals of model building, is useful for advanced builders as well as for beginners.

If you're not using the kit, you'll need these materials: basswood ¼ x 1¾ x 9⅛ inches; balsa 1-16 x 4 x 10½ inches; bamboo 1-16 x ¼ x 3 inches; model airplane cement. Your tools are sandpaper, razor blade, jackknife—nothing more!

Your first job is the basswood fuselage. "Why basswood?" you ask. The answer is that basswood is easy to work with, yet heavy enough so that you don't have to add weight to its nose as you would on a balsa fuselage. An outline of the fuselage is printed on the basswood block contained in the kit. To make sure the right shape is obtained, the wing and tail slots are also cut ready for assembling. If you don't have a kit, the drawing shows you the shape and dimensions of the fuselage.



Its widest point, 1⅝ inches, is just 2⅞ inches back from the nose. Section AA, ⅞ inch in width, is 4⅝ inches back from the nose. The tail tapers to a width of 3-16 inch at the very rear. Outline the whole fuselage on one side of the basswood board and cut it away with your jackknife. Sand the edges smooth, first with coarse and then with fine sandpaper.

Note that, at the rear of the fuselage, you must cut away a 1-inch section to permit attachment of the balsa tail. This should be 1-16 inch deep. The angle between the top of the fuselage and the bottom is 6 degrees; work out this angle carefully, coming as close to it as you can by observation of the drawing.

Now the grooves for the wings. Cutting these is a delicate job, and you'll have to handle it carefully and expertly. If you're using a kit, you'll find the grooves already cut. If you're not, you may prefer to depend on a butt joint, for cutting them is a tough job. They are 1-16 inch wide and just about as deep. If you attempt to cut them you must be extremely careful not to make them too deep—if you do you'll cut all the way through the fuselage! Take extreme care, too, to get them at precisely the same angle—approximately 10 degrees. If they vary, they'll wreck the setting of your wings and throw your model out of balance.

Finish the bamboo skid as shown in the drawing and photograph, bending up the last half-inch slightly. To shape it, heat it over a candle flame or a hot soldering iron, bend it to the desired angle and hold it there until it cools. It will retain the angle. Cement it to the bottom of the fuselage, as shown in the diagram.

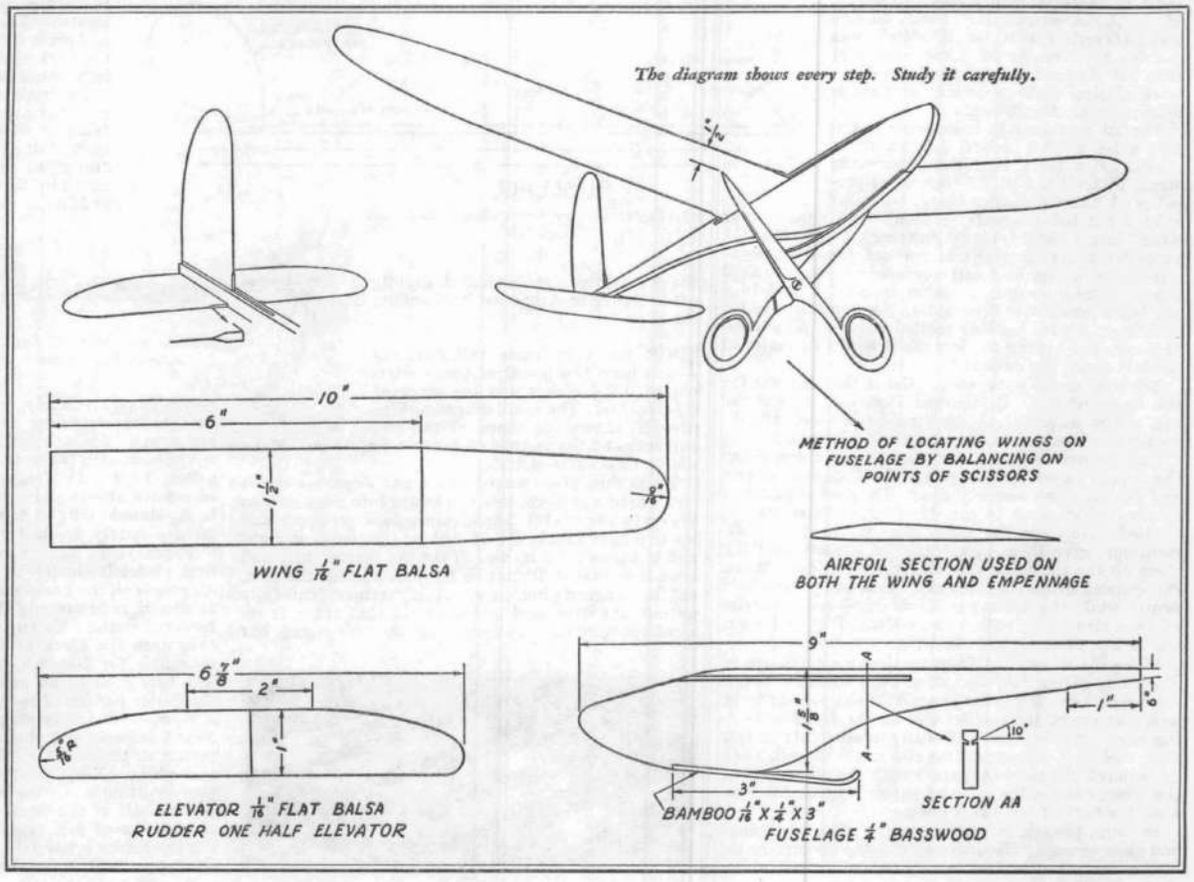
Next come the wings. They are cut from 1-16 inch flat balsa, 10 inches long. They retain their 1½ inch width for 6 inches from the center, then taper toward the end. To get the rounded end, find the exact center of the wing at a point 9-16 inch from the tip, and draw a circle of 9-16 inch radius. Taper the edges from the 6-inch point to the side of the circle, and sand the whole wing down.

The drawing shows a suggested airfoil section for both wing and tail members. It isn't absolutely necessary to work out this detail, but a model with airfoil section wings has been shown to perform better than one with perfectly flat wings, so likely you'll want to do it.

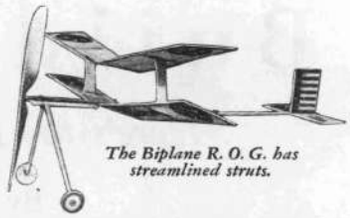
The drawing itself is a little exaggerated. The chief point to remember is that the thickest point should be one-third of the distance from the leading edge to the trailing edge—½ inch back, in this case. Here are two "don'ts" on making the airfoil.

Don't attempt to carry the airfoil all the way to the tips.

Don't make both wings rights or lefts! Remember that their wide ends are together, and that the leading edge is the heavier (*Continued on page 63*)



Build Three R. O. G. Models in One



The Biplane R. O. G. has streamlined struts.

Here's the Baby R. O. G. Build it first!

Here's the Baby R.O.G.—Make It Into a Biplane or Endurance Model

By Merrill Hamburg

Secretary of the Airplane Model League of America

HERE comes the famous Baby R. O. G. again! And it's bringing some new tricks with it.

Last month, in THE AMERICAN BOY, thousands of Airplane Model League of America members learned how to build and fly a balsa-and-basswood glider. They learned how to use jackknife and razor blade on balsa, and something about the things that make a model airplane fly. Here's the chance to follow up that knowledge with the most popular model in miniature aircraft history, the Baby Rise-Off-the-Ground. I'm telling you how to build it and make it stunt, and then how to turn it into an endurance model or a tricky biplane. There's more fun in a Baby R. O. G. kit than in a barrel of Hallowe'en noise-makers, and there's real aerodynamic information as well. If you want to find out what makes a propeller pull an airplane, build these models!

The League has prepared a new Baby R. O. G. kit—ask for Number 20—which supplies you all the material you'll need to build any one of the models. What's more, it has complete instructions—even more complete than in this article—for all three models. It has not only a balsa propeller block but also a nearly-finished propeller needing only a little sanding; and it includes a wire bending tool. To get it, send 50 cents in check or money order to the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., and ask for Kit Number 20. And remember that Kit Number 19, for the balsa-basswood glider, is also available at League headquarters, for 25 cents.

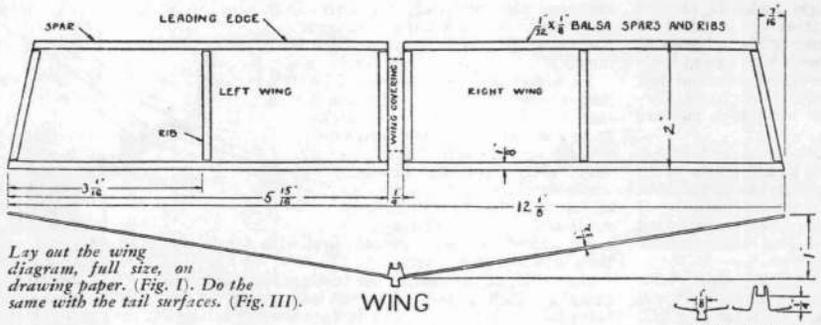
The kit contains: 14 balsa wing spars, 1-32 x 1-8 x 6 3-4 inches; 3 balsa motor sticks, 1-8 x 1-8 x 9; 1 flat balsa wing strut, 1-32 x 1-2 x 9; 1 5-inch balsa propeller; 1 balsa propeller block, 1-2 x 5-8 x 7; 2 flat balsa wheels; 1 front wing clip; 1 rear wing clip; 1 can; 1 thrust bearing; 1 rear hook; 1 propeller shaft; 2 washers; marked Japanese tissue paper for wings and tail surfaces; 1 sheet waxed paper; 1 tube cement; 1 rubber motor 1-16 x 1-16 x 16; No. 8 music wire for rudder; No. 9 music wire for stabilizer; 1 wire bending tool; 6 pages of directions. If you're not buying the kit, you'll need this material to build one of the models.

Begin by making the wing. Using the diagram for the standard R. O. G., marked Figure I, lay out the two wings in pencil on drawing paper—be sure dimensions correspond to those on the diagram.

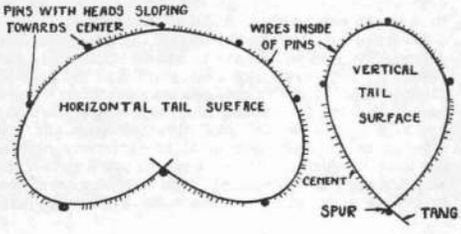
Lay the drawing on a flat pine board; above it lay the waxed paper and over this the Japanese tissue, and pin all three securely down. The waxed paper is to prevent sticking to the drawing when cement is applied. Now cut the wing spars to the proper dimensions, give them light coats of cement, and lay them on the tissue as your drawings indicate. When the cement dries—be sure the balsa strips are held firmly while the cement is hardening—you can trim off the extra paper with a razor blade. Don't trim out the section between the two wings yet, however.

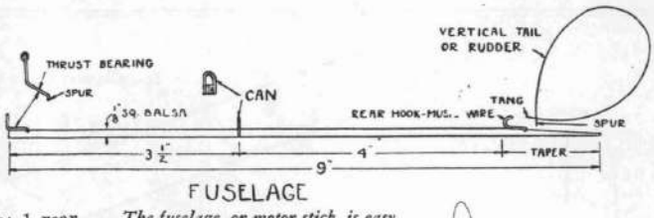
Make the wing clips from music wire as shown in Figure I. Then fold the wing over with the paper sides together. Press the spurs of the clips into front and rear spars, the smaller clip on the front or leading edge. Apply cement liberally to all joints in this wing and let it dry, cementing clip joints as well. Then go through the same operation with the other half of the wing, cut out the strip of paper between the two, and this part of the job is done.

Be sure, though, in putting in the wing clips, that you have enough "dihedral angle"—the upward angle of the wings that makes their tips about an inch above the center. You need this angle to gain stability in the air, and you can adjust it slightly after the cement has set by bending the clips.



Lay out the wing diagram, full size, on drawing paper. (Fig. I). Do the same with the tail surfaces. (Fig. III).





The fuselage, or motor stick, is easy. (Fig. II).

FOR the wire-frame tail surfaces you need two pieces of music wire, one of 9 3-4 inches and the other of 6 1-2 inches. The small diagram, Figure III, shows the shape of the two surfaces and the method of constructing them. Make the vertical surface first.

To do this, place waxed paper and Japanese tissue on a board as before, then stick pins into the board as shown in Figure III. The distance between upper and lower pins should be 2 5-16 inches; that between right and left pins 1 1-2 inches. Take the shorter wire and bend it so that it fits flat on the paper inside the pins, as the diagram indicates. Apply cement carefully *outside* the wire, and make certain that there is cement between wire and paper all the way round, but none inside the wire—too much cement will warp the paper. Let the cement harden, trim off excess paper with a razor blade, and the rudder is finished.

Use exactly the same process for the horizontal surface or stabilizer. The distance between the top pin and that where the wire crosses is 1 3-4 inches. From left to right pin is 3 5-16 inches. Place the other four pins to agree with the diagram. Then place and cement the wire, and trim the paper after the cement has set.

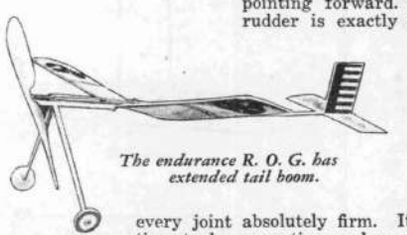
The motor stick or fuselage is simple. See Figure II. Take a piece of balsa 1-8 x 1-8 x 9, taper 1 1-2 inches at the end as shown, and sand the stick smooth. Take your thrust bearing, rear hook and "can"—the little loop through which the rubber motor is to run—and cement them into place. Both bearing and hook have spurs which stick into the wood. Be liberal with your cement—you don't want these pieces to come loose under strain.

If you're making your wire parts yourself—they come ready made in the kit—you'll need to develop skill with half-round pliers. The A. M. L. A. Manual, which you can get at League headquarters for 5 cents, gives you a lot of tips on wire-bending and on other fundamentals of model-making, including the next important step in the construction of this plane.

Before going ahead with this step, however, assemble the tail group. Place drops of cement on the horizontal surface—on the wire side—just where the top and bottom pins were located. Then lay the fuselage above it, and press it firmly in place. Be sure that the stick is exactly centered, then hold it in position until the cement hardens.

The rudder goes on the other side of the stick, the top. Insert the little protruding wire marked "spur" into the stick, 1 inch from the rear; cement the "tang" to the top surface of the stick, pointing forward. Make sure that the rudder is exactly vertical, and let the cement set.

"There's a lot of time wasted while cement is hardening," a model builder once complained to me. But it isn't wasted. Your model needs lightness, but it needs to have every joint absolutely firm. It would cost a lot of time to be cementing and re-cementing joints time and again. So don't get impatient.



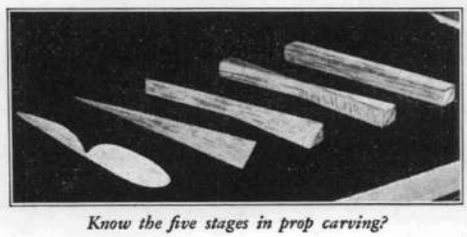
The endurance R. O. G. has extended tail boom.

The next step is the final one. It's carving the propeller; Figure IV (page 50) and the photograph of successive stages show you how to do it. The A. M. L. A. Manual tells in detail, too; and Kit No. 20 contains a nearly finished propeller.

To carve it, take your propeller block—for this first model it should be 7-16 x 9-16 x 5, and draw diagonals on the broad surfaces. Mark end diagonals as shown, remembering that the diagonals run in different directions on opposite ends. Put a pin vertically into the block at the intersection of the long diagonals for 1-4 inch, for the propeller shaft hole. The hole need be no deeper because you'll cut away the center portion of the prop later.

Now—with a very sharp knife—cut away the wood as the drawing and photograph show you. Leave the section at the center, in the first step, no less than 1-8 inch thick. Very carefully, then, go on to the next step—cutting away the wood *above* the end diagonal on one half of the block, below it on the other. Turn the block over and repeat the process. Don't try to cut the blades below 1-16 inch in thickness, however—sandpaper will do the rest.

Once the carving is (*Continued on page 50*)



Know the five stages in prop carving?

Build Three R. O. G. Models in One (*Continued from page 23*)

completed, sand the blade down almost to paper thinness. With a razor blade you may curve the tips as the photograph shows. (The picture of the standard Baby R. O. G. shows the leading edge of the propeller cut away; the other pictures show the trailing edge cut out, the type most model builders prefer. The prop on the standard model is the 5-inch variety that comes all ready for sanding in the kit. The others are carved from a 7-inch block.)

Balance the prop by inserting a pin in the hole and making sure that neither blade is heavier. If one outweighs the other, sand it down to equality. With this finished, take the propeller shaft and insert it from rear to front; bend back the protruding end into a U, and pull it so that the short end of the U is imbedded in the wood of the prop. Put an even coat of cement all round the hub of the prop, then, for additional strength.

NOW all the fundamental parts of the Baby R. O. G. are completed, and you can assemble them—you'll need a loop of 1-16 inch square rubber, 8 inches long, for the motor. But you still haven't a Baby R. O. G.—there isn't any landing gear!

Figure IV shows an all-balsa gear that will take plenty of knocks. You get all the dimensions from the drawing. The wheels, you'll note, are 3-4 inch in diameter; they're cut from 1-16 inch flat balsa, and must have a hole at the exact center for the hub. A drop of cement on each side of this hole will make an excellent bearing surface for the hub. The hub is made from a bent and cut-off pin, as shown, which is cemented to the lower end of the strut.

Cut the upper ends of the struts at such an angle that they will give you a 4 1-2 inch tread, or distance between wheels. Cement the struts 1-2 inch behind the nose of the motor stick, one on each side. Check to see that they line up with each other and are set at the same angle before the cement hardens.

The ship's complete, and ready for flight.

First, test its gliding ability. The wing should be clipped with the forward clip about half an inch in front of the can. Launch the model from shoulder height, holding it level, with an easy push. If it dives, it's nose heavy; move the wing forward a little. If it stalls—that is, noses up immediately and tends to slide back on its tail—the wing is too far forward. Find the proper wing setting so that it makes a long, even glide to the floor.

Now give the wing washin and washout. You do this by breathing on the cement joints of the left wing (left as the ship faces away from you) to soften them and twisting the forward tip so that it slants upward a little; do the same thing with the right wing, but twist the wing tip downward. You do this—increase the lifting power of the left wing, decrease that of the right—to counteract the twisting effect of the unwinding propeller. This effect is known as torque; the prop tends not only to unwind in its own direction, but to twist the entire model in the opposite direction.

Next, hold the plane in your left hand, prop toward you; with the right forefinger give the prop about 150 turns in a clockwise direction. Then hold the plane much as you did to start a glide, but keep the prop from turning. Release the prop so that it starts revolving, then let the model go with a gentle forward thrust.

If you've done your work and made your adjustments carefully—off she'll fly!

You can work out all kinds of variations in flight. By twisting the rudder you can circle the model in a small room. You can make it loop and do every kind of stunt in the book by changing adjustments of wing, rudder and tail and by varying power. You can make it take off from the floor or the library table. And you shouldn't be satisfied until you've got a 60-second flight from it. It's good for more than that.

There's very little you need to do to change the model to an endurance R. O. G. The major differences are in the propeller and the tail surfaces. The propeller is made from a block 1-2 x 5-8 x 7—you carve it out in the same manner as that described for the 5-inch prop. The longer propeller will unwind more slowly than the shorter one, and consequently will tend to keep the plane in the air longer. This is a point you'll want to remember in building contest models in the future.

The tail surfaces, as the photograph and the drawings show you, are something else again. They're all-balsa, which gives them extreme lightness; and they're on the end of a tail-boom, which moves the center of gravity farther back, makes the plane more stable, its balance in the air more certain, and its gliding angle flatter.

The drawings are complete enough so that, with your previous experience as a basis, you can go ahead with the construction of the tail boom and the tail surfaces. The boom is 4 inches long, and tapers from 1-16 inch square at its forward end to 1-32 square at the rear. It is butt-jointed to the end of fuselage stick, which is cut off just behind the rear hook for the joint.

The stabilizer is 1 x 4 inches, and the rudder just half the size—1 x 2. You know how to make a balsa frame on paper—just as you made your wings. For this model, choose very small pieces of balsa—1-32 inch square stock is about right. You can cut these from heavier wood with a razor blade.

Assemble the tail group by cementing the stabilizer on the lower side of the tail boom, as the drawing shows; then cement the rudder on top of the stabilizer, its rear edge 1-16 inch to the left of the leading edge. This is to make the model circle, a necessity in an endurance plane. Figure IV shows a method of making sure that the rudder stands at right angles to the horizontal tail while the cement is drying—a book and a stick serve as supports.

You'll have a semi-endurance model if you simply take your standard Baby R. O. G. and make these changes in it. But you'll have a better job if you make a new wing—one with lighter spars as shown in the diagram. You can use the same general dimensions for the wing, but taper the four spars from 1-8 inch at the center to 1-16 at the tips, and make the six ribs from 1-16 stock instead of 1-8.

And you'll have a model that should be good for at least two minutes! One of much this same style did 288 seconds—more than 4 1-2 minutes—at a high school contest last spring.

IN building this model you'll be using more skillful workmanship than you did in the first plane. You're working with finer materials, and lightness is a prime requisite. So make every piece and every joint neat; don't use excess cement (but be sure to use enough); sand your propeller so thin that you can see light through it. Every such precaution will add seconds to a flight.

And you'll need all this skill, and more, in building the biplane wings. The biplane differs from the endurance R. O. G. only in the wings—otherwise it's the same plane.

You're an old hand at wings by this time. In fact, the wing on your endurance model can very well serve for the lower wing on this new job. You make the upper wing in just the same manner, except that you cement the two halves directly together. You may make the center ribs very light, for they're joined and furnish center strength as a unit.

The wing struts are made from balsa 1-32 x 1-2 x 2 inches in size. Figure IV shows dimensions of these struts. Note carefully the angles at both ends. They're different, because you want a higher angle of incidence on the lower wing than on the upper; therefore you cut the angle at the bottom of the struts to a 3-16 inch measurement, but those at the top to 3-32 inch.

(*Continued on page 52*)

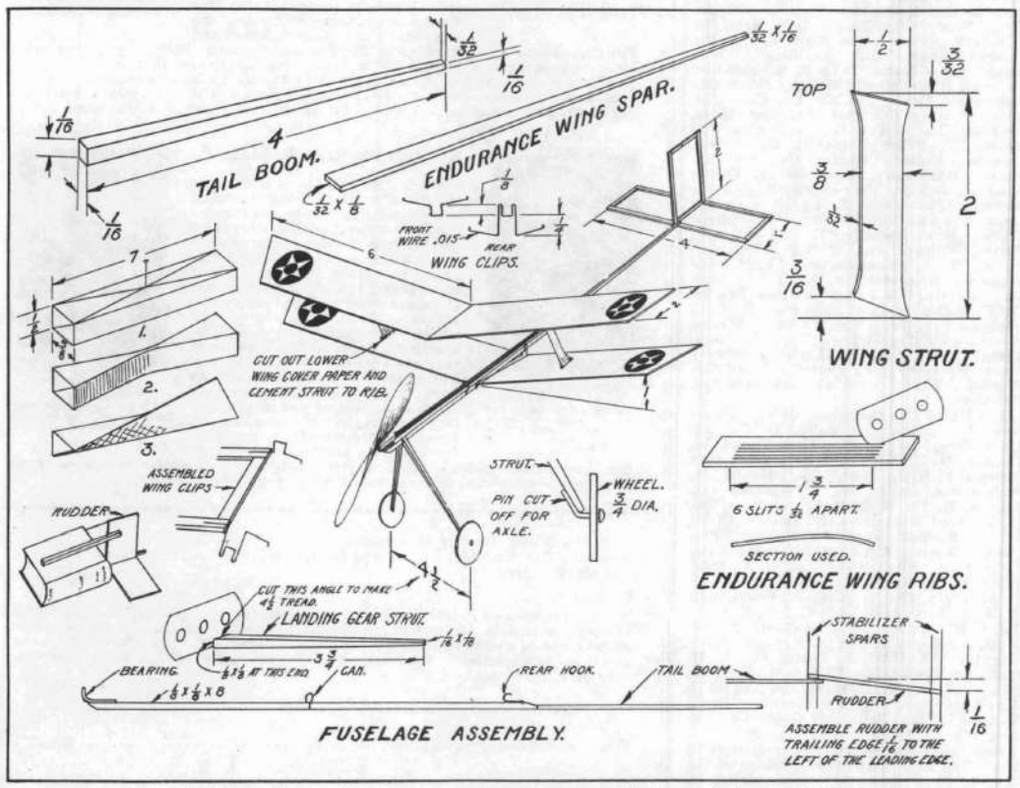


Figure IV shows details of landing gear and endurance and biplane variations in the R. O. G.

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(*Continued from page 50*)

The higher incidence on the lower wing puts more than half the load on this wing, hence keeps the center of gravity lower; this in turn aids in stability.

To assemble the two wings (once you have both struts made exactly alike), scrape 5-8 inch of paper from the top of the center ribs of the lower wings. Some builders prefer to cut a little paper away from the sides of the ribs, too; the width of the cut, however, should be no greater than 1-8 inch. Cement the two struts in place on the lower wing, remembering that they must be vertical when the wing is in horizontal position—don't put them at right angles to the wing! You can use that stick-and-book method to hold them upright while the cement dries.

Before the cement is quite hard, turn the upper wing upside down on the table and cement the upper ends of the struts to its center ribs. Be sure that the two wings are lined up properly, and that the whole device is held firmly in position while the cement sets.

Now this job is finished, and you're set for some more fun. You're not likely to get as long flights from this model as you have from the endurance R. O. G.—if you do, there's something wrong with the endurance plane!—but you'll have a biplane that will make beautiful flights, lasting a minute or more. And you'll get more "ohs" and "ahs" from an audience with the biplane than with half a dozen monoplanes, because it resembles more closely a standard big ship.

There's a lot of work here, but it will be more than repaid by the fun and the success that well-constructed miniature aircraft will bring. You may have to try more than once—don't give up if the first model isn't a world-beater! And don't forget the tricks you learned from that first Baby R. O. G., either. You can use washin and washout, wing-setting and the other adjustments as well on the more advanced planes as on the Baby.

Remember that the League kit supplies you all the material you need to build any one of these planes. Two of them will give you enough for all three models, and you'll have some left over for experiments of your own.

The League is not issuing honor certificates for this year's models—League members outstrip honor certificate requirements so fast that it's hard to keep them high enough! But headquarters is just as eager as ever to hear of good flights and interesting experiments. Keep the good word coming!

And watch for a description of Ray Thompson's 11 minute 47 second indoor tractor next month, together with a lot of hints on other crackerjack models. They're the next step toward the championship class!

November, 1930

Ten Minutes and Up!—

Ray Thompson won the 1930 A.M.L.A. Indoor Contest with an 11 minutes 47 seconds flight! Carl Goldberg and Fay Stroud both beat 11 minutes. Six others went above 10. Next month *The American Boy* will tell you

HOW TO BUILD

THE CHAMPION'S MODEL

and give you a lot of tips on others in the list. Watch for the article. It's

BY MERRILL HAMBURG

A. M. L. A. Chat

About the Activities of the 400,000 Members of the Airplane Model League of America

LEAGUE members who saw the excellent scale model of a Boeing mail plane built by Gordon Lamb, Oakland, California, exhibited at the Third National A. M. L. A. Contests wish him better fate next year.

Lamb's model was amazingly complete in detail, as well as in accuracy. He had a tiny carburetor on his motor! He had shock absorbers and movable controls and a lot of other unusual fine points. But his model was exhibited, not entered in the contest, and the reason was that he sent it to Detroit some seven days late.

"Tough luck," commented Lamb. "But it was fair enough. Other fellows got their models in on time—they lived up to the rules—and it wouldn't have been right to let late models in. A lot of point-winning final details are usually added in those last few days."

That's sportsmanship. . . . Lamb is a scale model builder of experience. He took eighth place in the 1929 contests, with the 40-C Boeing cabin mail plane shown in the picture "flying" over the Oakland airport. It's suspended by invisible wires.

As the Chat has already reported, Canadian model experts gave American boys something to think about in their National Contests in Ottawa last July. Three flights of better than 16 minutes topped their outdoor endurance contest; and although the flights were made under the old rules now discarded by the A. M. L. A., it should be remembered that never, in any other official contest any place, have such records been made.

Tales of long flights continue to come in from League members, however. Here are some of them:

Carl Fries, St. Louis, flew an outdoor twin pusher for 18 minutes 15 seconds (the model was found later 20 miles away!)

Aubrey Robinson, Houston, Texas, flew a fuselage model for 42 minutes 28 seconds!

Ralph Jones, Portland, Oregon, reports a 35-minute flight with his large tri-stick tractor—an outdoor model of his own design.

Newell Terry, Bartow, Florida, clocked a Senior R.O.G. in the air for 10 minutes 7 seconds, outdoors.

Edward Svendsen, Minneapolis, got 78 seconds from a "Baby Culver Tractor" with a 6-inch prop and an 8-inch hollow motor stick.

And the first trans-oceanic flight is reported from New York. M. J. Israel found on the roof of a building there a labeled toy balloon released on May 21, at Caterham, Surrey, England!

Any others? Or any unusual construction tips?

One novel construction stunt is suggested by Albert Price, Durant, Oklahoma. Price doesn't say he used it—you might try it if it sounds good to you. "Take three capsules, two large and one small," directs Price. "Glue them on the wing tips and the tail of a flying model. Catch three lightning bugs and put them in the capsules. And you'll have three plane-lights that ought to pay their own way!"

Music wire bearings for propeller shafts are favored by Newell Terry, Barstow, Fla. He used .020 music wire with a loop bent in the end for the shaft and the shank that fits against the motor stick flattened to 3-64 inch. Terry recently built a model sailplane which he tows satisfactorily behind an R. O. G. at the end of a 2-foot silk thread.

Robert Tiehen, Falls City, Nebr., makes his washers from "shims," the thin metal fillers used between automobile bearing surfaces. "Buy or seduce shims of varying thicknesses from a garage man," Tiehen advises. "Get a small darning needle, break off the top of the eye so that two prongs are left, and use the prongs as the bit of a drill—insert the needle in a small hand drill—to bore a hole in the shim. Take a pair of scissors and cut out the shim around the hole, and you have a washer!"

From Sydney Isaacson, New York City, comes a suggestion for detachable round wing tips. Isaacson makes his wing tips in separate pieces, and bores tiny holes in the ends of his wing spars so that the 1-64 square bamboo ends of his tip-frames fit into them. "It makes it easier to carry a very long contest wing," he points out.

Lots of you League members know that the League is establishing official headquarters chapters in various cities of the country. Perhaps there's one near you—the list is below. If a chapter is handy, why not go and get in touch with the chapter director? You'll get in on contests and other official events that will be a lot of fun, and you'll get help with your models, too—or perhaps be able to help somebody else, which

Here's Lamb's mail plane.

is just as good! There are headquarters chapters at:

Abraham & Straus, Inc., Brooklyn, N. Y.; Ackerman Store, Hackensack, N. J.; American Legion Post 16, Roseburg, Oregon; A. C. Arnott, Chatham, N. J.; L. S. Ayres Co., Indianapolis, Ind.; Bamberger's, Newark, N. J.; Barker, Rose & Kimball, Inc., Elmira, N. Y.; S. H. Berry Hardware Co., Dover, N. J.; M. E. Blatt Co., Atlantic City, N. J.; John Boesch Co., Burlington, Iowa; Bolles Brendamour Co., Cincinnati, Ohio; Bon Ton (Fisher Dept. Store), Indiana, Pa.; Bon Ton (S. Grumbacher & Son), York, Pa.; Boys' Wear, Inc., Tulsa, Okla.; Broadway Dept. Store, Los Angeles, Calif.; Bush & Bull Co., Easton, Pa.; J. L. Brandeis Co., Omaha, Neb.; Geo. D. Campen Co., Eau Claire, Wis.; Carson Pirie Scott & Co., Chicago, Ill.; Cassel & Hartsel, Ashland, Ohio.

O. J. deLendrecie Co., Fargo, N. D.; Dreier's Sporting Goods Store, Plainfield, N. J.; Exclusive Shoppe, Montclair, N. J.; H. Feinberg, Inc., Chester, Pa.; H. Feinberg, Inc., Wilmington, Del.; Fisher Bros., Monessen, Pa.; Fisher Company, Everett, Wash.; Fisher Company, Tacoma, Wash.; Franklin Thrift Stores, Piqua, Ohio; Wm. F. Gable Co., Altoona, Pa.; Gano Downs Co., Denver, Colo.; Geismar's, Inc., Hoboken, N. J.; F. H. Gillingham & Sons, Woodstock, Vt.; Gimbel Bros., Inc., New York City; Gimbel Bros., Inc., Milwaukee, Wis.; Gimbel Bros., Inc., Philadelphia, Pa.; Gimbel Bros., Inc., Pittsburgh, Pa.; Honolulu Star-Bulletin, Honolulu, Hawaii; The Hub, Baltimore, Md.; Huber Bros. Co., Fond du Lac, Wis.; J. L. Hudson Co., Detroit, Mich.; Jordan's Hardware Co., Ottawa, Ill.; Jordan Marsh Co., Boston, Mass.; Joske Bros., San Antonio, Texas; Harry Kaplan, Bayonne, N. J.

Frank D. Keck Furn. Co., Champaign, Ill.; Frank M. Knepfer, Yonkers, N. Y.; Lamson Bros. Co., Toledo, Ohio; H. Leh & Co., Allentown and Bethlehem, Pa.; Levy Sport Shop, Jersey City, N. J.; Levy Brothers, Elizabeth, N. J.; Logan Music & Sporting Goods, Salinas, Calif.; McMillan Athletic Goods, Terre Haute, Ind.; R. A. McWhirr Co., Fall River, Mass.; Malcolm Brock Co., Bakersfield, Calif.; The May Co., Cleveland, Ohio; Messing & Becker Sporting Goods, Freeport, Ill.; Millen Hardware Co., Wilmette, Ill.; Miller Mercantile Co., Salem, Oregon; Muller Clothing Co., Windom, Minn.; Middough's, Long Beach, Calif.; Leon H. Nester, Norristown, Pa.; A. L. Newman, Providence, R. I.; Niles Center Mercantile Co., Niles Center, Ill.; Olympic Stores, New Rochelle, N. Y.; Olympic Stores, White Plains, N. Y.; Pantagraph Y. M. C. A., Bloomington, Ill.; George Plambeck, Bloomfield, N. J.; Quackenbush Co., Paterson, N. J.; Radin & Kamp, Fresno, Calif.; Rutblatt's Sport Shop, Passaic, N. J.; Spokane Dry Goods Co., Spokane, Wash.; Stix, Baer & Fuller, St. Louis, Mo.; Tabram's, Trenton, N. J.; E. B. Taylor Hardware Store, Winnetka, Ill.; Thornton Laird Co., Bluefield, W. Va.; Thrush Hardware Co., Belvidere, Ill.

The Union Co., Columbus, Ohio; Vandermast, Inc., Santa Ana, Calif.; D. Waldorf, Union City, N. J.; A. W. Walton & Sons Co., Camden, N. J.; Edward H. Wegmann, New Brunswick, N. J.; Weinstock, Lubin & Co., Sacramento, Calif.; W. M. Whitney Co., Albany, N. Y.; Wicks & Greenman, Utica, N. Y.; Saul Winkelman, St. Ignace, Mich.; A. B. Wyckoff, Inc., Stroudsburg, Pa.; George Wyman & Co., South Bend, Ind.; Y. M. C. A., Alton, Ill.; Y. M. C. A., Danville, Ill.; Y. M. C. A, Decatur, Ill.; Y. M. C. A., Elgin, Ill.; Y. M. C. A., Gary, Ind.; Y. M. C. A., Granite City, Ill.; Y. M. C A., Joliet, Ill.; Y. M. C. A., Kankakee, Ill; Y. M. C. A., Kewanee, Ill.; Y. M. C. A., Marietta, Ohio; Y. M. C. A., Peoria, Ill.; Y. M. C. A., Springfield, Ill.; Y. M. C. A., Sterling, Ill.; Y. M. C. A., Vincennes, Ind.; Y. M. C. A., Watertown, N. Y.; Yuncker Bros., Mansfield, Ohio; Zahn Dry Goods Co., Racine, Wis.

Join the League—invite your friends to join. Tell them about the activities of the League. Show them the announcement on page 65, get them to fill out the coupon and have them mail it to-day.

base their tall yarns on, after all."

"What are they going to do with Maloney?" Bruce inquired as he threw the last things into his suitcase.

"Well," chuckled Mr. Madden, "of course you could look at it in either one of two ways. He seems like a pretty nice fellow and you could say it was a practical joke on his part. Or you might think he was trying to get the house under false pretenses. You can't really say, however, that there's any crime concerned. As a matter of fact, he was right about the house. He's willing to pay my price for it now, though, for a couple of reasons. One is that he made a fool of himself, and the other is that we did clean up something that would have cramped the sale. He's satisfied now, and so am I if you are."

"Sure," grinned Bruce. "Give him my regards. I won't have time to see him. Barrett's O. K., eh?"

"Uh-huh. Maybe a little concussion, but that will be all. Well, son, I'm sure glad they didn't scare you to death among 'em."

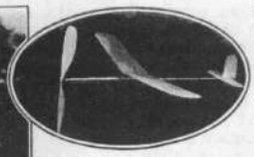
"Oh, well," laughed Bruce as he locked the suitcase, "if every time I get scared the family makes that much extra money, I'm going to take up ghost hunting as a profession."

Reprinted from The American Boy, December, 1930

Build a Twelve-Minute Plane!

Here Are Plans for Three Record-Smashing Indoor Models

Fay Stroud built hollow wing spars!



By Merrill Hamburg,

Secretary of the Airplane Model League of America

HERE they are—the big three that placed one, two, three in the Third National Airplane Model League of America indoor contest, held by THE AMERICAN BOY in Detroit last June.

Eleven-minute planes, all of them. Crackerjacks of workmanship. Models of design. Perfection in the miniature aircraft field. And as different, these three models built by Ray Thompson, Carl Goldberg, and Fay Stroud, as a Ford and a Fokker, a Stinson and a Lockheed!

You may want to build a model exactly like one of them. More likely you'll take features of the three of them that appeal to you, perhaps combine them with features of your own or of the four other models described in the chart on Page 68, and make up a brand-new model of your own. By this time—if you built the models described in the October and November AMERICAN BOYS, or if you've done other model work — you have some private ideas on endurance models. It's pretty sure to be a plane that is an improvement over any of these that will rank at the top of the important 1931 contests.

These, however, are the best now known to model builders. They're all capable, their designers say, of better than twelve minute flights. So you'll go a long way with any of them.

Most A. M. L. A. members know something about them already.

Thompson's 707-second model, he says, owes its design largely to the skill of Albert Mott, the expert who placed second in both 1928 and 1929 Stout indoor contests, and who was generally considered the leading 1930 contender before his death last March. Goldberg's model with a contest record of 683 seconds, made its flights with an inferior propeller — Goldberg's best prop, upon which he had been counting, was accidentally broken the night before the contest when another builder went to sleep and fell on it! And Stroud's plane, in the opinion of everybody who examined it, made its 664 seconds because it was the finest example of workmanship in the contest. In fact, says Thompson:

"If Stroud had had a little more slack rubber on his motor, so that he could have given it a few more winds, or if Goldberg had had his best prop, I probably wouldn't have had a trip to Europe!"

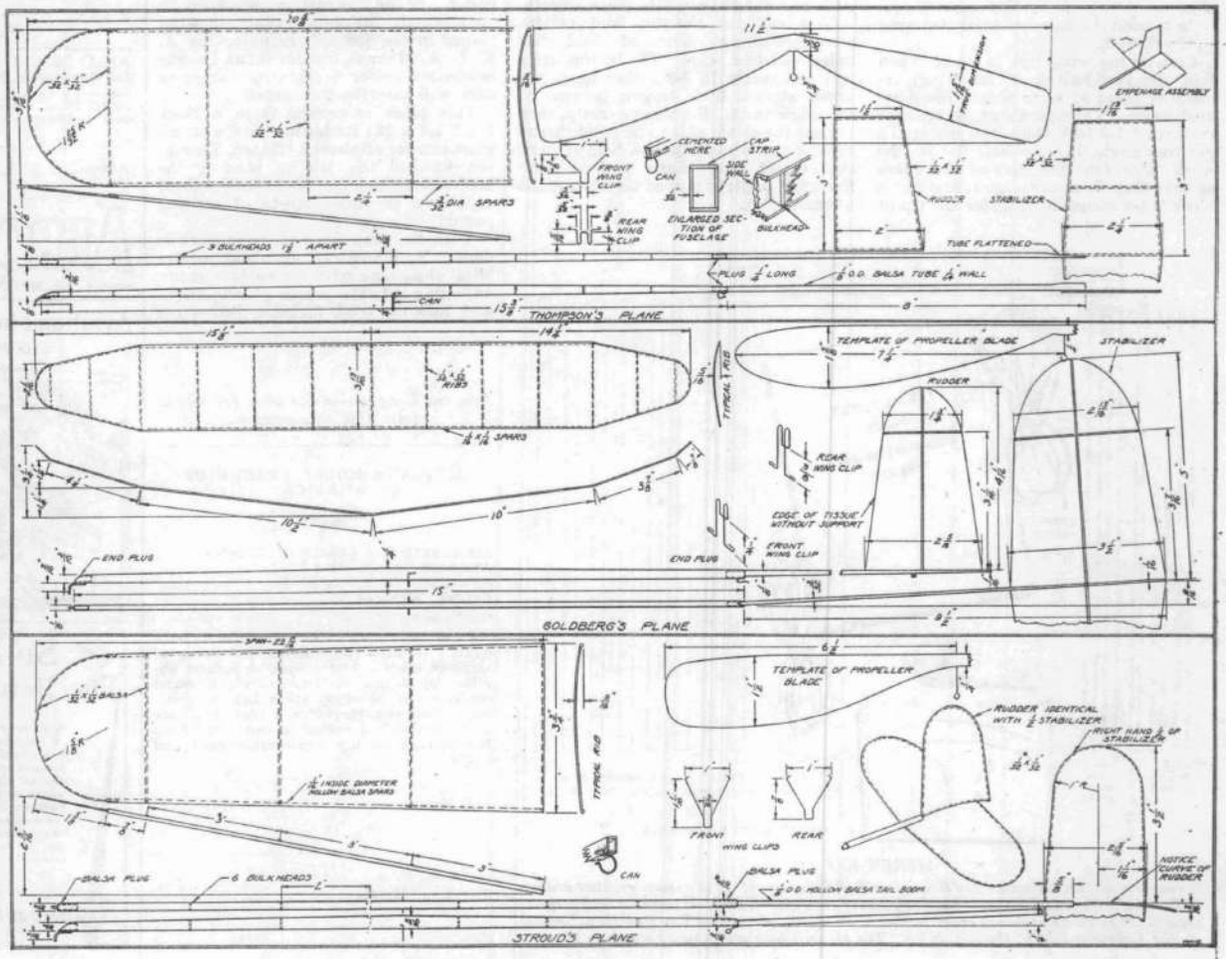
The other four models described in the chart are those of Jack Fisher, who took a lesson from the soaring glider and used a 35-inch tapered wing with an aspect ratio of nearly 13 to 1; Ernest McCoy, designer of the McCoy "mystery ship" of 1928, whose aluminum foil model "stole the show;" Samuel Balkan, who had the highest ranking pusher in the contest; and Lawrence Hankammer, whose plane with blue motor stick, orange empennage and unusual construction was one of the high lights of the event. Space does not permit full drawings of these four models.

Carl Goldberg's tractor has sharply slanting wing tips.

Ray Thompson's plane has a sweep-back prop.

Drawings for them, however, as well as for the other three models, are included in Kit No. 21. Any one of the seven models may be built from the kit. And you can get it by sending $1.25 in check or money order to the A. M. L. A., American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich. The materials in the kit—you'll need them to build any one of the models—are as follows:

Eight 1-32 x 1-2 x 18 in. balsa, for ribs, motor stick, empennage; one propeller block 1 x 1 1-4 x 13 in.; four 1-8 x 1-8 x 18 in. balsa spars; one 1-8 x 5-16 x 18 in. balsa motor stick; four 1-16 x 1-16 x 18 in. balsa



spars; two wing clips; one 6 in. .016 music wire, rear hook and can; one 6 in. .020 music wire, propeller shaft; one drilled thrust bearing; two brass thrust washers; one large tube cement; one 18 x 24 in. sheet superfine tissue; one 3-32 -30 in. flat rubber motor 36 in. long; one 1-8 -30 in. flat rubber motor 36 in. long; one book of plans and directions for all 7 championship planes described above.

LET'S take a look at the Thompson model. The diagram shows half of its wing span of 21 1-4 inches, and its chord, or width, of 3 9-16. The four balsa spars are round, tapering from a diameter of 3-32 inch at the center to 1-16 at their ends. To make them, take 1-8 inch square balsa 9 inches long, wrap very fine sand paper around it and sand the stick down by rubbing back and forth. Careful work will produce a perfectly round, evenly tapered stick. All four must be exactly alike, and all must be cut out at the ends to permit the wing tips to fit snugly.

Nine balsa ribs must be made from 1-32 flat balsa. It is wise to bend a strip of balsa of the proper length, 3 9-16 inches, to the right wing curve—the diagram shows it to have a maximum depth of 5-16 inch—before slicing off the ribs. To form the balsa, steam it or soak it in boiling water, then bend it to the right curve and allow it to dry. Finally, with a razor blade, slice off 1-32 inch strips and the ribs are made. Cement them into place on the wing spars—they should fit between the spars, not over or under them. The center rib should be placed so that, when the center ends of the spars are butt-jointed together, the rib will fit neatly over the joint.

Before joining the two halves, however, make the wing tips. These are made of 1-32 inch square balsa, bent to a perfect half circle of 1 25-32 inch radius. Thompson bent his tips by placing a milk bottle in a steam jet and slowly forcing the thin balsa around the bottle in the steam, then allowing it to dry. Experience will make it possible to bend the balsa without steaming, if you wish.

Cement the wing tips in place. Then join the two halves of the wing, cementing them so as to obtain the dihedral angle. Thompson's angle brought each tip 1 1-8 inch above the center. To get this angle, lay one half flat on the work table (cut the ends of the spars so that they fit at the angle), and put a block 2 1-4 inches high under the tip of the other half. When the cement dries, the wing frame will be complete.

Now cover it one half at a time. Lay your tissue paper carefully over the horizontal half of the wing, with its edge exactly over the center rib. If you use cement, apply it evenly to the center rib and the spars up to the next rib, wipe excess cement off and press the paper smoothly into place. Don't let the paper wrinkle—be sure that it lies smoothly before the adhesive dries and before you go on to the next section. Continue section by section, allowing each section to dry before advancing. . . . If banana oil is your adhesive, you may fasten the paper to the ribs by painting it just *above* the ribs instead of painting the ribs. The oil soaks through and acts satisfactorily as adhesive.

Cover the second half in the same manner, lapping the tissue at the center rib. When it has dried, trim off excess paper with razor blade or sandpaper.

Thompson used two types of wing clips. His rear clip is the older double grip type, his front clip a new style developed by Stroud. Cement the two clips in place at the center of the wing.

Thompson's motor stick is of the hollow type, with nine bulkheads for additional strength. Notice that all three sticks are of the tapered type—that is, they are heavier at their centers to help them stand the strain of tightly wound motors. Cut the two side pieces of the motor stick first, from 1-32 inch flat balsa; be sure that they are identical. Sand them down to about 1-64 inch in thickness. Now mark off the position of the bulkheads on one piece, and cut the bulkheads from a strip of 1-32 balsa 1-8 inch wide.

Cement the bulkheads into place on the marked side strip, allowing each to protrude slightly. Cement small end plugs, 1-8 x 1-4, and of the proper height, into place at the ends. When the cement has dried, put on the other side strip, being very sure that it is exactly placed. Now shave the bulkheads off even and sand the whole piece smooth.

Now cut out the top and bottom pieces, making them of 1-32 flat balsa 5-32 inch wide. The bottom strip will be exactly 15 3-8 inches long; the upper strip a little longer, because of the angle in it. Fit them exactly, then cement them into place and wind thread around the whole stick to hold it until the cement sets. Sand it down with fine sand paper wrapped tightly around a small block.

If you've done the job carefully, you won't be able to see a joint in the whole stick!

Now you're ready to cement on the thrust bearing, the can and the rear hook. Kit No. 21 supplies you all metal parts. If you haven't the kit, make the bearing of a small brad hammered flat, carefully bent and drilled for the propeller shaft hole; make the can and hook of music wire. The bearing has just enough height so that the propeller shaft hook will barely clear the motor stick when it turns. A high bearing puts unnecessary strain on the stick.

Thompson's tail boom is of 1-64 inch balsa. Most model builders prefer to make this hollow tube by winding the paper-thin balsa, steamed or soaked in boiling water, in a spiral around a 3-32 wire or drill rod. Thompson wound his balsa straight, however. A cloth tape around the whole thing until it dries, and cement carefully applied at the spiral joint, will finish the job.

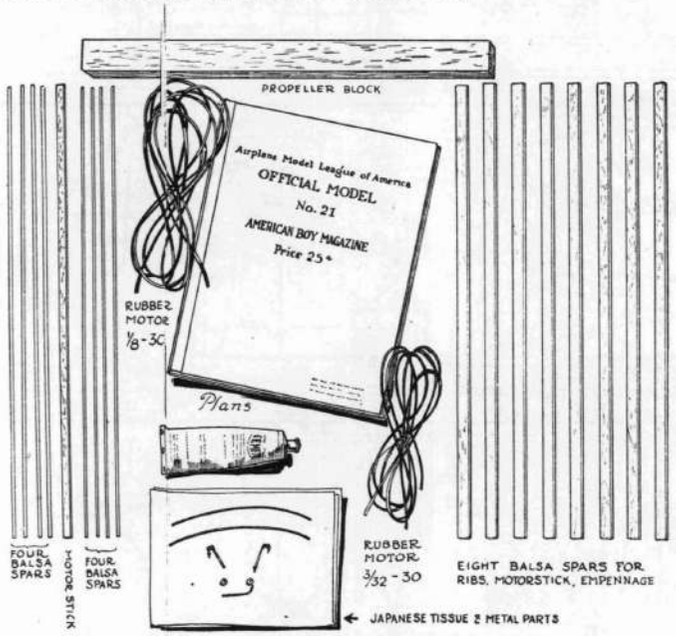
Thompson butt-jointed the boom to the motor stick, but squeezed the rear end flat and cemented it to the side of his rudder frame. Details of this frame appear in the diagram. The lower crosspiece of the rudder forms the center rib of the elevator; thus you may make the rudder frame first and cover it, then build up the elevator frame around this lower crosspiece, and cover the elevator on the bottom.

Now the propeller—the most distinctive feature of Thompson's plane. It has, you've already noted, a decided sweepback, and is of the broad-bladed, butter-paddle type. The diagram shows the dimensions of the propeller, and it looks like a difficult job. Actually it isn't; for you make it just as you would any other propeller—like a perfectly straight job. When it is completed, you cut it in two in the middle and rejoin the halves at an angle to form the sweepback.

Last month, in building the R. O. G. described in the November AMERICAN BOY, you learned how to carve a propeller. If the instructions are hazy in your mind, the photograph showing stages in the job will help; or the A. M. L. A. Manual, obtainable at League headquarters for 5 cents in stamps or coin, will describe it in detail.

This block is carved from a block 1 x 1 1-4 x 12; its blades have a maximum camber of about 3-32 inch. Thompson finished the job by sanding the blades to a thickness of .01 inch—about as heavy as three sheets of writing paper!

With the prop finished, your work is done. Now you can go about assembling the plane with its rubber motor, adjusting it to the proper gliding angle, and making trial flights. Remember



HERE'S KIT 21!

It contains all the material you'll need to build any one of 1930's seven greatest indoor endurance ships. In addition, it has drawings of each model, and full working instructions. Send $1.25 in check or money order to the A. M. L. A., American Boy Building., Second and Lafayette Blvds., Detroit, Mich. The kit will help you to new records in 1931!

Join the League—invite your friends to join. Use this coupon.

AIRPLANE MODEL LEAGUE OF AMERICA

AIRPLANE MODEL LEAGUE OF AMERICA
American Boy Building
Second and Lafayette Blvds.
Detroit, Michigan

Gentlemen:

I am interested in learning about aeronautics through the building and flying of airplane models. I also wish to become eligible for official national airplane model contests and to enjoy other League privileges. Will you, therefore, please enroll me as a member? I enclose a two-cent stamp for postage on my membership card and button.

Full Name .....

Age .....

Street and Number .....

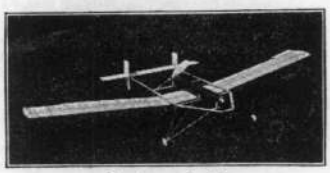
City ..... State .....

A. M. L. A. CHAT

About the Activities of the 400,000 Members of the Airplane Model League of America.

YOU League members are going to be reading this Chat Column between Thanksgiving and Christmas, so Paul Jones' idea for the construction of a model plane prop ought to appeal to you.

Jones, writing from his home in Redondo Beach, Calif., says: "Extract two ribs from the Christmas turkey, cut to the desired length and then sandpaper. Join to a balsa



Compressed air!

hub with cement and you have a durable prop."

Maybe Jones uses turkey feathers for the wings!

A. J. Hoover, Tonganoxie, Kan., a model builder of a lot of experience, tells of a variable pitch prop made by a friend. The hub was spruce with sockets for the blades, and tiny wire wound around the hub, once the blades were adjusted in place, held them to the desired pitch.

Massachusetts model builders will be pleased to learn that H. Russell Clement, director of the Jordan Marsh unit of the A. M. L. A.—sponsored by the Boston *Traveler*—received a solid silver aviation watch charm in appreciation of his work for model aviation. Sidney J. Paine of Boston made the presentation.

By this time you've probably been wondering about the photo reproduced in this column. It's a compressed-air model built by Donald Burnham, West Lafayette, Ind., 1929 National Outdoor and 1930 Junior Outdoor champion.

Contestants at the Third National A. M. L. A. Contests remember the detachable tail boom that featured the models built by Lawrence Hankammer, Des Moines, Ia. Knowing that tail groups and delicate booms are easily damaged in contact with rafters, Hankammer make up a number of identical booms with tail groups cemented to them. If a model returned to him after a trial with a damaged elevator, rudder or boom, he simply took the whole member off and put on a new one. So his models were in four parts—prop, motor stick, wing, and boom and tail group. Not to mention the motor!

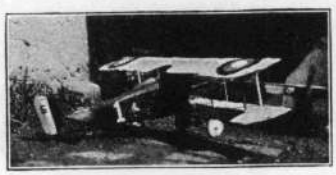
Speaking of the contests, Tom Miller of Washington, D. C. writes about the splendid co-operation given the League by the airplane industry and men and organizations interested in the work of the League. "Why not let us know just who helped?" suggests Miller. Good idea—here's the dope:

First comes the Detroit Board of Commerce, which puts on Detroit's great annual Aircraft Show. The Board of Commerce, through its aircraft bureau, again backed the Contests with extensive financial aid, and commented in doing so that the work of the League is one of the most important influences in developing American aviation. Mr. Edsel Ford, president of the Ford Motor Company, gave a banquet for contestants at Ford Airport. Mr. E. L. Cord, and Eddie Stinson of the Stinson Aircraft Corporation gave a trip to Europe to the scale model winner. THE AMERICAN BOY gave two more trips to Europe and provided a chaperon. The Detroit Aircraft Corporation and the Curtiss-Wright Flying Services made possible the use of the great Grosse Ile Airport and dirigible hangar for the contests.

William B. Stout, League president, gave a new trophy and cash prizes for the Stout Outdoor Fuselage Event. The Cracker Jack Air Corps furnished lunches for contestants on June 30. Prizes and financial assistance came from the Hotel Statler, Michigan Mutual Liability Company, George R. Wallace, Jr., of the Fitchburg (Mass.) Paper Company; Aviation Institute of the U. S. A.; Westfield Watch Company; Peru (Ind.) Model Airplane Shop; Berry Brothers, manufacturers of airplane paints; Doubleday, Doran & Company, Inc.; D. Appleton & Company.

Other assistance was rendered by W. Irving Glover, assistant postmaster general in charge of air mail; the Canadian Pacific Railway and the Canadian Pacific Steamship Company, the manual arts and health education departments of Detroit public schools; the Detroit *Free Press;* the Honolulu *Star-Bulletin;* George D. Wanner & Company, manufacturers of official A. M. L. A. kits; Frank A. Tichenor and George McLaughlin of *Aero Digest;* B. Russell Shaw, chief scale model judge; the Michigan State Fair Grounds; the Detroit Department of Street Railways; Frederic Nelson Litten and Laurie York Erskine, AMERICAN BOY writers of air stories.

And all the following contributed to the fund for putting on the contests: J. H. Allison, Standard Oil Company, Cleveland; Howard Beazley, Nicholas-Beazley Airplane Company, Marshall, Mo.; David Beecroft, United States Radium Corporation, New City; W. E. Boeing, Boeing Aircraft Company, Seattle; Mr. Bellanca, Bellanca Aircraft Corporation, New Castle, Del.; Bendix Brake Company, South Bend, Ind.; Walter S. Bucklin, National Shawmut Bank of Boston, Boston; C. J. Brukner, The Waco Aircraft Company, Troy, O.; Paul Becker, Chance Vought Corporation, Hartford, Conn.; Glenn H. Curtiss, Country Club Estates, Miami, Fla.; Harry M. Crane, New York City; Charles H. Colvin, Pioneer Instrument Company, Brooklyn, N. Y.; Reed M. Chambers, United States Aviation Un-



Rickenbacker's Spad.

derwriters, Inc., New York City; A. B. Coffman, Chicago; James T. Downey, The Balsa Wood Company, Inc., Brooklyn, N. Y.; F. B. Downing, Aeronautical Service Transport Corporation, Erie, Pa.; W. F. Davidson, Brooklyn, N. Y.; William H. Dey, United States Radium Corporation, New York City; Herbert G. Fales, New York City; Sherman M. Fairchild, Fairchild Airplane Mfg. Corporation, Farmingdale, L. I., N. Y.; R. H. Fleet, Consolidated Aircraft Corp., Buffalo, N. Y.; Julien L. Eysmans, Pennsylvania Railroad Company, Philadelphia; S. L. Gabel, Summerill Tubing Company, Bridgeport, Conn.; Henry Gund, Jr., John Gund Brewing Company, La-Crosse, Wisc.; N. H. Gilman, Allison Engineering Company, Indianapolis, Ind.; Allan Jackson, Chicago; L. S. Horner, Kissel, Kinnicutt & Company, New York City; Haskelite Mfg. Corp., Chicago; Herbert Hoover, Jr., Western Air Express, Los Angeles; Richard E. Hoyt, New York City; Stedman S. Hanks, Manchester, Mass.; Randolph F. Hall, Cunningham-Hall Aircraft Corp., Rochester, N. Y.; Horace C. Knerr, Philadelphia; George Law, Sky Trails, Inc., Espanola, N. M.; Kendall Refining Co., Bradford, Pa.; Charles F. Kettering, Mutual Home Building, Dayton, O.; William B. Mayo, Detroit; Arthur Nutt, Curtiss Aeroplane & Motor Company, Inc., Buffalo, N. Y.; Clarence O. Prest, Prest Airplanes and Motors, Arlington, Calif.; Harold F. Pitcairn, Pitcairn-Cierva Autogiro Company of America, Philadelphia; J. H. Parker, The Carpenter Steel Company, Reading, Pa.; J. Brooks B. Parker, Parker & Company, Philadelphia; Earle H. Reynolds, Peoples Trust & Savings Bank, Chicago; A. E. Raabe, Eclipse Aviation Corp., East Orange, N. J.; F. B. Rentschler, The Pratt & Whitney Aircraft Company, Hartford, Conn.; W. Parker Seeley, Bridgeport, Conn.; S. S. Stewart, Flint, Mich.; J. Story Smith, Philadelphia; George I. Stich, Aero Supply Manufacturing Company, Inc., College Point, L. I., N. Y.; Horace B. Tuttle, Madison, Ohio; A. A. Toochkoff, Sikorsky Aviation Corp., Bridgeport, Conn.; J. A. Talbot, Richfield Oil Company, Los Angeles; Ralph Upson, Red Bank, N. J.; George S. Wheat, New York City; Harvey L. Williams, Air Investors, Inc., New York City; F. E. Wellington, Wyman-Gordon Company, Worcester, Mass.; Raycraft Walsh, The Hamilton Standard Propeller Corp., Homestead, Pa.; C. Roy Keys, Curtiss Aeroplane & Motor Company, Inc., Buffalo, N. Y.

CARL GOLDBERG'S model was distinctive for two things—the shape of the wing, and the fact that he offset his propeller torque by having the left half larger than the right.

The wing may be constructed by the methods suggested for the Thompson model. Note particularly the shorter spars in the right side of the wing, however, and the taper of the wing from the joint between the main spars and the auxiliary spars.

The elevator and rudder, you'll see, have no outside frame. The tail boom, tapered in both dimensions, serves as part of the rudder frame. And the boom's rear end is set 9-16 inch off center, to make the model circle to the right.

The motor stick is hollow, but has no bulkheads. The double grip wing clip is that you'll need to have the rudder at a slight angle to make it circle to the left.

necessary with this tick—a single grip type would be likely o cut its thin walls.

The propeller is at from a block 7-8 x 1 1-2 x 15 inches, nd has a maximum camber of about 1-1 inch.

Stroud's beautifu model is characterized by hollow win spars, motor stick and tail boom and very simple, light and carefully constructd tail group. The drawing gives you al the details, and by following it carefuly you'll be able to duplicate the ship.

The chart on thispage gives you the essential informatin about four other models. Remember that, if you want drawings for the oher four, they are obtainable in Kit No. 21—they are not available elsewhere so don't write to League headquarters for them!

With these tips, here ought to be a flock of new indoor records. Get to w[illegible] and write to the League about your own improvements and the new high marks you establish!

Seven Outstanding Models!

COMPARISON CHART

MOTOR STICK	Raymond Thompson	Carl Goldberg	Fay Stroud	Lawrence Hankammer	Jack Fisher	Samuel Balkan	Ernest McCoy
Type of construction	Built up	Built up	Built up	Built up	Solid	Solid	Built up
Tapered	Yes	Yes	Yes	Yes	Yes	No	Yes
Bulkheads	9	None	6				19
Cans	1	1	1	1	2	2	1
Size at ends and center	½x½ ½x¾	½x½ ½x¾	½x½ ½x⅞	½x⅝ ⅝x⅞	½x⅝ ⅝x⅝	½x¾	½x½ ½x¾
TAIL BOOM Type	Balsa tube	Solid	Balsa tube	Solid	Solid	Rd. Solid	Balsa tube
Size	⅛" Dia.	½x½ ½x½ 9½"	⅜x7½	½x⅜x5½	No boom	½x13¼	⅜" Dia.
Method of attachment	Butt joint	Butt joint	Butt joint	detachable	Butt joint	Dove Tail	Butt joint
EMPENNAGE Rudder height	3	4½	3⅛	5½	5½	to rudder	3¾
Rudder length, bot. & top	2—1½	2⅝—1¾	2½	3⅜ max.	3 max.		2¾—2
Area rudder	5.25	8.25	7	11½	7		6
Size of rudder frame	½x½	½x½	½x½	½x½	½x½		½x½
Stabilizer span	6"	10	7	8	8	6	7½
Stabilizer chord	2¼"x1⅛"	3½"x2⅛"	2½"x2"	3" max.	7"	2"	2¼"
Shapes of tips	square	elliptical	round	elliptical	elliptical	square	square
Size and No. of ribs	½ sq.—5	½ sq.—2	½ sq.—1			½ sq.—3	½ sq.—1
Section	Flat	Flat	Flat	Flat	Flat	Arc	Flat
Size stabilizer frame	½ sq.	½ x ½	½ sq.	½ sq.	½ x ½	½ x ½	½ x ½
Stabilizer area	12½	25	14	18	29½	12	14
WING Span	21¾	29⅜	22⅛	24	35	28½	26½
Chord at root	3½	3⅛	3¾	3⅝	3½	4⅜	3½
Chord at tip	3½	2½	3¾	3⅜	2	3	2¾
Area	73.12	108.05	75.105	81	94¾	113	67
Type of wing tip	round	round	round	airfoil	elliptical	square	elliptical
Amount of dihedral	1⅜	3¾	2½	2	4	1¾	3
Amount of incidence	½	⅜	½	½	½	½	½
Sweepback	none	none	none	none	none	none	none
Type of wing	cambered	cambered	cambered	cambered Gott. 81	cambered	cambered	cambered
Construction spars	solid	solid	Balsa tube	solid	solid	solid	Balsa tube
Size and shape	½" Dia.	½x½	½" Dia.	½x½	½x½ ½x½	½x½	½" Dia.
Size and No. of ribs	½x½—9	½x½—13	½x½—7	½x½—7	½x½—11	½x½—9	½x½—9
Covering	superfine	superfine	superfine	verithin	superfine	Jap tissue	alum. leaf
PROPELLER Size of block	1x1¼x12	⅞x1½x15	1x1¼x13	⅞x1¼x 12½	1x1½x14	⅞x1x15	2x2½x12½
Maximum width	1⅛	1⅜	1½	1⅜	1⅜	1⅜	1¾
Depth of hub	½	¼	¼	¼	¾	½	¼
Width across open. of V	6	6	5	5	6	8½	3
Tip shape	corners rd.	elliptical	round	round	round	elliptical	elliptical
Sweepback	1½						
MISCELLANEOUS Size of rubber motor	⅛—30	⅜—30	⅛—30	⅜—30	⅜—30	⅜—30	⅛—30
Lubricant	Yes	Yes	Yes	No	Yes	Yes	Yes
Best time	11:47	11:23	11:04	10:30	10:20	8:10	
Weight of model less rubber	.09 oz.	.11 oz.	.09 oz.	.11 oz.	.115 oz.	.12 oz.	.09 oz.

To improve your own endurance model, study these comparative details of 1930's seven greatest indoor planes. Please don't ask for additional information. Kit 21, announced on page 46, will contain drawings and full information about every one of these models.

Build an Indoor Fuselage Ship

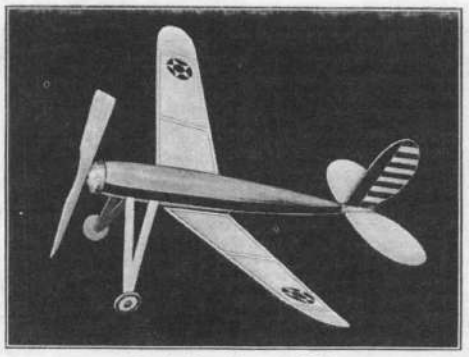
By Merrill Hamburg, *Secretary of the Airplane Model League of America*

THE day of the fuselage model has arrived. Flying sticks are fun—they'll always give the best duration. But the fuselage ship, with its enclosed motor, its beautiful appearance, and great flying qualities, is the new thrill in model aviation.

The indoor fuselage ship described herewith is a trim, neat performer. Study the photograph and drawing. Notice the streamlined balsa veneer fuselage; the sturdy, tapered wings; the one-piece landing gear struts. Here's a ship that will challenge your construction ability, and more than repay you when you launch it.

The A. M. L. A. has prepared a kit that will save you much time in building. It contains the two halves of the hollow fuselage, formed and trimmed, ready for assembling. It has a nose cap, completely finished, that will save you from building the three-piece front bearing. The tail plug is turned and slotted to receive the tail group. You can get the kit by sending 75 cents in check or money order to the A. M. L. A., American Boy Building, Second Boulevard at Lafayette, Detroit, Mich.

If you don't get the kit, you'll need the following material: 2 pieces of balsa 1-32 x 1 1-2 x 8 1-2; 1 piece of balsa 1-32 x 1 x 9; 1 balsa propeller block 1-2 x 5-8 x 7; 6 pieces of balsa 1-16 x 3-32 x 6 1-4; 1 piece of balsa 1-8 x 1-8 x 3 1-2; 8 inches of .010 straightened music wire; 18 inches of .020 straightened music wire; 2 pieces of 5-16 gummed craft tape; 1 sheet of Japanese tissue; 1 tube of cement; 2 thrust washers; 1 propeller bearing (see Fig. 7); 1 propeller shaft; 1 rear hook; 2 wing clips; 1 rubber motor; a block of wood (preferably balsa) 1 1-4 x 1 1-4 x 8 3-4 for the fuselage form.



Here's the ship, assembled.

The ship has a number of neat features. There's the removable tail plug with the tail group attached. There's the N. A. C. A.-type cowling. And there's the all-balsa fuselage. If you get the kit, the building of these parts will be simplified. Yet, if you have built stick models, you'll be able to do a satisfactory job with your own materials.

The first—and hardest—job is the fuselage. It's a streamlined hollow form, made of flat balsa, 1-32 in. thick. To build it, you'll have to adopt good mechanical practice, and that means making both a template to check the front-to-rear shape and a wooden form.

Fig. 1 shows the template. Cut it out of stiff cardboard to the dimensions shown.

The wooden form may be turned from a block 1 1-4 x 1 1-4 x 8 3-4. If you haven't a lathe you'll have to whittle and sand it down to the right shape. Fig. 3 shows you how to get started by drawing end diagonals and describing a circle that's the same size as the end section of the fuselage. To check the shape of this form, you might cut out circles from stiff cardboard—each circle corresponding to the diameter of the fuselage at a given point. (Notice the varying diameters in Fig. 1.) Also check constantly with your template.

With the form finished, you're ready to shape your two flat pieces of veneer. These pieces are 1 1-2 in. wide by 8 1-2 in. long. That gives you a little extra stock at the ends for trimming. Soak one of the two pieces in boiling water for three or four minutes to make it pliable. Then bend it over the form and wrap it with cloth tape—don't use the sticky kind. When you've finished the first half, do the second.

After the halves are dried, you must trim them for cementing. Fig. 4 shows you how to do this. Support the form on two V-blocks. Over it place one-half the fuselage and hold it in place with pins. Next, adjust the V-blocks back or forth until the form is exactly level. Then, with the safety razor blade supported on a height block, you can do a neat, straight job of trimming.

Now lay out your wing-clip slots along the center of the lower half of the fuselage. Fig. 5 shows their size and position in relation to each other, and the side elevation of the ship (top of plate) shows their location from front to rear. Each slot is 3-4 in. long and 5-16 in. wide. When the slots are cut, glue in position the wing-clip stick, 1-8 x 1-8 x 3 1-2. (Fig. 5.)

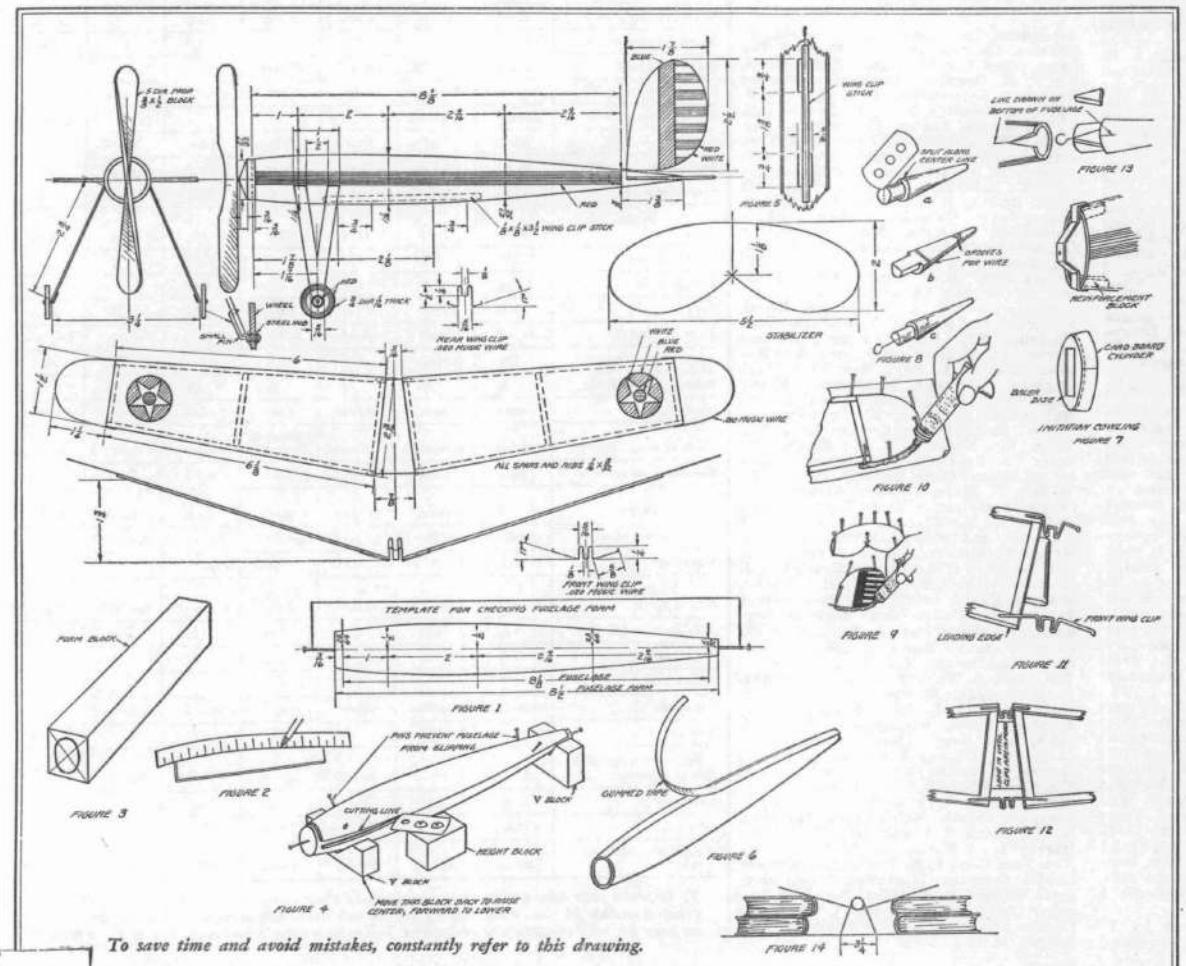
Now you're ready to assemble the two halves. Do it with gummed tape, as shown in Fig. 6.

If you have the kit, your nose cap comes ready to fit over the fuselage. If you're using your own material, follow Fig. 7. You'll have to bend a flat strip of metal as shown in the top drawing and bore a hole in it, for the propeller shaft. Cement it to the front end of the fuselage with reinforcement blocks, so that the strain of the wound-up rubber won't break the thin balsa veneer.

Next, construct a cowling in two pieces, a flat disc of balsa slotted to receive the propeller shaft, and a cardboard collar. The bottom drawing, Fig. 7, shows the detail. Slip the cowling on to the fuselage, over the propeller bearing, and glue it in place.

YOUR next job is the tail plug. In the kit this plug is made of one piece and is slotted to receive the stabilizer. If you're making it at home, whittle the plug out of balsa and split it into two halves (Fig. 8.) The drawing shows how to slot the plug. The straight slot is just 1 1-8 in. from the intersection of the cross slots. Later, you'll glue the front edge of the stabilizer to the

(*Continued on page 36*)



To save time and avoid mistakes, constantly refer to this drawing.

Build an Indoor Fuselage Ship

straight slot and the rear to the cross slots. On the other half of the plug glue the rear hook—the drawing shows how.

To shape the stabilizer, outline it in pencil on a sheet of drawing paper. Cover the outline first with a sheet of wax paper and then with Japanese tissue. Insert pins as shown in Fig. 9, to hold all in place. Then place the .020 wire inside the pins and glue the wire to the tissue.

Apply the cement to the outside of the wire to prevent the paper from puckering. When the glue is dried, trim the paper and glue the stabilizer to the tail plug.

Follow the same procedure in making the rudder. Cement the rudder to the top half of the tail plug.

The wing is constructed in two halves. Use the same method you used in making the stabilizer. First draw out the two halves, following the dimensions given in the drawing of the wing. Then lay over the drawing the wax paper and the tissue, holding the tissue in place with pins. Now cut spars and ribs to fit the drawing and cement them in place on the paper. Place a drop of cement at each rib and spar joint.

Now drive pins around the wing-tip outline as shown in Fig. 10. Then glue in the .010 wire outline. When the layout is dry, trim off the extra paper, making sure to *leave in* the paper between the two halves of the wing.

Your front and rear wing clips are shown in the drawing. Bend them carefully to the shapes shown. These clips, remember, determine not only the dihedral angle, but also the angle of incidence and sweep-back. The details will be correct if you follow the drawing.

Fold the wing with paper sides together and press the spurs of your wing clips into the front and rear spars. Then cement the clips in place. Figs. 11 and 12 will help you. Now the paper between the wings—which has helped you to space the wings just the right distance apart—may be cut out.

The landing-gear struts are cut from balsa 1-16 in. thick, with a sharp razor blade. Cement the struts to the sides of the fuselage as shown in the drawing. Fig. 14 shows you a way of supporting the fuselage between books while the landing gear is drying.

You may make the wheels by cementing together two flat paper cones, using thrust washers inside of each apex to act as bearings. Or, if you wish, you may cut the wheels from balsa. The front elevation shows you how to bend a small pin to act as an axle. First slip the wheel on the pin. Then bend it to the proper shape and glue it to the landing gear.

Every model builder knows how to carve a propeller. If, however, you're a beginner, you'll want to get an A. M. L. A. manual. This tells you not only how to make a propeller, but gives you all the other elementary steps in model building. You may get the manual by sending five cents (please put a coin in a coin card, cut out of cardboard) to the A. M. L. A.

In assembling the ship, it's important to line up the stabilizer carefully with the wing. Since your stabilizer is glued to the tail plug, you must do that by correctly fitting the plug to the rear end of the fuselage. Glance at Fig. 13 (upper right-hand corner of plate). Notice the V-shaped wedge glued to the bottom of the plug. This wedge is cut out of the bottom of the fuselage, so that wedge and slot fit together. To determine just where to cut the V, put the plug in place and turn it until the stabilizer and wing are correctly lined up. Then draw a line along the bottom of the fuselage and the plug. After that, cut the V from the fuselage, as shown in Fig. 13, and cement it to the plug, along the line you have drawn.

October, 1930

A. M. L. A. Chat

About the Activities of the 400,000 Members of the Airplane Model League of America

HOW did Joe Ehrhardt win the Wakefield Cup?

Nobody can tell better than Mark L. Haas, member of THE AMERICAN BOY staff who took the party of model champions to Europe as guests of the magazine and the Stinson Aircraft Corporation. And here's what Mr. Haas has to tell:

"We were ready for any kind of weather—and we got *every* kind. The Wakefield Contest was held in connection with the annual Halton Aerodrome Exhibition, so there were thousands of spectators. It did my soul good to hear the British entries complaining about the weather, for I knew that if we won there would be no qualifying adjectives applied to our victory. 'Beastly weather, by Jove,' they said. 'I say, a wicked day!' And we agreed—it was a real test for the models. Occasional rain, a wind that jabbed instead of blowing steadily. Gusts that would flip a plane over before it could get up enough power to fight.

"A British entry made the first trial and flipped over before it left the runway. We insisted that this be called 'no flight,' for he hadn't had a chance to test conditions. His next try was more successful—he made 35 seconds. Joe Ehrhardt flew next. He had decided to use the same plane that won the A. M. L. A. Contests three weeks before, though he had extra wings and props and another fuselage ready. His plane weighed about three ounces—that first British ship weighed ten! But Joe's ship had power, as was shown when it held its own against the worst wind of the day. His first flight was 64 seconds. The next British entry—captain of the British team—made Joe's flight look weak, though. He made 84 seconds. Applause and yells from the sidelines—excited announcements from

Here it is, in The American Boy office! The Wakefield cup! Joe Ehrhardt and E. P. Grierson, general manager of The American Boy, are looking at it.

the loud speakers — congratulations from us.

"Joe wasn't bothered a bit. He knew his plane could do close to three minutes, and he knew just why it hadn't done it on that first flight (a knot of rubber prevented the motor from unwinding; the plane came down dead stick, with a third of the turns still in the rubber). Let me say right now that Joe Ehrhardt didn't win any contests on luck or somebody else's reputation. He knows aerodynamics from birth to the grave. He was chairman of our speaking committee whenever anybody wanted to talk aviation.

"Flights continued. Bill Chaffee did 26.6 seconds, which was just good enough to get him sixth place. Ray Thompson did 37 seconds, but the flight was disqualified because he accidentally pushed his plane in launching. But the wind and not the judges gave Ray the count, for he picked up his ship with a dustpan. Bill did the same thing on his next flight. But in the meantime Joe's turn came again, and he had three minutes written all over his face. He had so much power in his ship that it went almost straight up—snickered at the wind—then lit out for points north. His official time was 155 seconds. England had seen its best outdoor fuselage flight, and the crowd certainly appreciated it.

"Joe gave at least two dozen lectures on model aviation to builders who crowded around him and his plane asking questions. He was at the service of anyone who wanted information."

That contest was just one day in the champions' European trip. They saw London at breakneck speed, went to Antwerp and Brussels, motored through the war zones of Belgium and France, spent ten days in Paris. They reached home in the middle of August, and collectively they had gained 38 pounds!

THE AMERICAN BOY is going to give League members tips on Ehrhardt's winning model in a late winter issue. Information won't be available before that time, however.

The plane is powered with four strands of 1-16 in. flat or two strands of 1-8 in. flat rubber. For your first flight give the rubber about 150 turns. If, on launching, the ship has a tendency to turn left and go into a spiral dive, try giving the left wing more washin—you do that by bending the wing clip so that the leading edge of the left wing is higher. If necessary, you may also give the ship a little less left rudder.

Did you ever see the ship that Colonel Charles Lindbergh is now flying? It's a low-wing monoplane with a rounded streamlined fuselage and tapered wings. In fact it looks almost exactly like the model you've just finished. The latest and best thing in modern, efficient airplane design!

You're due for some great fun, when your indoor fuselage model leaves your hand on its first non-stop flight around the chandelier and back!

Build an All-Weather Twin Pusher

By Merrill Hamburg

Secretary of the Airplane Model League of America

HERE is an outdoor twin pusher that conforms to the new National Aeronautic Association weight rules. It's a sturdy, all-weather ship that will outfly a gusty wind—the right ship for this summer's outdoor model airplane contests.

Model builders will remember the big step taken by the N. A. A. last year when it announced that in all official contests, outdoor ships must have at least 125 inches of wing area; wings must be double-surfaced; and—most important of all—ships must weigh at least one ounce for each 50 square inches of wing area. In other words, outdoor ships must be heavier!

Nearly all builders realized the need for these rules. They knew that in the past, flimsy indoor ships had won outdoor contests. They knew that a lucky air current would give the lighter ship a tremendous advantage. They knew that the outcome of the contest depended mainly on the air conditions at the moment of launching, and that the best ship frequently didn't win.

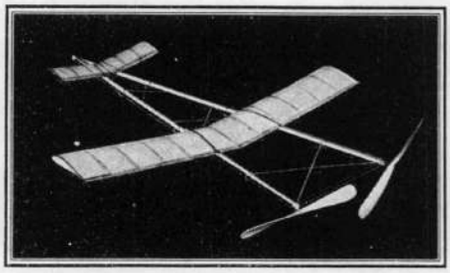
Yet, at the 1930 contests conducted by THE AMERICAN BOY in Detroit last June, many ships were too light, and had to be weighted down with BB shot, nails, and extra rubber, to conform to the rules. Then the Weather Man took a hand to demonstrate that the light ship is the wrong one for outdoor contests. A sharp, gusty wind proceeded to crack up one plane after another.

But the Weather Man wasn't able to injure the ship of Lawrence Hankammer, Des Moines contestant. Nor did Hankammer have to add BB shot and nails. Months before the contest he had decided to distribute the extra weight demanded by the new rules where weight was needed. He had designed a ship that was heavy and sturdy throughout. And although he didn't win the national contest, his twin pusher was conceded to be one of the best-flying, best-constructed of them all. It delivered two flights, in bad weather, of 235 and 110 seconds to win second place.

This article describes Hankammer's model. It has a heavier wing and stronger frame than previous twin pushers. It has ingenious clips to hold the wing and elevator to the frame. It even has a propeller shaft support so that the propeller will run true, down to the last revolution.

The League has prepared no kit for this ship. All the material required is readily obtainable at any model airplane shop. Here's what you'll need:

One 1-16 x 2 x 36 in. balsa strip for wing ribs; one 1-16 x 1 x 18 in. balsa strip for elevator ribs; two 5-16 x 5-16 x 18 in. balsa leading edges; three 1-8 x 1-2 x 18 in. trailing edges; one 3-16 x 1-4 x 14 in. elevator leading edge; four 1-32 x 3-16 x 40 in. balsa cap strips; four 1-16 x 5-16 x 40 in. balsa longeron side pieces; two 5-8 x 1 1-4 x 12 in. balsa propeller blocks; one 3-16 x 3-8 x 6 in. balsa strip for clip blocks; one 1-16 x 5-16 x 18 in. balsa for bulkheads; three sheets Jap tissue; one can of thinner; one can of banana oil; one tube of cement; five 1-16 x 1-4 x 15 in. bamboo; 70 feet 1-8-30 flat rubber thread; two pieces of music wire, one .035 diameter and the other .026 diameter; two drilled thrust bearings; four brass washers; and small rubber bands for wing and elevator clips.



The new outdoor twin pusher.

Start with the wing. Study the drawing, noting particularly the Eiffel Pescara 400 airfoil with its camber on the lower surface as well as the upper. This wing surface is most efficient when tilted upward at a one degree angle.

Construct the two halves of the wing separately. The 13 ribs are cut out of 1-16 in. flat balsa and the front ends cut off so that they may be butt-jointed to the leading edge. To save weight, cut three holes out of all except two ribs, which will be used for the end ribs of the wing.

Both the leading and trailing edges should be shaped to fit the airfoil of the wing. To shape the leading edge, it's best to use a template cut out of brass, similar to the one shown in the drawing.

When the ribs are glued to the leading and trailing edges—don't glue on the center and end ribs until later—cut the leading and trailing edges to a length of exactly 17 1-2 in. Then place the tip ends of the halves under books so that the tips will be just two inches off the table. The centers should be resting on the table with the spars overlapping about 1-16 in. With a sharp razor blade, cut down through both spars at the same time so that you can glue the two halves of the wing together in a neat butt joint. Put the center rib in place when you glue the halves together, and then glue on the end ribs.

THE wing is covered with Jap tissue. Be sure to iron out all creases in the paper before you begin. The covering is then done in the usual fashion. (If you're just beginning to build model planes, send five cents to the A. M. L. A. and ask for the A. M. L. A. manual. This tells you not only how to cover wings, but gives you a complete technique in model plane building, including the carving of propellers, bending bamboo, shaping balsa, and making wire parts. No builder should be without the A. M. L. A. manual.)

The elevator is constructed in the same way as the wing and needs no further explanation except for the two small location blocks. These blocks are glued to the trailing edge after the frame is made, to keep the elevator in position on the "A" frame.

The "A" frame consists of two built-up balsa longerons joined together with bamboo braces. The top and bottom strips of each longeron are 1-32 in. thick, 3-16 in. wide, and 40 in. long. The side strips are 5-16 in. wide. The bulkheads are spaced one inch apart, and inside the two ends of each longeron are end plugs two inches long. Notice, in the detail drawing, how bulkheads 1-32 in. thick are alternated with plugs 1-2 in. long. The plugs add both weight and strength. Be sure, in constructing the longerons, to keep all strips aligned so you'll have a straight job.

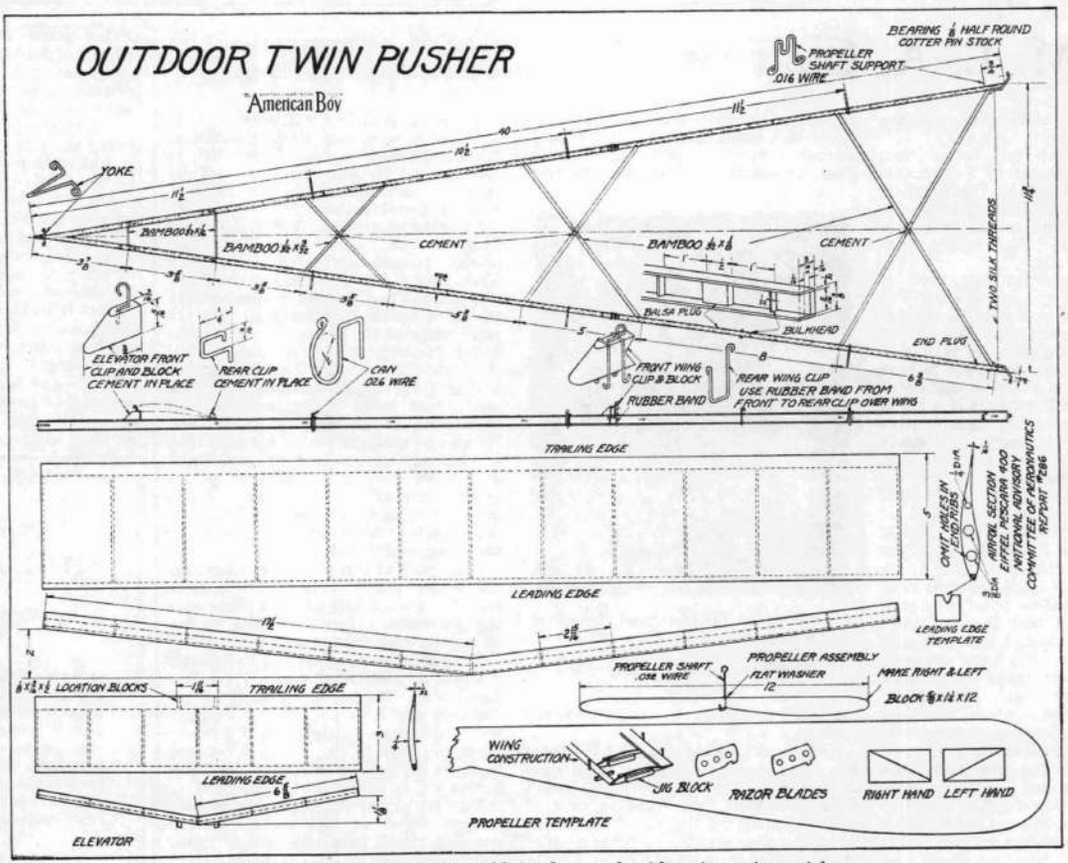
The drawing gives you the size and location of the bamboo braces. You simply slit little holes in the longerons at the proper places, and insert the sharpened ends of the braces. Don't glue any of the braces in place until you have lined up the frame so that the open ends are just 11 3-4 in. apart.

The drawing shows you the yoke at the closed end of the frame, the location of the metal cans that enclose the motors, and the two thrust bearings at the open end. An innovation in Hankammer's model is the propeller shaft support, which is glued to the longeron just 3-4 in. from the thrust bearing. The propeller shaft runs in the "U" of this support, the purpose being to keep the propeller from wobbling when the motors start to run down.

The side view of the frame shows the method of holding the wing and elevator in place. The wing blocks and clips are shown in detail. They're especially valuable because they not only hold wing and elevator firmly in place but are easily adjusted.

The two propellers on the twin pusher turn in opposite directions to neutralize the torque, or twisting force. The A. M. L. A. manual will tell

(*Continued on page 44*)



The new built-up frame gives additional strength without increasing weight.

Build an All-Weather Twin Pusher (*Continued from page 13*)

you how to carve propellers and the drawing gives you the distinctive shape of Hankammer's props. Notice, on the drawing, that in order to guarantee that one propeller shall be right-hand and one left-hand, the end diagonals on the propeller blocks must be drawn from different corners.

In assembling the model, place the wing so that the leading edge is about 17 1-2 in. from the open end of the frame. The elevator goes on the front, at the spot indicated by the drawing.

Notice that the angle of incidence—front-to-rear angle—of the elevator is determined by the balsa block, and that the elevator is prevented from twisting on the frame by the two location blocks that fit inside the longerons.

Slip small washers on your propeller shaft to prevent wear between the thrust bearing and balsa propeller. Then put the shafts in your thrust bearing.

The two ten-strand, 18-30 rubber motors may now be folded and tied. Each strand is 40 inches long, which allows enough slack to enable you to get a few extra winds, but not enough to interfere with flying. One end of each strand is looped over the propeller shaft hook and the other is connected to the yoke by means of the S hook.

The sole purpose of the S hook is to permit you easily to disengage the motors from the yoke and attach them to the egg beater winder. Be sure to place the motors in the cans along the frame. Otherwise the tension will tend to pull the frame out of shape.

Before powering the ship, glide it to see if the adjustment is correct. You do this by holding the plane at the rear end and giving it a gentle shove. If the ship noses down too sharply, adjust the wing forward to increase the lift. If the plane has a tendency to nose up and stall, adjust the wing back.

For your first trial flight, 750 winds are enough. Although you can wind the rubber by hand for your trial flights, it's best to use an egg-beater winder.

It takes two boys to use the winder—one boy to hold the ship by the propeller end, the other to do the winding. Stretch the rubber to three times its length in order to get the maximum number of turns on the motor.

Hankammer gave his motors 1250 turns at the 1930 National Contest. In spite of a hard, tricky wind that cracked up ships on his right and left, he got consistently good flights all day.

Because he had designed his plane in the first place to conform to the weight rules; because he had followed the intent of the National Aeronautic Association to induce boys to build huskier, more reliable planes, he got consistent performance out of his craft on a day when consistent performance was almost impossible for the lighter ships.

You'll get the same kind of results if you follow the drawings carefully in building this championship plane. You'll have a ship that you can safely launch in a hard, tricky wind.

Remember that in good aeronautics, a model plane must have two qualities—the ability to fly a long time, and reliability. Hankammer's model has both—plus.

What Ship Would You Like to Build?

FROM League headquarters you may obtain reprints containing drawings, instructions and photographs, for any one of 21 different kinds of ships, including the outdoor twin pusher described in this issue. Hydroplanes that rise from the water, fuselage ships, a soaring glider, scale models, planes that have won championships!

The reprints cost only two cents apiece—or if you order fifty or more, one cent apiece. Send your check or money order to the A. M. L. A., American Boy Building, Second and Lafayette Blvds., Detroit, Mich.

You can get any of the following:

Indoor Pusher	Improved Baby R. O. G.
Outdoor Twin Pusher	Senior R. O. G.
Curtiss Hawk—Ford Tri-motor	Culver Tractor
Hydroplane	C-4 Indoor Fuselage Model
Indoor Commercial	Fokker F-10 A—Boeing P-12 B
Spirit of St. Louis	Outdoor Fuselage Model
All-Wood Models	Small Twin Pusher
High-Climb Baby R. O. G.	All-Wood Glider
Outdoor Twin Tractor	New Baby R. O. G.
Vought Corsair	1930 Indoor Endurance Model

1930 Outdoor Twin Pusher

Build a Different Model!

It's the builder who constructs something *different* who makes new discoveries in model aviation. By departing from regular design, he may learn facts of importance. Become an experimenter by ordering one of the following kits. A check or money order for the proper amount, sent to the Airplane Model League of America, American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich., will start you on the road to new thrills.

Kit No. 13 .....$2.25
The Outdoor Twin Tractor. Two propellers, mounted on outriggers. Built-up wing. Recorded duration, four minutes! All the necessary material including rubber motors, balsa, bamboo, tissue, glue, finished metal parts, complete plans and instructions.

Kit No. 2 .....$.65
The Indoor Pusher. An easy-to-build, simple, and dependable performer. Try modifying the design to fit your own ideas.

Kit No. 18 .....$2.00
An Outdoor Fuselage Ship. It's a low-wing monoplane, designed by Donald Burnham, national outdoor champion in 1929, for all-weather flying. It has a built-up wing, enclosed fuselage, and landing gear. In 35 flights it averaged 90 seconds!

Scale Model Plans for the Stinson-Lycoming plane..$.20
Full scale-size drawings for this famous monoplane, with instructions and photographs to help you build a two-foot scale model.

By experimenting with new and different models you increase your skill as a builder. Order one, or more, of these kits to-day!

Build the Waco Taperwing!

GOOD news for scale model builders! The A. M. L. A. has just prepared for you the scale drawings for the Waco 300 Taperwing, one of the best-known and most successful open-cockpit ships in the history of aviation!

The drawings are exceptional. They contain more helpful detail than any other plans the League has prepared. There are photographs of the ship and engine. The complete control system is pictured. Wing ribs, struts, methods of jointing are given in enlarged drawing. To get the drawing, you have only to send twenty cents in cash or money order to the Airplane Model League of America, American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich.

There's a reason for the great demand on the part of model builders for the Waco plans. Waco airplanes have made an enviable competitive record. They won first place in the Ford Reliability Tour in 1928 and 1929. In 1930 they took second and third, and were the only open cockpit ships to place within the first ten.

In the 1930 tour, Waco entries showed the quickest take-off and shortest landing of any ship. Throughout the 1428 miles of the tour, two Waco planes averaged 148 miles per hour—the fastest speed of any of the entries.

But the tour isn't the only event in which the Waco has shown its merit. In 1927, Charles Meyers won first place in the Class B Derby from New York to Spokane. In 1928, John Livingston won the transcontinental race from New York City to Los Angeles, winning all the sweepstakes prizes with his Taperwing—the ship you'll learn to build through the League's scale model plans. The Waco also won the international race from Windsor, Canada, to Los Angeles.

Waco's record, in fact, has been a long record of consistent top-notch performance. No wonder! The Waco has a top speed of 167 miles per hour and a cruising speed of 142! In other words it's a light, open-cockpit plane with the speed of a pursuiter.

That's the plane you will reproduce in a 24-inch wing span model, from the A. M. L. A. plans. The photographs give you an idea of the neat, smooth lines of the ship. Order those scale drawings and start building now

Model Builders—Attention!

Next month—plans for the airplane model that brought the famous international Wakefield trophy from England to America in 1930! Designed by Joseph Ehrhardt, St. Louis, national outdoor champion. A ship that may win you the right to represent the United States in the 1931 Wakefield contest to be held in this country. Watch for more details—IN MARCH.

Build the Wakefield Winner!

(*Continued from page 25*)

over the wing again. In windy weather Ehrhardt ties a silk thread between wing tips and fuselage, to prevent the breeze from folding the wing back. The stabilizer is held to the fuselage in the same manner as the wing.

The plane is powered with ten strands of 1-8-30 rubber. Ehrhardt says that he gave the motor 1150 to 1200 turns, on his winning flight in England. For your first trial flight, though, three hundred winds will be enough.

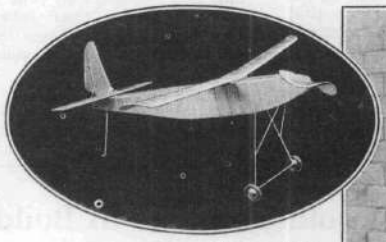
The proper setting of wing and stabilizer you may determine by experiment—the manual tells you how.

When the model is finished and tested, fly it in all kinds of weather. If you've built it properly it will stand any number of bumps. The way to better Ehrhardt's duration record is to do lots of flying, to make experimental changes in design—and then to do more flying!

Build the Wakefield Winner!

By Merrill Hamburg

Secretary of the Airplane Model League of America



Above—The plane that brought the Wakefield Cup to America. Joe Ehrhardt, Wakefield Champion, with some of his model plane trophies.

HERE'S the ship that brought the Sir Charles Wakefield cup from England to the United States. Joseph Ehrhardt, St. Louis, national outdoor endurance and Stout outdoor fuselage champion, built it. And Joe Ehrhardt, as a member of the 1930 party of airplane model champions, went to London, flew his ship, defeated English, German and Canadian fliers, and took home the Wakefield Cup.

His winning flight was 155 seconds, 58 seconds longer than his closest rival! He established a new record for fuselage models in England.

Model builders all over the country are going to welcome this ship. Its performance in England, and at the 1930 national contests conducted by *The American Boy* at Detroit, proved its ability to fly in bad weather. It has the weight and power to force its way into a gusty wind. It's hard to crack up. It has exceptional endurance.

In every respect the plane lives up to the rules that make a ship eligible for American and English contests. The motor is entirely enclosed with the fuselage. The cross-sectional area of the fuselage is slightly more than 9 square inches, which is the required area for a fuselage 30 inches long. (To get the minimum cross-sectional area for any ship, divide the fuselage length by ten and square the result. That's the minimum number of square inches you must have at the fuselage's widest point.) The wing area is just over the 125-square-inch minimum. Its weight is 2½ ounces, the necessary weight for a ship of this size.

A glance at the photo will reveal some of the unusual features of the plane. The high landing gear gives clearance for the 17-inch propeller and lowers the center of gravity. A gust of wind won't upset this model! The special section at the rear of the rudder is framed with bamboo so that it can be bent to any angle.

Ehrhardt's plane is just the model to work on when you tire of the flying stick. It's not at all difficult to construct. You'll need the following material:

4 1-8 x 1-8 x 30 in. balsa longerons; 15 1-16 x 1-16 x 18 in. balsa bulkheads; 3 3-32 x 3-32 x 18 in. balsa for bulkheads; 3 1-32 x 1 x 18 in. balsa rib stock; 2 1-16 x 3-16 x 18 in. balsa wing spars—front; 2 1-16 x 1-8 x 18 in. balsa wing spars—rear; 2 1-16 x 1-8 x 18 in. balsa trailing edges; 3 1-8 x 1-8 x 18 in. balsa leading edge, wing and stabilizer; 1 7-8 x 1 1-2 x 17 in. propeller block; 1 1-2 x 1 x 4 in. balsa for front and rear plugs; 1 1-16 x 1-4 x 18 in. balsa stabilizer spar; 1 1-16 x 1-8 x 18 in. trailing edge for stabilizer; 2 1-16 x 1-4 x 15 in. bamboo; 2 2-in. aluminum disc rubber-tired wheels; 1 6-in. length .032 music wire for propeller shaft and rear hook; 2 3-16 flat brass washers; 3 sheets Japanese tissue; 1 large tube Wanner's cement; 1 can banana oil; 25 feet 1-8-30 rubber motor.

The A. M. L. A. is not offering a kit for this ship. Model airplane material is readily obtainable at reliable supply houses. Many boys prefer to use the materials they have at home and add only what additional material they need, rather than buy a full kit.

Before you start, study every detail in the drawings. If you go to work with an accurate mental picture of the different parts, you'll work faster.

Start with the fuselage. Note that it's simply a long box, tapered at both ends, with closely spaced bulkheads. The two side panels are just alike. Start with a side panel.

The best procedure is to make a full-size ink drawing of this panel. Lay over the drawing a sheet of waxed paper and on top of that a sheet of tissue. Stick pins through the paper along the longerons, as shown in the detail drawing at the bottom of the plate. Then cut your longerons to size, paint one side with banana oil, and lay them on the tissue between the pins. Next, cut your crosspieces to size, paint with banana oil, tip the ends with cement, and put them in place. That's all there is to it. Give the layout several hours to dry and the panel is finished.

Make the other side panel in just the same way. Then place both side panels on edge, over the drawing of the top panel, and hold them in place with blocks of wood as shown in the drawing. Now cut your crosspieces for the top panel, tip the ends with glue, and lay them in place. Add the crosspieces for the bottom panel, tie string around the whole to keep it in position while the glue is drying, and the fuselage is finished except for covering the top and bottom panels. That's a simple matter.

If you're a beginning builder, you'll want a copy of the A. M. L. A. Manual telling how to cover framework with tissue, bend bamboo, carve propellers, and perform all the other elementary operations of model building. To get the manual, send five cents in cash to the A. M. L. A., American Boy Building, Second and Lafayette Blvds., Detroit, Mich.

The fuselage, like the wing, is doped with a mixture of five parts of acetone and one part of banana oil, to shrink and waterproof the paper.

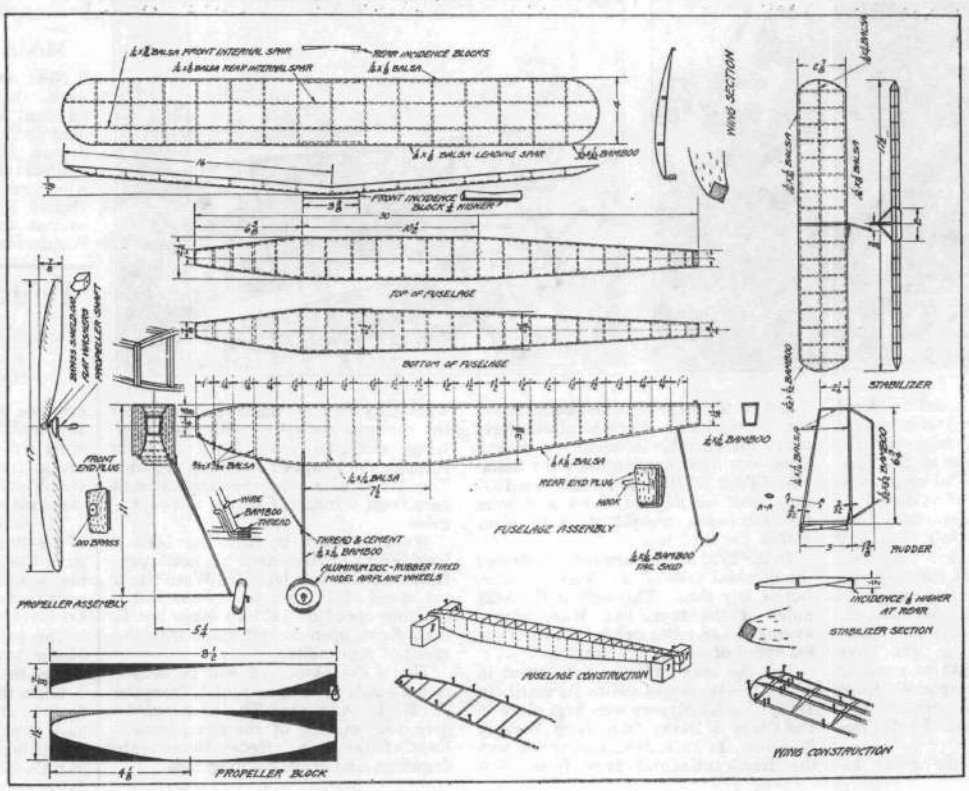
THE drawing gives you the size and construction of the landing gear. You can build it without any added instructions. Be sure, though, when glueing the struts to the fuselage, to scrape away the paper. It makes a stronger joint. Note the tail skid is glued to the left longeron, not to the center of a crosspiece.

The aluminum disc, rubber-tired wheels used on the landing gear are fairly heavy and serve to lower the center of gravity, thereby stabilizing the ship. Don't use light wheels!

You'll have no trouble with the wing. The drawing shows you the unusual wing section—one with both the upper and lower surfaces cambered. It shows you the internal construction with its two spars (members running the length of the wing) in addition to leading and trailing edges. In the lower right-hand corner of the plate is a detail drawing showing how the ribs are cut to fit over the two internal spars. The upper drawing shows you the blocks on which the wing rests, the front block a quarter of an inch higher than the rear, to give the wing the proper angle of incidence (front-to-rear angle of the wing.)

The wing is built in two separate halves. The A. M. L. A. manual, if you're a beginner, will give you all the necessary details on wing construction.

The stabilizer is built and covered in the same manner as the wing. Study the drawing at the right side of the plate. Notice that the stabilizer is streamlined—that its top and bottom surfaces are curved opposite to each other. Under the rear of the stabilizer, Ehrhardt has a wedge-shaped block that slants the stabilizer forward at about a three-quarter degree angle. In other words the stabilizer has negative angle of incidence.



Rudder details are given in the drawing. Notice that it's a balsa frame except for the rear section, which is made of bamboo, to permit the flier to bend it as he wishes. The rudder is cemented in place on the stabilizer and braced by four small pieces of 1-32 x 1-32 bamboo.

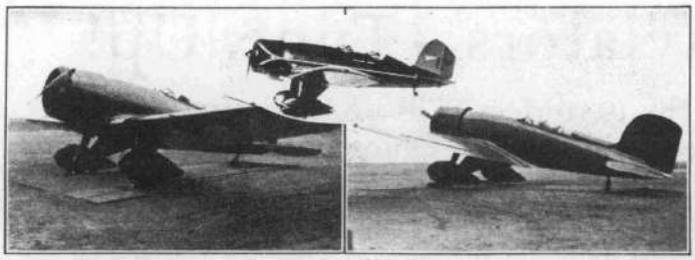
The propeller is carved from a block 7-8 x 1 1-2 x 17 in. The manual tells you how to do it. The drawing suggests the distinctive shape of the blades on Ehrhardt's prop.

Notice in the drawing that the propeller is backed by a brass shield to prevent wear. The front plug—1 in. across the top, 7-8 in. across the bottom, and 1 1-4 in. high—is mounted right on the propeller shaft. The rear hook is in the rear plug. Both plugs are carved from solid balsa, to fit the front and rear openings.

The wing is held in place on the model by small rubber bands looped over the wing, under the fuselage, and

(*Continued on page 43*)

Ready for You!



The Detroit-Lockheed Sirius.

THE Detroit-Lockheed Sirius scale model drawings are ready! Prepared for *The American Boy* by the Lockheed engineers, these plans enable you to build an exact model of Col. Charles A. Lindbergh's transcontinental record breaking plane.

In 1929, officials of the Detroit Aircraft Corporation asked Col. Lindbergh for his idea of the most perfect airplane. He told them. Low wing, for great lift and minimum resistance; open cockpit, because air mail pilots are partial to them; complete streamlining—for speed. He wanted to know if a sliding hatch could be arranged to cover both cockpits in rough weather. The answer was the Sirius.

The Lockheed engineers originally designed the Sirius to fill Col. Lindbergh's personal requirements, but they produced an airplane that could readily be converted into a mail plane, or fast transport ship. The standard job is built with two cockpits containing dual controls, for instruction purposes, covered with sliding hatches of pyralin. Drawings for the retractable landing gear to be included on later models of the Sirius are not available. Please do not write for them.

The Sirius has an unusually high pay load of 1250 pounds, and a high speed of 178 miles per hour. Flying his Sirius, Lindbergh crossed the continent in slightly over thirteen hours!

The fuselage is available either in metal or wood construction, while the wing is built up on spruce spars and is covered with plywood instead of the usual fabric. Standard colors are—fuselage, black; wing and tail surfaces, red; and red striping.

Further construction details and hints for builders are on the scale drawings. Get yours now by sending twenty cents in cash or money order to the Airplane Model League of America, American Boy Bldg., Second and Lafayette Blvds., Detroit, Mich.

An Announcement to Airplane Model Fans

THERE will be no national A. M. L. A. contest in Detroit in 1931. The officers of the Airplane Model League of America have reached this decision only after much consideration, and it's with sincere regret that they make the announcement. And they wish you to know just why it has been necessary to take this step.

Previous contests have been supported in the following way: The Detroit Board of Commerce has generously contributed $7,500, or about half of the total cost. *The American Boy* has contributed its staff for the management of the contest; it has paid for the trips to Europe, and the final banquet; it has solicited from interested people added funds for the support of the tournament. In addition, *The American Boy* has supported and conducted the activities of the League throughout the year.

This year, however, the Board of Commerce, with money enough only to carry on its own activities, is unable to contribute its $7,500. The Board has approached other organizations, without success. And without this support, the officers of the League feel it best not to hold the contest in Detroit this year.

The following contests, however, will be conducted in Dayton, Ohio, this summer, under the direction of Merrill Hamburg, secretary of the A. M. L. A.: the Mulvihill Outdoor, The National Scale Model, the Stout Outdoor Fuselage, and the international contest for the Sir Charles Wakefield cup. The last two contests are for fuselage models—ships with built-up fuselages that entirely enclose the rubber motor. The Wakefield contest, which has never before been held in the United States, took place last year at Halton, England, and was won by Joseph Ehrhardt, American outdoor and fuselage champion. The date will be Monday, June 29. The place, Dayton, Ohio.

For further information on the above contests, and for general airplane model information, address Merrill Hamburg, Secretary, Airplane Model League of America, 300 Davis Ave., Dayton, Ohio. Until further notice, this address will hold good for all communications with the A. M. L. A.

Although *The American Boy* is not conducting the contests this year, the magazine will continue to publish airplane model articles. The magazine will still be your authority for the newest and most up-to-date ships. And during the coming year the magazine will publish the best planes developed in 1931.

On behalf of its membership of 400,000, the League wishes to thank the Detroit Board of Commerce, the hundreds of interested individuals, and *The American Boy*, for the impetus they have given model aviation during the past four years.

—THE OFFICERS.

Model Aviators--Tune Up!

The 1931 Meet Will Be Held in Dayton, Ohio

THE time is June 29-30. The place, Dayton, Ohio, home of the father of aviation, Orville Wright. The event: the national airplane model contests of 1931.

Hundreds of boys from all over the country will gather in Dayton on June 29, bringing with them the outdoor and fuselage ships that may set new records for future generations of model builders to aim at. And they'll not only compete for official National Aeronautic Association trophies and cash prizes, but for five trips to Washington, D. C.!

The national contests this year will be under the supervision of Merrill Hamburg, secretary of the Airplane Model League of America. As explained in the April issue, *The American Boy* has regretfully decided not to conduct the contests this year because the Detroit Board of Commerce, which has generously given $7,500 at previous contests, has been unable to continue the support this year, and because the magazine—which has financed the League, given trips to Europe, the final banquet, and the services of its staff in conducting the meet—feels that it shouldn't bear the entire expense.

The Dayton contests, however, will include all the divisions of previous meets except the national indoor endurance contest. There is no auditorium in Dayton large enough for the indoor.

But there will be the official Mulvihill Outdoor, with cash prizes of $500, and the Mulvihill trophy; the Stout Outdoor Fuselage contest, with the national Stout trophy and $175 in cash; the international fuselage contest for the Wakefield Cup and cash prizes; and the Scale Model, with a trophy and $500 in cash. For the first-place winners in all divisions there will be trips to Washington, D. C., in a Ford Trimotor plane! In each of these contests any boy under 21 will be eligible—there will be no junior and senior divisions.

All contests will be held at the famous Wilbur Wright Field, and the near-by Fairfield Air Depot. At Wilbur Wright, the entrants, in addition to competing for the national championships, will see the unique museum that contains every type of aircraft engine.

Upper left: The Mulvihill trophy. Center: You'll go through the laboratories and hangars at Wilbur Wright Field. Lower right: The International Wakefield Cup.

They will go through the testing laboratory of the U. S. Army Air Corps, where every new piece of equipment is tested. They will see, and perhaps wear, electrically heated flying suits, watch wind tunnel tests, and learn how the Army makes the air safe for its pilots.

Headquarters for the contest will be the Hotel Biltmore, where special rates of two dollars a night will be given the modelers.

There will be a big banquet in downtown Dayton, and sightseeing through the city. And when the contest is over and prizes awarded, five winners will climb into the big, all-metal plane, for a trip to the national capital.

This is the first year that the Wakefield contest has been held outside of England. Last year, Joseph Ehrhardt, St. Louis, a member of *The American Boy's* party of champions that toured Europe, won the contest against English, Canadian, and Continental model fliers, at Halton, England. He brought the cup back to St. Louis, and will defend his title at Dayton, June 29 and 30.

To be eligible for the Wakefield contest the ship must resemble a real airplane. Its motor must be completely enclosed by the built-up fuselage. The maximum cross section of the fuselage must equal the square of one-tenth of the length of the fuselage. That is, if your fuselage is 30 inches long, its maximum cross sectional area must be at least 30 over 10 squared. (30 divided by 10 is 3. And 3 squared makes 9 square inches.) These same rules hold good for the Stout Outdoor Fuselage contest, except that the wing must also be built up in the Stout contest.

In the Mulvihill outdoor contest, the model must have a wing area of at least 125 square inches and must weigh at least one ounce for every 50 square inches. These rules are laid down by the N. A. A. and are designed to prevent freak planes from competing in the outdoor.

The main requirement in the scale model contest is that the ship must have a wing span of exactly 24 inches, must be built to scale, and must be accompanied by the plans of the large ship it resembles—unless it is built from scale model plans that have been published in *The American Boy.*

To enter the contests, there are other important rules that you must know. Write immediately to Merrill Hamburg, Secretary, A. M. L. A., 300 Davis Ave., Dayton, Ohio—this address will hold good for all League communications—*enclose a two-cent stamp,* and ask for contest instructions.

You will receive entry blanks which you must fill out and return to League headquarters in Dayton. You will receive a parents' consent blank, which you'll have filled out and take with you, and which will be necessary if you win one of the airplane trips to Washington. If you are entering the scale model contest you will be given instructions on packing your model and the date it must arrive in Dayton.

You will be reminded that when you buy your ticket for Dayton you must ask the ticket agent for a *reduced fare certificate.* Unless you live in the Rocky Mountains or the Pacific Coast, you must have this certificate. It will enable you to get half fare for your return trip and will enable other contestants to make the same saving.

Full contest instructions will be mailed you by Merrill Hamburg. Write him to-day. Keep in mind the four contests: Mulvihill Outdoor, Stout Outdoor Fuselage, International Wakefield, and National Scale Model. Get your flying models tuned up, put the finishing touches on your scale models, and prepare to go to Dayton to battle for the official National Aeronautic Association 1931 championships!

National champions of 1931 will take off in a Ford Trimotor, circle Dayton, and head for Washington, D. C.

Program

Fourth National Contest

of the

Airplane Model League of America

JUNE 29-30, 1931

Wright Field
Dayton, Ohio

MATERIEL DIVISION
U. S. ARMY AIR CORPS

JUNE 29th

8:00 A. M. Arrival at Wright Field on interurban

8:30 A. M. Assembly in Auditorium
Greetings .....
Brig. General H. C. Pratt
Chief of Materiel Division
Explanation of program to contestants .....
Mark Haas, Staff of American Boy

9:00 A. M. Mulvihill Model Contest

12:00 M. Inspection of airplanes on line
(The different types will be described by a Materiel Division engineer over the loud speaker)

12:30 P. M. Luncheon (Box lunches will be available)

12:35 P. M. Flying demonstration by Air Corps pilots

1:00 P. M. Mulvihill model contest continued

5:00 P. M. Contests concluded

9:30 P. M. "Looping Comet:" Just an Army airplane, some fireworks, and—
Capt. St. Clair Streett,
Chief of Wright Field Flying Branch

NOTES: The "Looping Comet" will be flown over the old McCook Field. It may be seen to especial advantage from the Main Street bridge or from the roofs of any of the hotels.

On both days special guides will conduct groups of boys through the Materiel Division laboratories during the intervals when they are not participating in contests.

JUNE 30th

8:00 A. M. Arrival at Wright Field

8:20 A. M. Stout Fuselage Contest

8:30 A. M. American elimination of Wakefield Trophy Contest

12:30 P. M. Luncheon (Box lunches will be available)

12:40 P. M. Moving pictures in Auditorium

1:30 P. M. Wakefield International Contest

4:00 P. M. Return to Dayton-Biltmore Hotel

7:00 P. M. Banquet at Dayton-Biltmore Hotel
William B. Stout, Ford Motor Company, Toastmaster.
Award of prizes

SCALE MODEL CONTEST

Non-flying models built to exact scale of full-size military or commercial airplanes. 24-inch wing span required. Models judged on accuracy to scale, fidelity to design, neatness of workmanship and finish.

Models will be on display at Dayton-Biltmore Hotel throughout period of contest.

Former Winners:

1928—William Loftis Dennis, Miami, Florida.
1929—Louis Proctor, Vancouver, Washington.
1930—William Chaffee, Detroit, Michigan.

MULVIHILL TROPHY CONTEST

Requirements: Flying models; wing area, not less than 125 square inches; weight, one ounce for each 50 square inches of surface.

Contest is for duration, the plane remaining in the air the longest elapsed time being the winner. Contestants entitled to three trials each. The longest of the three flights is accredited.

Former Winners:

1928—Joseph Lucas, Chicago, Ill.
1929—Donald Burnham, West Lafayette, Ind.
1930—Joseph Ehrhardt, St. Louis, Mo.

STOUT FUSELAGE CONTEST

Requirements: Flying models; wing area not less than 125 square inches; maximum cross section of fuselage not less than the square of 1/10 of the length; fuselage enclosed, except for two square inches, left open for operating elastic.

Contest is for duration, the flight conditions being the same as for those of the Mulvihill Trophy Contest.

Former Winner:

1930—Joseph Ehrhardt, St. Louis, Mo.
(First contest for this trophy in 1930)

INTERNATIONAL WAKEFIELD TROPHY CONTEST

Requirements: Flying models, taking off from a platform under own power; maximum cross section of fuselage not less than the square of 1/10 of the length; fuselage enclosed.

Contest is for duration, the flight conditions being the same as for those of the Mulvihill Trophy Contest.

This trophy presented by Sir Charles Wakefield, Bart, of England for international competition. It was first contested for in 1929 and won by a British entry. In 1930, it was won by Joseph Ehrhardt, St. Louis, Mo., and brought to the United States. British models forwarded this year for entry in contest.

Prizes:

All, except the Scale Model Contest, carry trophy awards. The Mulvihill trophy is a bronze figure of a winged man; the Stout trophy is an airplane mounted on a built-up base of crystal and silver; the Wakefield trophy is a large silver cup.

The Scale Model Contest and the Mulvihill Trophy Contest carry awards of eight cash prizes: $200, $100, $75, $50, $30, $20, $15, and $10.

The Stout Fuselage Contest carries awards of three cash prizes: $100, $50, and $25.

The Wakefield International Trophy contest winners will receive $50, first prize; $25, second prize.

The top-prize winners of the four contests, will receive in addition a flight in a Ford tri-motor airplane to Washington, D. C., where they will be received by President Hoover for whom they will have the opportunity of demonstrating their winning models.

Wright Field 6-22-31-2M

Reprinted from the American Boy Magazine, June 1931

Dayton Is Your Goal!

You'll Compete There for the 1931 Model Airplane Championships

Merrill Hamburg, Contest Director.

NIGHT flying, demonstrated by expert army fliers, especially for you! Comets of light, cutting brilliant curves against the black sky!

That's just one of the exceptional treats in store for the contestants who gather in Dayton, Ohio, June 29, 30 for the 1931 national airplane model championships. If you haven't already entered, there's still plenty of time, if you act now. Write to Merrill Hamburg, secretary of the Airplane Model League of America, 300 Davis Ave., Dayton, Ohio, and ask for entry blanks.

All flying contests—the Mulvihill Outdoor Endurance, the Stout Outdoor Fuselage, and the International Wakefield contest — will be held at the famous Wright field. This is the experimental field for the U. S. Army Air Corps. Here, new ships and new devices are tested. Here, expert pilots perform every conceivable flying stunt in the necessary work of experimentation.

And it's here that you will get your greatest thrill, whether you win a prize or not. Through the courtesy of General Pratt, commandant of the field, all the latest types of army airplanes will be wheeled out on the apron, and pilots will be on hand to explain the ships to you. There'll be a "flight tutor" in operation—a cockpit mounted on a frame to test the cadet for "flight sense."

You'll see engine and wind tunnel tests. During the lunch hour you will receive lectures on airplane performance, and after lunch ships will be sent into the air to illustrate the points given in the lecture. A liberal two-day schooling in army flying!

In addition to the three outdoor flying contests, you may compete in the national scale model event. In this division, it's not necessary for you to come to Dayton. You may pack and express your model, and be eligible for the trophy and the $500 in cash prizes. Your scale model must reach A. M. L. A. headquarters by June 14.

In the Mulvihill outdoor contest, too, there will be an official National Aeronautic Association trophy and $500 in cash prizes. In the Stout Outdoor Fuselage, you'll compete for the Stout trophy and $175 in cash. In the Wakefield contest, you'll be competing for the international trophy brought to this country for the first time by Joseph Ehrhardt, St. Louis, last year, and cash prizes.

Unfortunately, since Dayton has no hall large enough, there will be no indoor contest this year.

Five winners—the first-place winner in each of the four divisions of the meet, and one other contestant yet to be designated—will win trips to Washington, D. C., in a Ford trimotor!

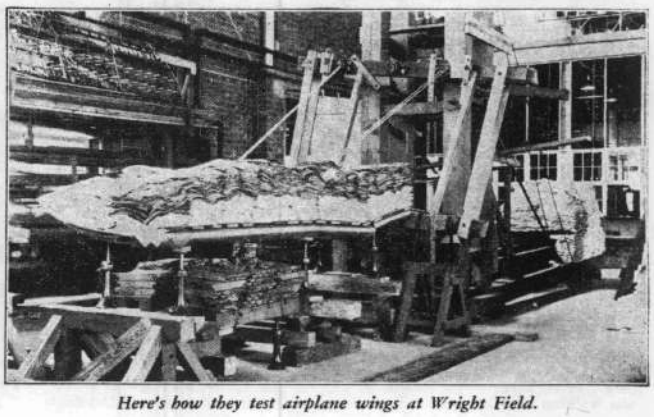
In addition to the competition, there will be a big banquet at the Biltmore Hotel, your downtown headquarters during the two days. And there will be sightseeing through the city, which is headquarters for many of the nation's largest industries. Great times are waiting for the 1931 contestants!

Write now to Merrill Hamburg, at the address given, asking for entry blanks and a digest of the official rules. You are eligible if you are under 21—in other words if your birthday was prior to June 28, 1910.

Your headquarters—the Biltmore.

In addition to the rules and entry blanks, you will receive a parent's consent blank, which must be filled out and brought to the contest in case you win one of the airplane trips. You will receive instructions on the reduced fare certificate. Unless you live in the Rocky Mountain district, or on the West Coast, you must ask the railroad ticket agent for a reduced fare certificate when you buy your ticket to Dayton. Then, if enough contestants have certificates, you'll be able to get half fare on your return journey.

Keep these rules in mind! There's plenty of time to get into the 1931 championships if you get busy now!



Here's how they test airplane wings at Wright Field.

Up Go the Records

As New Champions -- and One Repeater -- Are Crowned at Fourth A. M. L. A. Meet

Feinberg, record-smasher.

President Hoover met the champions at the White House. With the President here (left to right) are Ehrhardt, Lamb, Mr. Hamburg (secretary of the A. M. L. A.), Feinberg, Klazura and Mr. Haas (of The American Boy).

"Bill" Stout.

AMERICA'S airplane model builders again have a new set of records to shoot at.

For America's champions met in Dayton, Ohio, on the last two days of June for the Fourth National Airplane Model League of America Contests, and in three of the four contests held they established astounding new marks.

Most astounding was the record made by Emanuel Feinberg, Detroit boy, in the William B. Stout fuselage contest. Feinberg sent his model up for an official time of 29 minutes 30 seconds—and behind that flight there lies a story.

But before the story, hear of some of the other records. Gordon Lamb, Oakland, Calif., placed at the head of the scale model division with his beautiful Boeing mail plane, scoring 98 points out of a possible 100. Steve Klazura, Chicago, won the outdoor duration event for weighted models with a twin pusher flight of 340 seconds—the only winning mark that fell short of 1930 records. And Joe Ehrhardt, St. Louis, 1930 winner of the duration and Stout fuselage contests and of the Wakefield Cup contest in England as well, kept the big silver Wakefield Cup for a second year by flying his fuselage model for 4 minutes 24.8 seconds.

The contests opened early Monday, June 29, when 157 contestants had registered at headquarters, the Biltmore Hotel. Rain greeted the flyers as they reached Wright Field, the huge army airport near Dayton, but Brigadier General H. C. Pratt, chief of the material division of the Army Air Service, met them and turned the hangars, the laboratories and the field over to them! For four hours they examined the big wind tunnel and the experimental airplanes, the mechanical "flight tutor" and the big airplane parachute, all under the leadership of special guides furnished by the army. They saw movies and learned all about aviation! Then box lunches in a hangar were followed by an obliging weather man who brought out a hot sun, and the outdoor endurance event was on. All flying contests were under the direction of Mark L. Haas, of the *American Boy* staff.

Officials for the contests were uniformed army officers, equipped with stop watches and side-carred motorcycles to follow flights. All afternoon the flights continued, and when 8:30 rolled around the last trial had been made and Klazura's 340-second flight was declared winner. One hundred sixteen boys competed in the contest.

The thrill of the evening was furnished by Captain St. Clair Streett, who gave a startling flying exhibition over old McCook Field. Captain Streett took his ship 12,000 feet in the air, touched off fireworks that covered the plane, and went through gyrations and dives and swoops and wheels that made a true "flying comet" of the ship.

Tuesday morning, early, the Stout contest got under way. Very soon Richard Herrick of Champaign, Ill., had a record of better than 16 minutes. Along came Kenneth Diget, Battle Creek, Mich., with almost 18 minutes!

Meantime Feinberg had sent his model into the air on a trial flight, watched it fly for 17 minutes, followed it—lost it! Feinberg had no other model available, and he was walking back toward the field disconsolate, when an automobile passed him. In the car he saw two boys holding a fuselage model—and he recognized it as his! He claimed it, sent it off for an official flight, and it remained in sight of judges for 1770 seconds—far ahead of any other flight. The model was lost again, but Feinberg didn't care this time!

Hot weather and exceptionally good flying conditions, according to Merrill Hamburg, A. M. L. A. secretary and general director of the contests, accounted for the fine flights. Six boys passed the 7½-minute mark in the Stout contest.

This contest over, trials for the Wakefield contest commenced. Rules for the contest say that any nation may have six entrants. United States had six, England five (English builders sent their models to be flown by American experts) and Canada four. Ehrhardt, who had managed less than 3 minutes in the Stout contest, finally got his model to performing, and his 264.8-seconds flight won the cup for the United States. American boys took second and third; a model built by R. N. Bullock of England and flown by Joseph Lucas, Chicago, was fourth. Bullock's model flew 162 seconds, a better flight than those which have won all previous contests in England.

Meantime scale model results had been announced—judging of the more than 50 models had been done by army engineers at Wright Field—and Lamb's plane proved to be one point ahead of the Stinson-Lycoming built by John Roche, Kansas City. Five of the models rated better than 90 per cent, very much the highest record yet made in a contest of this kind.

The banquet offered the boys in the evening by the Dayton chapter of the National Aeronautic Association and the Dayton Chamber of Commerce closed the program. Speakers included William B. Stout, A. M. L. A. president; Griffith Ogden Ellis, *American Boy* editor; and Dayton civic officials. Orville Wright, the first man to fly a heavier-than-air machine, was introduced.

The contests were sponsored by the George D. Wanner Company of Dayton. Aid of General Pratt and of Stanley Somers, head of the editorial department at Wright Field, added to the success of the contests.

Following the contests the four winners—Lamb, Klazura, Feinberg and Ehrhardt—went to Detroit for a six-day visit, as guests of the Wanner Company; then, in a big tri-motored monoplane furnished by the Ford Motor Company, they flew to Washington to meet President Hoover and display their models to governmental officials. Prizes in the outdoor duration and scale model contests were $200, $100, $75, $50, $30, $20, $15 and $10 to the first eight boys; in the Stout contest, $100, $50, and $25; and in the Wakefield contest, in addition to the trophy, $50 and $25. First place in the special scale model contest for finish jobs on models, sponsored by Berry Brothers, Detroit, was shared by Lamb and Arthur Kronfelt of Arlington, Mass. The traditional Stout indoor contest was not held, due to lack of adequate auditorium.

Leaders in the various contests were:

SCALE MODEL CONTEST

Gordon Lamb, Oakland, Calif., Boeing mail plane, 98, first; John Roche, Kansas City, Mo., Stinson-Lycoming, 97, second; Quan Gue Cheong, San Francisco, Vought Corsair, 94, third; C. Nelson Black, Columbus, Ohio, Vought Corsair, 93½, fourth; Clarence Sharp, Kansas City, Mo., Lockheed Sirius, 91, fifth; Matthew Moziek, Springfield, Mass., Boeing P-12 B, 89½, sixth; George Schairer, Bronxville, N. Y., Fleet, 87, seventh; John Szwczyk, Easthampton, Mass., Curtiss Hawk seaplane, 86½, eighth.

OUTDOOR DURATION CONTEST

Steve Klazura, Chicago, 340 seconds, first; Jack Purvis, Toronto, 320, second; Ernst Pinkert, St. Louis, 296, third; Alan Loofbourrow, Columbus, Ohio, 290.4, fourth; Vernon Boehle, Indianapolis, 287.2, fifth; Ralph Kummer, St. Louis, 283.5, sixth; Elmer Lueckerath, Ferguson, Mo., 237.8, seventh; Arthur Mott, Cleveland, 225, eighth.

STOUT FUSELAGE CONTEST

Emanuel Feinberg, Detroit, 1770 seconds, first; Kenneth Diget, Battle Creek, Mich., 1061, second; Richard Herrick, Champaign, Ill., 968, third; Walter Bray, Logan, Ohio, 840.5, fourth; Casimir Leja, Chicago, 792, fifth; Jack Kistler, Detroit, 458.1, sixth; Elmer Lueckerath, Ferguson, Mo., 250.8, seventh; Ruick Myers, Chicago, 271.8, eighth.

Hiroshi Kagimoto came from Hilo, Hawaii.

WAKEFIELD INTERNATIONAL CONTEST

Joseph Ehrhardt, St. Louis, 264.8 seconds, first; Elmer Lueckerath, Ferguson, Mo., 217.8, second; Richard Herrick, Champaign, Ill., 207.2, third; R. N. Bullock, England, 162, fourth; Albert Levy, Toronto, 151.5, fifth; Ross Farquharson, Vancouver, B. C., 138, sixth; Edward Becvar, Chicago, 118.8, seventh; Edward Miller, Oak Park, Ill., 106, eighth.

PAINT JOB CONTEST

Gordon Lamb, Oakland, Calif., and Arthur Kronfelt, Arlington, Mass., tied for first.

A Champion

August, 1934

MARTIN DICKINSON, 15-year-old Seattle schoolboy, had faith in his ability to construct airplane models. Otherwise he wouldn't have shipped four neat scale models to Bristol, England, via air mail to compete in the Twelfth Annual Eisteddfod and Arts and Craft Exhibition of the Wesley Methodist Church.

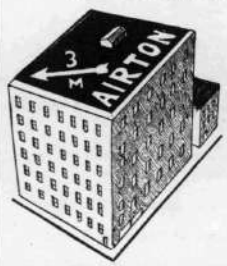
When Dickinson won first prize over 154 contestants, he was undoubtedly pleased and surprised. But he had prepared well for victory. In the four years previous he had built 100 scale models. Furthermore, he was preparing for a career as an experimental aviation engineer. Wasn't he going to West Point—if he could get in—and then try to get into one of the government's experimental stations? Building model planes wasn't only a hobby with him—it was part of his life's work.

The four models that won him the English championship were a Fokker D7, a Curtis P 6E, and two Curtis A8's, all constructed of white pine and realistically painted. The P 6E had chrome yellow wings and olive drab fuselage and carried the insignia of the 17th Pursuit; the A8, an attack plane, carried four machine guns and bore the insignia of the 90th Attack. They were built carefully to scale.

Combat ships, all of them, good enough to swoop down on ancient Bristol and carry away the prize cup in the name of the United States!

Air Mark Your City!

Enlist in THE AMERICAN BOY Campaign, Conduct Your Attack, and Win an Honorable Discharge Signed by Herbert Hoover, General Fechet, Admiral Moffett, Colonel Henderson!



ONE of the greatest needs of air commerce to-day is the proper air marking of cities. Air travel is growing. Mail, freight and passenger planes are filling the skyways. Pilots, flying through fog and storm, sometimes get off their courses. To locate themselves, they need to learn quickly the names of the towns over which they pass!

You and the other fellows of your town can help these pilots. Enlist in THE AMERICAN BOY Air Marking Campaign. The method of marking recommended by the U. S. Department of Commerce is shown in the illustration. The name of the city in large block letters, an arrow pointing to the nearest airport or landing field, the distance to it—that's all. A godsend to the doubtful pilot!

"Members of the A. M. L. A. can do a great service for aviation," says William P. MacCracken, assistant secretary of aeronautics, Department of Commerce, "if they will promote the Department plan. This plan, though it may be modified in the future, is extremely serviceable, and you can go right ahead on it."

The job isn't hard. Organize the air enthusiasts of your community. Find out from a hardware dealer how much it will cost to paint the name of your town in the largest possible letters on the largest roofs. Raise the small amount of money involved by holding airplane model exhibitions or other entertainments.

No matter how small your town is, air mark it. Pilots know the large cities. They won't know the small ones.

Start now! These air notables are behind you: Herbert Hoover; Major General J. E. Fechet, Chief of the U. S. Air Service; Rear Admiral W. A. Moffett, Chief, Bureau of Aeronautics, U. S. Navy; Colonel Paul Henderson, president of the Aeronautical Chamber of Commerce; Frank A. Tichenor, publisher of "Aero Digest" magazine; William P. MacCracken; Grover Loening, president of the Loening Aeronautical Engineering Corporation; and C. S. "Casey" Jones, famous pilot and operations manager for the Curtiss Flying Service.

Win an Honorable Discharge!

These men, through THE AMERICAN BOY, will present, to the boys who conduct successful campaigns to air mark their towns, engraved discharges bearing their signatures.

To enlist in this campaign of peace time service to your country, fill out the enlistment card below and send it to Air Marking Headquarters with a two-cent stamp. A full plan of attack will come back to you in the next mail.

ENLISTMENT CARD

American Boy Air Marking Headquarters,
550 West Lafayette Boulevard,
Detroit, Michigan.

I wish to enlist for service in the American Boy Air Marking Campaign. Please send me the plan of attack.

Signed .....
(Write clearly)

Here's the Red Flash

It's a Simple Soaring Glider That Means Death to All Gliding Records

By Merrill Hamburg

WHEN Red Gardner designed the Red Flash, he took man-carrying gliders as his patterns.

"Real gliders fly well," he reasoned, "and models of them ought to. They're not like airplanes—the problem of balance caused by the heavy motor is absent here, though it makes all the difference in the world in model airplanes."

So Red—Detroit model expert known to hundreds of national contest entrants—designed his little balsa glider along strictly professional lines. He completed the ship, and decorated it to his taste—death's head and all! Then he took it out for a trial flight—

And it soared for two minutes, first time up! It climbed almost a thousand feet, traveled more than a quarter of a mile.

It's easy to build and to fly. The beginner can do it as well as the expert—and the fellow new at model planes will find it one of the best jobs in the world to start on.

These materials are all you'll need: 2 pieces balsa, 3/32x1¾x18" for wings; 2 balsa blocks ⅝x1¼x12" for fuselage; 1 piece balsa 1/16x1¾x18" for stabilizer and rudder; 1 balsa block ½x½x1¾ for wing block; 1 piece bamboo 1/16x1/16x7" for skid; airplane cement. If you want an exact duplication of the Red Flash you'll need also crimson aniline dye and some black India ink.

First, the fuselage. The drawing shows two views of the fuselage, top and side, drawn on a series of squares. On a sheet of light cardboard draw similar squares, making sure that each one is exactly ¼". Now make a dot at each point on these lines where the curve of the fuselage crosses them. Next, connect these dots—the best way to insure a regular curve is never to draw a line connecting less than three dots. Do not draw the skid down in the side view. Next, cut out along these curves, and you'll have full size templates of the top and side sections of the finished fuselage.

Now cement the two 12" blocks together. Use only a few drops in the center of one 1¼ x 12" face of each block. The blocks must be taken apart after the outside is shaped, and too much cement would make this difficult.

Now trace the side outline of the fuselage on each side of the cemented block, making sure that the template is placed in a corresponding position on each side. Carve the bottom of the piece to this outline without attempting to round the edges. Notice how the fuselage sweeps up almost to a point at the rear. With your other template trace the top view of the fuselage and shape the block to the curve.

The oval marked AA shows the exact size and shape of the fuselage through the section under the wing marked AA. Cut out a cardboard template to fit around one side of this oval and shape the fuselage to fit it at AA. This can be done best by working down the four corners and then shaping the rest to fit the template. The entire fuselage is rounded to an oval. Locate and cut out the flat surfaces on top of the fuselage for the wing block and stabilizer. A pattern for the wing block shape may be made by folding a sheet of paper as shown in the drawing—directly below the AA section—and cutting out the dimensions given on the wing block drawing.

You're now ready to carve out the inside of the fuselage. Separate the two blocks and with a small gauge cut out the inside of the fuselage, leaving a wall 3/32" thick. Be careful not to pierce the wall! Smooth the inside with sandpaper, and check the thickness of the wall with outside calipers. When the inside has been carefully smoothed to the correct thickness cement the two halves together again and set the whole thing aside to dry.

Now start on the tail surfaces. Lay out on a piece of 1/16x1⅜x10" balsa the outline of the stabilizer. By folding a piece of paper at the center as recommended for the wing block, halves may be cut out with exactly the same shape. When opened out flat this paper can be used as the template. The stabilizer should be sanded to form a section similar to the one shown in the drawing. The center should be left thick to stiffen the stabilizer, but the ends may be tapered almost to a knife edge.

Lay out the rudder and shape it as you did the stabilizer. Notice that the bottom is cut out to fit around the stabilizer and along the end of the fuselage. The rudder is cemented to the fuselage over the stabilizer with the edge having the greatest curve to the rear. It is tapered to a thin edge at the upper end.

Now finish the fuselage. First, sand the entire piece to a smooth surface with the edges of the halves fitting snugly together. In order to get the correct shape at the extreme rear, sand down the oval cross section until it is almost flat. Using the folded paper method, you can cut a template of the cockpit opening from light cardboard. After tracing around this template, cut the opening with a razor blade or sharp knife. Sand the edges.

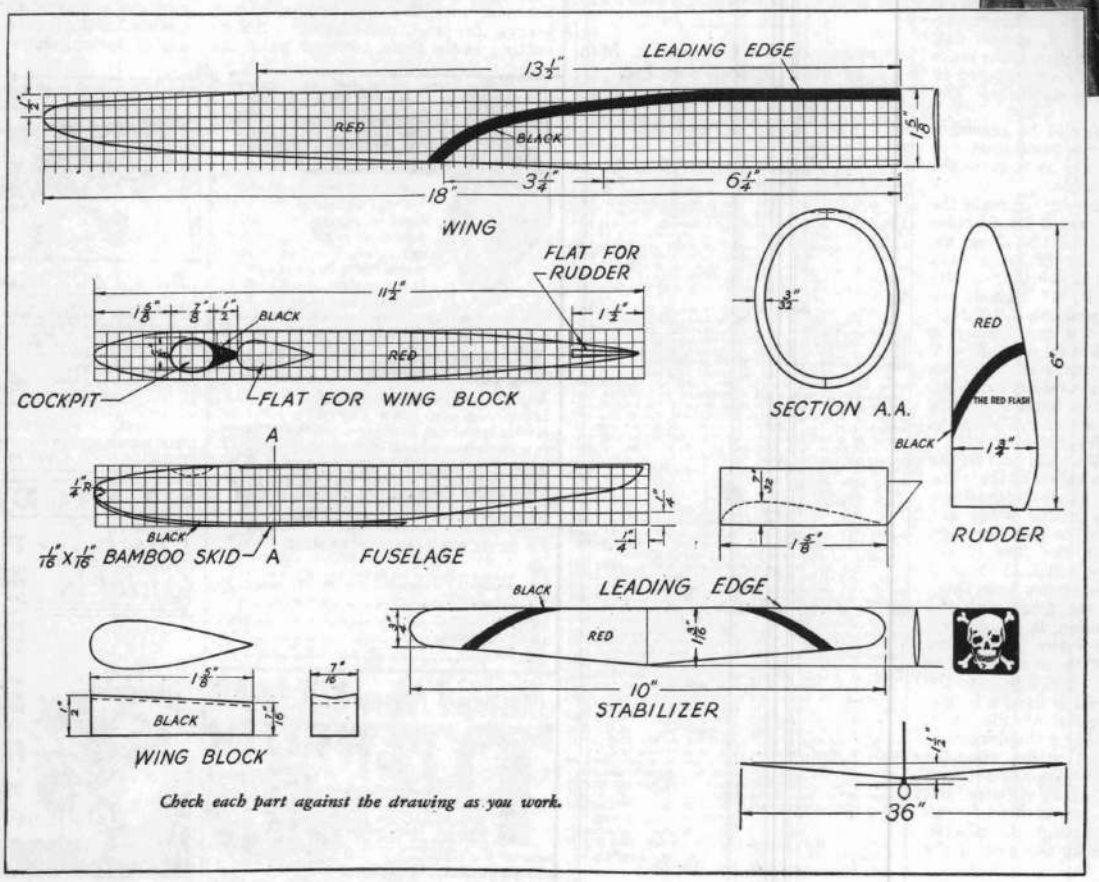
The drawing shows a bamboo skid bent to the shape of the fuselage and cemented in place. Although this isn't necessary, it will protect the soft balsa fuselage in landing, and adds to the realistic appearance of the finished model. Split a piece of bamboo 1/16" square and 7" long and bend it over an alcohol lamp or candle flame to fit the curve of your fuselage. An electric soldering iron can also be used. Bamboo becomes very pliable when heated and can be bent to any shape. Care must be taken, however, not to overheat the piece or it will char.

THE Red Flash's 36" wing is formed by cementing two halves together at the center. If you wish the exact shape used by Gardner on his model, lay out a template by the ¼" square method used in obtaining the fuselage curves. Almost any graceful curve will serve. Notice that Gardner's wing had a straight leading edge that extended out toward the tip for 13½" and a straight trailing edge for 6¼" from the center.

If you make a wing template, you can use it to lay out both wings by turning it over for the second. Be sure that you plan both a right and left wing. If you decide to shape your own curve without a template, lay the right and left wings together, making sure that edges are flush, and cut both halves at the same time. This will insure having them exactly alike.

(Continued on page 51)

"Red" Gardner, designer.

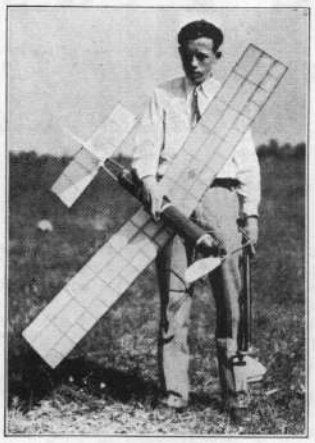


Check each part against the drawing as you work.

Build a Compressed Air Monoplane

HERE'S a ship that will stamp you as a graduate model plane expert—The "Rich Champion," a sturdy compressed-air craft that will soar through the skies like a Japan-to-Seattle airplane!

Every builder, sooner or later, wants to try his skill on a model with a real power plant rather than the usual rubber bands. The "Rich Champion," with its compressed-air motor capable of 250 pounds pressure, its solidly braced construction, and its simplicity of design, is just the job to give you a great model-airplane thrill.



It's air-driven and air-supported.

The "Rich Champion" has proved itself in competition. In 1929 it won first place in the National Recreation Tournament in Louisville, Kentucky. It has a wingspan of 60 inches and a fuselage length of 36 inches. With its dihedral of 9½ degrees, it is extremely stable in flight. And it will regularly make flights of 35 to 40 seconds with a pressure of only 150 pounds.

You can get plans for the model by sending ten cents to *The American Boy*. The drawings include full-size reproductions of wing, stabilizer, and rudder ribs, incidence block, and propeller blade, and full written instructions that will guide you to successful completion.

Please send the ten cents in coin—you can make a coin card out of a scrap piece of cardboard. Address your letter to the Airplane Model Editor, *The American Boy Magazine*, 550 W. Lafayette Blvd., Detroit, Mich.

Plans will be distributed as long as the limited printing lasts. Be wise and—SEND FOR YOURS TO-DAY.

Here's the Red Flash!

(Continued from page 26)

Before sanding, set the wings together in their finished position and mark the under side of each. This may seem useless, but many a veteran model builder has finished up a set of glider wings only to find on assembling that he has sanded the curve on the wrong side of one of them. The drawing shows the recommended curve. Notice that most of the sanding is done on the upper surface. The lower surface, almost flat, should be sanded enough only to make it smooth. The halves are tapered in thickness, as was the stabilizer. The ends are paper thin.

The two halves should be cemented together with the ends resting on two books in such a manner as to raise the tips 1½" above the table.

While the wings are drying, make the wing block. This is carved from a piece of balsa ½" square and 1⅝" long, using the template of the flat wing block surface for laying out the shape. Notice that the block is ½" high at the front or curved end and only 7/16" high at the rear or pointed end. When it has been finished to size, a shallow V is cut in the upper surface. This can be done by making a straight cut down the center of the block along its entire length. After the center cut is made, the V can be easily finished with a sharp knife. This V should just fit the V formed by the two halves of the wing. Cement the wing block on the fuselage.

The control surfaces and wings are, of course, cemented to the fuselage. Books placed under the tips of the wings and stabilizer will hold them in place while drying. If you look along the fuselage from the front with the glider in flying position, it should look like the little sketch shown in the lower right hand corner of the drawing. The rudder should be at right angles to the stabilizer. The model is dyed a bright red with the exception of the black curved lines indicated on the drawings.

The nose of your model must be weighted in order to gain the forward speed necessary to obtain sufficient lift for soaring. This can be done by inserting lead slugs through the cockpit, and cementing them in the nose of the fuselage.

Remember, too, that this model is not designed for stunting, but rather for soaring. Take it up on a hill with the wind sweeping up the slope, and launch it just as you would if you were taking off in it—into the wind. Don't throw it—just release it from your hand. If you've properly balanced it, you'll see it rise aloft on the breeze and soar away.

Statement of the Ownership, Management, Circulation, Etc.

Required by the Act of Congress of August 24, 1912, of THE YOUTH'S COMPANION COMBINED WITH THE AMERICAN BOY, published monthly at Detroit, Michigan, for October 1, 1931.

State of Michigan } ss.
County of Wayne }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Elmer P. Grierson, who, having been duly sworn according to law, deposes and says that he is the Business Manager of THE YOUTH'S COMPANION COMBINED WITH THE AMERICAN BOY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher—The Sprague Publishing Co., Detroit, Mich.
Editor—Griffith Ogden Ellis, Detroit, Mich.
Managing Editor—George F. Pierrot, Detroit, Mich.
Business Manager—Elmer P. Grierson, Detroit, Mich.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)
The Sprague Publishing Co., Detroit, Mich.
G. O. Ellis, Detroit, Mich.
M. S. Sprague, Detroit, Mich.
K. C. Leonard, Detroit, Mich.
E. P. Grierson, Detroit, Mich.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)—None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

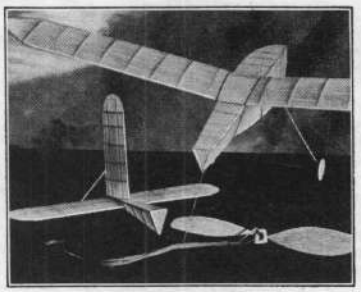
5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is.....
(This information is required from daily publications only.)

ELMER P. GRIERSON,
Business Manager.

Sworn to and subscribed before me this 18th day of September, 1931.
A. M. KIEFER.
(My commission expires June 11th, 1935.)

shown below Fig. 10, must also be reinforced. The landing gear is attached to this section, and you'll need transverse balsa braces as indicated in the section.

Build the fuselage extension in the same manner as you have done the fuselage proper. The dimensions are shown in Figs. 11 and 12. To insure your getting the large end of the extension exactly the right size, it'll be best to start with the triangular bulkhead shown in Fig. 13. This is made of two triangular pieces cut out of flat balsa, the smaller triangle fitting inside the rear end of the fuselage proper, and the larger triangle having the outside dimensions. To the exact center of the triangle the rear hook of .026 music wire is glued, as Fig. 13 shows. The fuselage extension must be built to fit the triangle.



Ready to assemble!

Figs. 11 and 12 show .016 music wire hooks glued to the outside of the fuselage extension. Fig. 14 (under Fig. 8) shows how they fit into eyes on the fuselage proper.

A short study of Figs. 11 and 12 and the photos will show you clearly how the rudder and stabilizer are glued to the fuselage extension. Notice that the rudder, Fig. 11, is set at a slight angle to counteract the twisting force, or torque, of the propeller. A brace of ⅛ sq[illegible] balsa, shown in the photos, helps to support the rudder rigidly in place.

The nose piece, Fig. 15, is carved from solid balsa and a 1/6 by 1/4 hole is cut through it to receive the propeller shaft. The small brass plate shown in Fig. 18 (near Fig. 11) is forced into the nose over this slot and acts as a bearing for the thrust washers. Before putting on the plate, however, paint the nose with cement to strengthen it. The small plate on the rear of the nose is cut from 1/16 flat balsa to fit the end of the fuselage. There's a half inch hole in it to give play to the propeller shaft.

The bamboo landing gear and tailskid are shown in detail in Figs. 19 and 20. The wheels are formed by cementing together two balsa discs, 1/32 inch thick, with the grains running at right angles to each other. The wheels are glued to the axle. Glue the tailskid to the rear end of the fuselage proper.

Feinberg laid out his propeller block according to the dimensions shown in Fig. 16. The shaded portion represents the part cut away. Notice that the top of the block is slanted off to give sweep-back to the finished prop. If you want to copy Feinberg's propeller exactly, cut your blades to the shape shown in Fig. 17. Be sure that you carve a right-handed prop—if you're in any doubt, talk to other model builders in your neighborhood before you start carving. When the job is done, cement the hub to strengthen it.

The prop and shaft assembly is shown in Fig. 18. The wing is held to the fuselage with a single rubber band. Power the ship with six strands of ⅛ inch flat rubber, and if there's a strong wind blowing when you test your ship outside, use eight strands.

If you've built the ship properly you'll find it one of the most satisfactory performers you've ever built. An engineer once said something like this: "The most efficient machine is usually the most graceful one." That's the Feinberg fuselage model. It's light, strong, and symmetrical—a craft that will delight your eye and astonish you with its flying quality. Take it outdoors, the first good day of spring, and watch it go!

It's the Best Ship of 1931!

By Merrill Hamburg, Airplane Model Editor

HERE'S the ship that sets a new pace in duration flight. Just as the big ships of Pangborn and Herndon and Post and Gatty are tremendously superior to the plane in which Lindbergh flew to Paris, so is the Feinberg fuselage model a vastly better ship than the fuselage jobs of a few years back.

The ship described herewith flew for 29 minutes, 30 seconds at the 1931 National A. M. L. A. meet, held in Dayton, Ohio, last summer! It set a world record. It won a national championship for its designer, Emanuel Feinberg of Detroit.

With its all-balsa construction and its sweepback wing, it's a trim, graceful craft. You'll enjoy flying it indoors this winter, and you'll get a tremendous thrill when you launch it outdoors on the first fair day of spring. But when you go outdoors have your auto handy—you may have to follow it all over the country!

Here are the materials you'll need: 12 pieces of 1/8"x1/8"x24" balsa; 12 pieces of 1/16"x1/8" balsa; 2 pieces of 1/16"x3/16"x24" balsa; 4 pieces 1/32"x1/2"x24" balsa; 1 balsa propeller block 1 3/8"x1 3/4"x12 1/4"; 1 strip 1/16"x2"x12" sheet balsa; two pieces 1/16"x1/4"x12" bamboo; 4 sheets of superfine tissue; music wire, 1/8" rubber, cement, and banana oil dope.

Here's grace and power and flying quality for you.

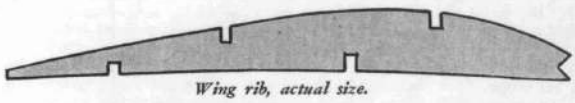
Study the drawings and photos before you begin actual construction. Have in your mind a clear picture of the ship and all its parts. Then, when you're under way, refer to the drawings each step you take.

Start with the wing. Fig. 1 shows you that the frame is all balsa except for the wing tips. You'll notice that there's a flat center section 2 inches wide at the front and 1 3/4 inches wide at the back. It's the shape of this section that gives the wing its sweepback.

To cut out your ribs, first make a template of tin from the full-size rib drawing on this page. Using the template as a pattern, cut out your 18 ribs, and then pin them together as illustrated in Fig. 3, so that you can file the notches for the spars on all ribs at the same time. This will insure your getting the notches in the same place on each rib. For this job, use sandpaper and a thin stick. Fig. 2 shows you exactly where the four notches are located.

Cut your spars from the 1/16 by 1/8 balsa, following the dimensions in Fig. 1. Feinberg constructed his wing frame all in one piece, and then cut it in two and joined the two halves by building in the flat center section. You can follow the same procedure, without further instruction. Notice that the trailing edge is tapered with sandpaper to a fine edge at the rear. The leading edge, of 1/8 square balsa, is set in the 90 degree notch shown in Fig. 2, and then sanded to the proper curve.

Fig. 4 shows the construction of the wing tips. To get the proper curve on the tip, bend a piece of 1/8 by 3/64 bamboo to the proper shape, comparing it as you work with a full-size drawing of the curve. Bamboo is pliable when heated. The bamboo curve may then be split into two pieces, and your two wing tips will be identical in shape. If you follow the drawing you'll have no trouble building the tips.



Wing rib, actual size.

When you have cut apart the two halves of the wing and are preparing to join them by building in the center section, be sure to support the tips 2 3/4 inches above the center section, using books for the purpose. The center section will have to be a hand-fitted job, since it's irregular in shape. Simply butt-joint the short center-section spars to the two center ribs and apply cement.

Cover the wing with Japanese superfine tissue, beginning with the center section and working outwards. Banana oil, applied to the leading and trailing edges, spars, and ribs, will hold the tissue to the wood. When the entire wing is covered, spray it with water to shrink the paper to the frame. Then apply a coat of airplane nitrate dope—you can get it at any model supply shop—first thinning the dope out with acetone.

Figs. 5 and 7 show the rudder and stabilizer. The same streamlined section, Fig. 6, is used for both. To construct your ribs, make a template of the full-size rib drawing shown on this page, following the same procedure as you did with your wing ribs. By referring to the drawing you can assemble and cover stabilizer and rudder without further help.

Before you start on the fuselage, give it some careful study. Figs. 8 to 10 show the top, side, and bottom sections in order. Now glance at the photo showing the ship ready for assembly. You'll see that the fuselage is constructed in two parts, the fuselage proper and the fuselage extension. The two sections are fastened together by three .016 music wire hooks. The rear section may be taken off when you wish to wind your motor with a mechanical winder. Notice, in the photo, that the rear hook to which the rubber motor is attached, is on the rear section.

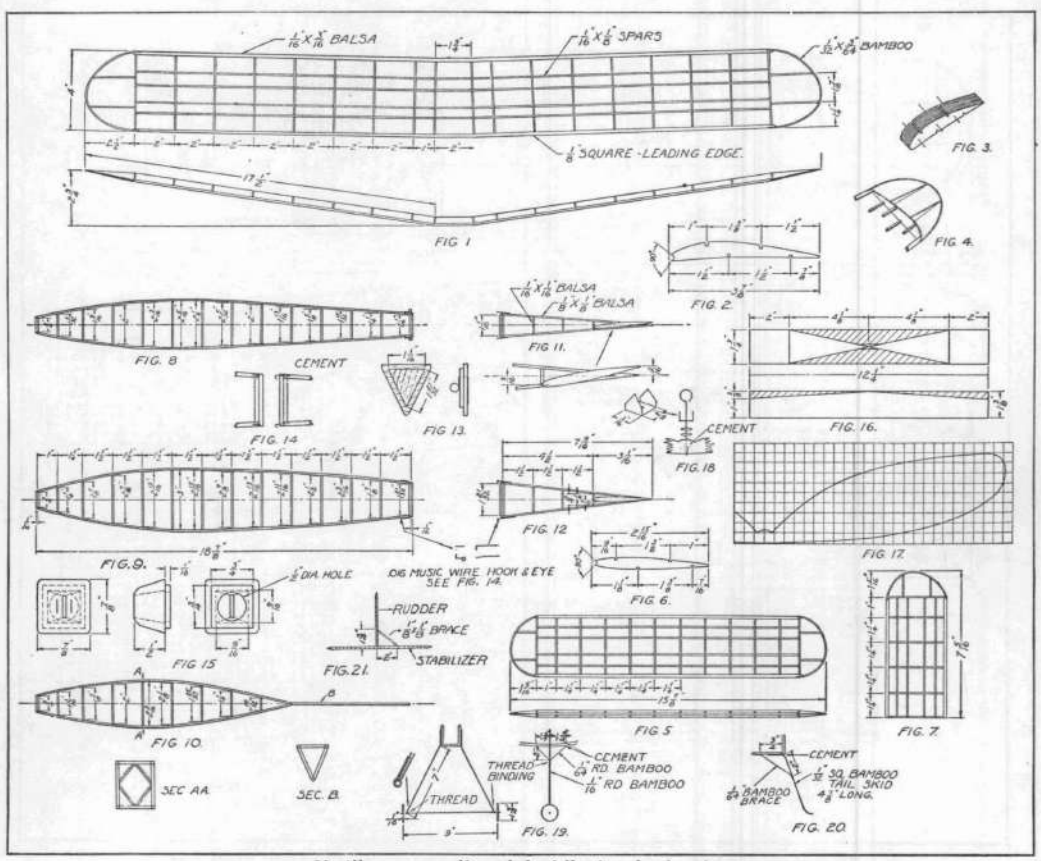
First construct the fuselage proper, starting with the top panel. This panel is made entirely of 1/8 inch square balsa. Your two longerons are 19 1/4 inches long. Cement the sixth crosspiece from the front, then the short front crosspiece, and finally the rear. Your longerons will have to bend to conform to the boatlike shape of the panel, but by laying the panel flat on the work bench and holding it in place with pins stuck into the wood, you'll be able to cement the frame without trouble. When the three crosspieces already mentioned are dry, cement in the others, cutting them to fit.

Stabilizer rib, actual size.

The bottom panel — Fig. 10 — is shorter. The longitudinal dimensions you can figure by comparing it with the side panel. The crosspieces are spaced exactly the same distance apart, and by counting back you'll find that the whole panel is 12 3/4 inches long. Construct it of 1/8 square balsa, cementing in the widest crosspiece first, then the ends, then the intermediate ones.

NOW assemble your top and bottom panels by cementing in the crosspieces shown in the side-panel drawing. Cement the widest crosspiece first, then the two ends, and last the intermediates. If necessary you may hold the framework together with thread as you work.

To add strength, reinforce the end bulkheads of the fuselage proper with 1/16 inch balsa. Section AA,



You'll save yourself work by following the drawing.

Build a Flying Model Lockheed

Here's a Ship That Looks Real--and Really Flies!

By Merrill Hamburg,
Airplane Model Editor

YOU fellows who have mastered the fundamentals of building and flying model airplanes have been asking for a model like a real ship. So here you are. Step right this way and inspect an entirely new type of fuselage model—it looks exactly like the fast Lockheed planes and it flies as well as it looks.

Everybody knows about the famous flight across the top of the world made by Sir Hubert Wilkins and Lieutenant Ben Eielson in their Lockheed Vega. Everyone remembers how Captain Frank Hawks, in the same type of plane, flew from coast to coast and back in 43 hours and 59 minutes. And of course you all know that Colonel Charles A. Lindbergh and Mrs. Lindbergh flew to the Orient last summer in a Lockheed Sirius. They're great ships!

This Lockheed model is a great ship, too, but to build it you must know the fundamentals of model construction. If you're a beginner, try out your wings on a simpler ship! Then tackle this one.

Before you start, study the photo showing the ship in flight over Wright Field, Dayton. Note its trim lines—it looks like its man-carrying original with its N. A. C. A. cowling and its streamlined fuselage and landing gear. Refer to the drawings and locate each part—get a clear picture of the ship in your mind so you won't make costly mistakes.

Here's what you'll need to build the model: 2 sheets balsa 3/64x5x21" for the fuselage; 2 sheets balsa 1/16x6-x24" for bulkheads, cowling, landing gear struts, ribs, etc.; 1 piece balsa ⅜x4x4" for cowling ring; 6 pieces bamboo 1/16x¼x15"; 1 piece balsa ⅛x5/16-x18" for the motor stick; 3 sheets Japanese tissue; 1 piece balsa 1⅝x1½x9" for propeller; and of course piano wire, cement, banana oil, and ⅛" rubber for the motor.

Start with the fuselage. Look at the top and side views in the drawing. The crosslines, lettered in alphabetical order from the front, show the location of each of the 7 bulkheads. A, shown between the two views, is a true circle 1⅜" in diameter. The true shape of the other 6 bulkheads is shown in the squared rectangles below, which are lettered to correspond with the crosslines in the views. For your templates, lay out on a sheet of cardboard 6 rectangles, each 4x2"—your rectangles are wider than those in the drawing so that the finished pieces will be easier to handle. Divide them into ¼" squares, like those in the drawing, and sketch in the half ellipses. Cut out along the lines. Be accurate, for these are your templates for checking the finished shape of the fuselage.

Now, for the wooden fuselage form. On a 3x4x21" block of white pine, lay out center lines on all sides extending around the block on both ends. Glue three 1" boards together if you can't find a 3" piece. Rough the block down to the size and form of the fuselage, checking with the cardboard templates. Be sure you use them at the proper stations! Sweep (curve) the points between into the finished shape. Sandpaper the block smooth, taking care not to change the outline.

Now to make the fuselage. Take one of the two 5x21x3/64" balsa sheets—sand them down from 1/16" or ⅛" balsa if you can't get them cut thin enough—and boil or soak it until it is thoroughly pliable. Lay it on one side of the wooden form. Trim the sheet so that it overlaps the center line ¼" when wrapped on the form, holding it in place by sticking numerous pins through it into the form. Now wrap it in place at about Station D with 1" cotton bandage.

Since the form tapers at both ends you will have to get rid of some of the surplus balsa. To do it, take a razor blade and make two slits about 3" long, equally spaced, at the nose end. Make three about 5" long at the rear end. Squeeze the sheet into place so that the edges of these slits overlap; then cut through both thicknesses with a razor blade and take out the long V-like pieces. Do a careful job, and the new edges will fit together without a wrinkle.

Now finish wrapping the piece with the bandage and lay it away to get thoroughly dry. Give it at least 12 hours—you may have to wait even longer.

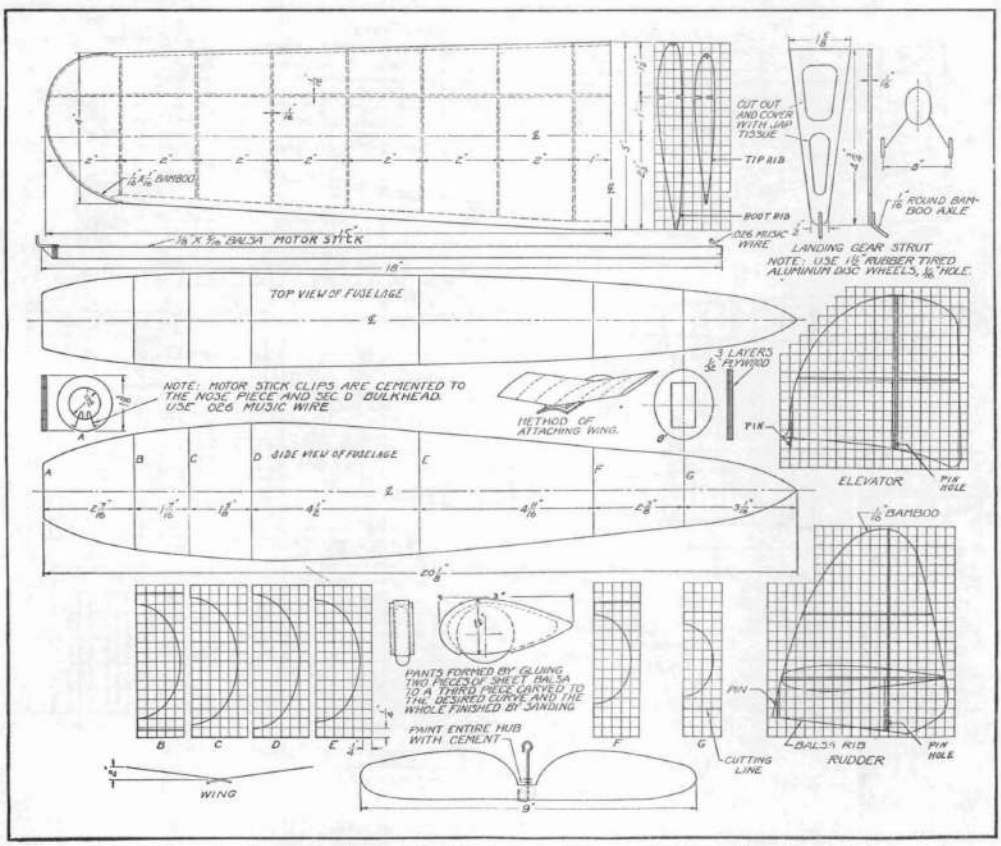
When dry take the piece from the form and make the other half of the fuselage with the second balsa sheet. Do it in precisely the same manner. Let it dry.

Next lay the two halves in place on the form and trim away the surplus so the edges will fit tightly together—take care that all the edges of the slits are tight while fitting the halves. Now take off the halves, rub the form with grease or oil so the balsa will not stick, replace the halves and cement the slits. Don't cement the halves—that comes later. Wipe off any surplus cement and rewrap.

You're ready now to get at the bulkheads. You cut them from 3/32" balsa plywood, made by glueing three sheets of 1/32" balsa together with the grain of the center piece at right angles to the others. Lay the glued sheets on a flat surface and hold them down with a weight. A sheet of glass and an old flat-iron are ideal.

Lay out the bulkheads from the cardboard templates. A sharp razor blade is best for cutting them out. Before you cut the outside shape, cut rectangular or elliptical holes in the

(Cont. on page 42)



Streamlined fuselage, double-surfaced empennage—here are all the details you'll need.

Build a Flying Model Lockheed (Continued from page 28)

bulkheads, leaving rims of at least ¼". Rectangular holes, like that shown in G', are easier, but elliptical holes save weight. Bear in mind, of course, that the templates show only half the finished bulkheads.

TURN to the drawing again and see how the motor stick clip is cemented to bulkhead A. This clip must fit the motor stick tightly, since it must withstand both the thrust and torque of the propeller. Cement a similar clip to bulkhead D, taking care to locate it so that the motor will be at the center of the fuselage—Bulkhead D is larger than A, so take this into account. This clip should fit the motor stick rather loosely. If it fits tight you'll have difficulty pressing the motor stick into place from the front end.

The drawing gives you all the facts you need about the motor stick.

Next you put in the bulkheads. Mark the proper locations for them in one of the halves and cement them in, making sure you get them set squarely. When dry, paint the bulkhead edges that will butt against the other half of the fuselage. Paint the edges of the two fuselage halves at the same time. Set the second half in place, so that all edges touch, and rewrap. Sand off any rough places after the cement is dry.

The drawing shows the shape and gives the correct dimensions of the landing gear struts. Use 1/16" flat balsa. Notice the wood cut away to reduce weight. Cover the finished strut with tissue on both sides to reduce drag and add strength.

In cementing the struts to the fuselage, cut a slit in the fuselage wall on each side between bulkheads C and D. The drawing shows how the attached struts look from the front; note that the tread is 8". Cement small pieces of balsa between the bulkheads for the struts to rest against; then cement the upper ends of the struts to these pieces. Don't cement the struts to the fuselage skin—it won't stand landing shocks.

The axles, you'll notice, are made of 1/16" round bamboo cemented to the lower end of the strut and bent to the necessary angle by heating. You'll find it a good idea to use 1½" rubber-tired aluminum disc wheels with 1/16" holes. They're heavier than balsa, but they give the plane greater stability by giving it a low center of gravity. They look well, too.

You make the pants for the wheels from a thick piece of balsa and two flat pieces. The thick piece is ⅛" thicker than the wheels so that there will be no less than 1/16" clearance on both sides. Carve this thick piece to the shape the drawing indicates — the pants are 3" long by 1½" high—then cut out on the inside as the dotted line suggests. Now cut two sheets of ⅛" balsa to the desired shape and cement them to the sides of the finished thick piece. Sand down to streamline shape. Fit the wheel and locate the hole for the axle by experiment —the clearance should be 1/16" on all sides. Cement the pants to the strut with the axle extending through them.

To form the N. A. C. A. cowling, carve a ring from ⅜" balsa having an outside diameter of 3½" and an inside diameter of 1⅝". Now cut a second ring, using ⅛" flat stock. The inside of this second ring should be slightly smaller than C template, and the outside is cut to an ellipse ¼" larger than the inside. You form the shell of the cowling by wrapping 1/16" flat balsa around the two rings while they are pressed into place on the fuselage as far as they will go—the thinner ring to the rear. Soak the balsa first, then bend it so that the grain is parallel with the length of the fuselage, and you will have no trouble. Hold the flat piece in place around the rings by wrapping with bandage. When dry, cement the piece to the rings. Sand the front of the cowling to the proper curve.

The finished cowling will stay in place while the plane is in flight if you press the rings firmly onto the fuselage. When you want long flights, leave it off—it doesn't add to the efficiency of the model but it does add a good deal of weight.

The drawing clearly shows the shapes of the tail surfaces. A streamlined section is used for both the rudder and the stabilizer.

Begin with the rudder. Its frame consists of three ribs, a pair of upright spars, and an outline of 1/16" square bamboo. First make a full sized drawing of the frame, as you did with the templates, and bend the bamboo to fit. The two lower ends, as the drawing shows, are joined to the bottom rib, which is cut from 1/16" flat balsa. You get the shape of the ribs by folding a piece of paper, of the same length as the ribs to be drawn, along its length. Then cut out the side of the rib. Any fairly thin streamline shape will do. By cutting the folded piece you get a section with the same curve on each side of the center line. All three ribs may be the same width, or you may get a tapered effect by making the upper ones thinner.

NOW assemble the three ribs, using two small spars—one on each side—set in notches like those used in constructing the wing. The drawing gives the idea. Cement the bamboo frame in place, notching the ribs at the nose to receive the frame.

Look at the rudder drawing again. At the leading edge and in front of the spars, just above the lowest rib, you see extra lines drawn in. These represent ⅛" square pine blocks cemented to the framework. The front block has in it an .026 music wire pin, which fits into one of three holes—at dead center, ⅛" right, and ⅛" left—at bulkhead F, so that the rudder can be adjusted. The rear block has a pin hole to fit a pin cemented to the fuselage at bulkhead G.

The finished framework is covered on both sides with Japanese tissue. Fasten it to the frame with banana oil.

You make the two halves of the stabilizer just as you make the rudder. Shape the 2 root ribs to the curve of the fuselage by soaking and wrapping to the fuselage form. Note the pine blocks for the pin and pin hole. The pin at the leading edge fits into one of three holes in the fuselage so that you can set it at a positive, negative, or neutral angle. The middle hole is at the center line, of course.

The wing of the Lockheed is double surfaced and tapered from the center. You make the wing in two halves, cementing the spars together later to get the proper 2" dihedral. Each wing half has 7 ribs, spaced 2" apart.

Study the drawing. Note that it shows the root (large) and tip sections plotted on ¼" squares. To lay out the ribs, glue 7 ⅛" flat white pine strips together, using just enough glue to hold them. Cut the root and tip templates and lightly glue one of them to each end of your glued strips. Now work down the block to form a tapered airfoil. Check the section by laying a rule along the block—it should lie flat, touching at all points along its length. Next lay out the slit for the spars with two pencil lines across the block, top and bottom. Now separate the 7 strips and use them as templates for the ribs. Make certain you are using the corresponding side of each template—better mark them so you won't make a mistake.

You use ⅛" square balsa for the leading edge, cementing it into the notches in the leading edges of the ribs. You make the trailing edge from 1/16x¼" balsa, and you butt joint it to the trailing edges of the ribs as the drawing shows, sanding it down to shape. The spars are cut to the length given in the drawing — their other dimensions are 1/16x3/16"—and are fitted to the 1/16" square bamboo used for the wing tips. Cement the spars of the two halves together to give a 2" dihedral.

You're ready now to cover the wing. Do the halves separately, painting the leading and trailing edges of one half with banana oil and covering with tissue before starting the other half. Get the wrinkles out before laying the paper in place. If you wish, you can dope the wing with a thin solution of acetate wing dope or a compound made of five parts of acetone to one of banana oil. Spray the paper with water to get a tight surface.

The wing mount next. Boil a sheet of 1/16x2x7" balsa and wrap it over the top of the fuselage form so that it will fit the upper side—a glance at the photo will show you where to place it. Now cement two small balsa blocks to the under side of the wing and the top side of the curved piece as the drawing indicates; the trailing edge should be a ½" above the curved piece when in place on the fuselage. Two rubber bands stretched around the fuselage and over the projecting ends of the curved piece hold the wing in position. You can adjust the wing to get the best possible results. Later, if you like, you can cement it in place.

You use the diagonal method in carving the propeller from your ¾x2½x9" balsa block. The blades when finished should be 1/16" thick near the hub and 1/32" thick at the tips. Six strands of ⅛" rubber make up the motor. If you want to wind it with a winder, take out the stick and replace it when ready.

Now, with your wing held to the fuselage with rubber bands, your rudder and stabilizer properly set, wind up your motor and insert the motor stick. Let the propeller turn over a few times so that you're sure the motor will unwind smoothly, and launch your ship into the wind. If you built carefully, the ship will do the rest—she'll sail off easily as a Lockheed should.

Model Aviation Strides Ahead—Keep Up With It!

It won a championship, the Rich compressed-air monoplane—yet it's a new development in model aviation. Keep up with hundreds of progressive modelers who are building this successful ship! A dime in a cardboard coin card will bring you full-sized drawings and complete instructions. Write to the Airplane Model Editor, *The American Boy Magazine*, 550 W. Lafayette Blvd., Detroit, Mich. Send your ten cents today—the supply is limited and to-morrow may be too late!

MEET THE CROCODILE!

He's the armor-plated U-boat of Florida. You'll call on him, next month, in the gloomy Okefinokee Swamp. And watch out!

"King of the Swamp"

By Samuel Scoville, Jr.

—And Now It's Microfilm!

INDOOR model planes that will almost double the present duration records by flying 20 minutes or more are coming — soon. They're made possible by "microfilm," a new wing covering 10 times lighter than the finest tissue and less than half as heavy as aluminum foil.

Emanuel Feinberg, holder of the world's record for outdoor fuselage models, makes that prediction. With microfilm he has already succeeded in flying a Baby R. O. G. longer than seven minutes!

Feinberg first heard about a mysterious new wing covering at the Dayton meet last July. Robert Clary and Jerome C. Kittel, of Englewood, N. J., told him about it. But they didn't tell him what it was — and they admitted that they hadn't yet been able to find a way of attaching it to a wing frame.

"But they had told me enough to let me guess what the secret was," Feinberg says. "The next thing was to attach the film. I worked out a method, and they did, too, but the two are absolutely different. I had to tell them what mine was before they told me theirs."

To make microfilm, Feinberg mixes five parts of nitrate dope—buy it at any model airplane supply house—with one part of banana oil. He uses the drug store variety of banana oil, which is thinner than the usual preparation for models.

With the mixture ready he fills a washtub full of water, first making sure that the tub is clean and then skimming off the surface so there will be no dust to weaken the film. Then he places three drops of the mixture in the middle of the tub. These three drops form a film about two feet in diameter on the surface of the water. This skin will turn purple in about 30 seconds. It is then ready to be lifted off.

"There's a trick about removing the film," says Feinberg. "You do it with a round hoop made of a wire clothes hanger. Put it in the tub perpendicular to the surface of the water and far

Emanuel Feinberg.

Build an Autogiro

This Model Rises Thirty Feet, Then Makes a Vertical Landing!

ON a spring day in 1930, James Ray, veteran mail and test pilot, brought down the Pitcairn-Cierva autogiro to a vertical landing on the White House lawn. A few minutes later Harold F. Pitcairn turned to receive from President Hoover the Collier Trophy, "for the greatest achievement in aviation in America, the value of which has been thoroughly demonstrated during the preceding year."

This queer looking windmill airplane has been called the most outstanding aircraft development since the first flight by the Wright brothers 27 years ago! And here, model builders, is your chance to learn more about it by building a model autogiro that actually flies.

The autogiro, invented by Juan de la Cierva in Spain and first flown successfully at Madrid in 1923, derives its lift from the rotary movement of its four vanes through the air. The vanes are not connected with the motor, but rotate freely because of the aerodynamical force of the wind produced by the forward movement of the plane. The small wings or stabilizers on each side of the fuselage are for lateral stability and control, and furnish about 20 per cent of the autogiro's lift in forward flight but practically none in vertical descent. Tail surfaces like those of an ordinary airplane give the further necessary control.

Hinging of the rotor vanes so as to make them flexible was accomplished by Cierva only after three years of experimenting. It is this flexibility, allowing the vanes to move up and down, that makes forward flight possible. By overcoming inequality of lift produced as one vane moves forward while the opposite vane recedes, complete stability is obtained. On the model this important, yet simple, principle is employed by using flexible bamboo for the rotor spars. This flexibility allows the advancing blade to rise automatically, *decreasing* its effective angle of incidence, while the receding blade descends, automatically increasing its effective angle of incidence.

The model pictured was designed by Dr. W. F. Gerhardt, aeronautical engineer, of Detroit City College. Built for League members and *American Boy* readers by Fay Stroud, well known Detroit model plane expert, it has a 15-inch span and a length overall of 13½ inches. It will descend almost vertically when released a few feet above the ground, and will climb to a height of thirty feet. The model shown in the picture flew for twenty seconds.

No kit has been prepared for the model autogiro, but you'll have no difficulty making your own parts. The material is essentially the same as that used in an R. O. G. which you can get from your nearest supply house.

THE materials you'll need are: Balsa propeller block, 1⅜ x ¾ x 6 inches; one strip flat balsa, 1/32 x ⅞ x 2 inches for rotor ribs and rotor bearing; one piece balsa, 1/16 x 5/32 x 3 inches for rotor mast; one piece balsa, 3/16 x ⅛ x 11 9/16 inches for motor stick; 25 inches of 1/32 square balsa for tail assembly and wings; two balsa wheels; one piece 12-inch bamboo to split into strips 1/32 inch square for wing and rotor spars and axle; 20 inches ⅛ flat rubber for motor; .014 music wire for wire parts; 3 brass washers; R. O. G. long size thrust bearing; Japanese Imperial tissue paper, 6x9 inches, for covering.

Start work by studying carefully the drawings and article. Since all dimensions are given, full-sized drawings are unnecessary and are not available.

First, the motor stick. The rubber motor is underneath so that the propeller can be given the downward thrust which you will notice on the drawing. This is important because when the autogiro is flying, the rotors should be revolving in a plane tilted up to catch the force of the wind produced by the plane's forward movement. The down thrust of the bearing, which you can give by bending it slightly, causes this tilting up of the rotors.

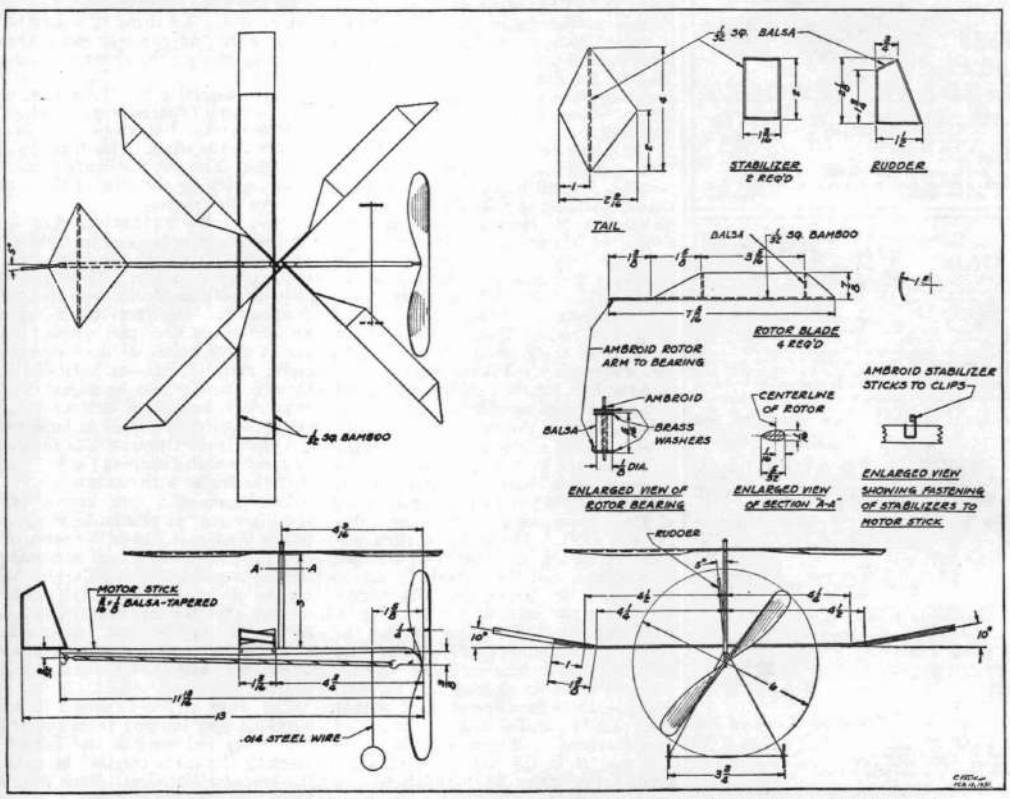
The rear motor hook serves also as a tail skid to protect the rudder. Make one loop in your wire and allow the free end to extend low enough to keep the rudder from resting on the ground. An S hook is used to attach the rubber motor to the rear hook. Reinforce both the rear hook and thrust bearing joints with glue.

For the tail assembly you'll want 1/32 inch square balsa. No thread outline is necessary for the stabilizer, but the rudder is outlined with balsa. Give the rudder a 5 degree turn to the right to counteract torque.

The landing gear is of the regular R. O. G. type. Sand down a 3¾ inch strip of bamboo to about 1/64 square for your axle, and glue on the wheels. Clip the landing gear over the motor stick 1⅝ inches from the thrust bearing.

The propeller is 6 inches long. Stroud found that a wide blade with a fairly high pitch was necessary for the autogiro, so he used a block 1¾ x ¾ inches.

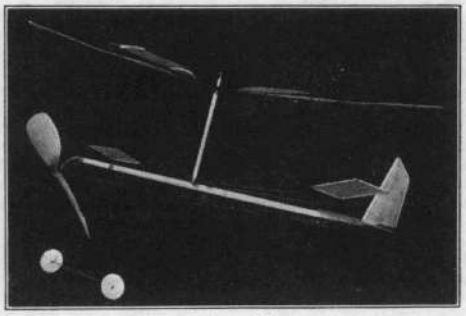
Before locating the rotor mast, put on the propeller, and hook up the motor. The mast must be at the exact center



You can build the model autogiro by following the drawing. Study it carefully—make sure of every step!

of gravity so after you have the motor rigged, find the point of balance by resting the motor stick on a piece of wire. The mast is a streamlined section of balsa as shown in the drawing, with a ¾ inch piece of wire protruding at the top for your rotor axle. Tip the mast with glue, and reinforce the joint at the motor stick with a coat of glue.

Now you're ready for the most important job—the rotor vanes. Split four pieces of 1/32 inch square bamboo for the leading edges of the vanes. Then with a draughtsman's compass set with the points one inch apart draw on flat balsa the arcs for your vane ribs. A circle of 1 inch radius provides the necessary curve. Since the ribs are ⅞ inch long and 1/32 inch square, you can cut them out of a 1/32 inch flat balsa strip ⅞ of an inch wide. Cut them with the grain, not across. There are eight ribs, two in each vane, so draw eight arcs 1/32 inch apart on your balsa strip. Cut them out with a razor blade, and with the bamboo spars lying flat on the table glue two ribs on each at the points indicated on the drawing. Cut out the four pieces of tissue and cover.



The finished model autogiro!

Make the rotor bearing by rolling thin, flat balsa around a 1/16 inch drill rod. Glue the joint where the balsa overlaps, and after it has dried sand to a smooth finish. Glue a brass washer on each end of the bearing.

The rotor vane spars are glued to the top surface of the lower washer, each spar end at right angles with another. Be sure that the leading edge of each vane will continue to be the leading edge when the rotor is revolving—it will turn clockwise as you look down on the plane. Place the bearing on your table and let the end of each vane rest on a match box or small block of wood while the glue is drying. This dihedral angle is necessary for stability. While the rotor vanes are drying, make your two wings, or stabilizers as they are called on the drawing.

Bamboo 1/32 inch square is used for the center sections of the wing spars; the tips are of 1/32 inch square balsa. The same 10 degree angle of dihedral for each spar can best be insured by bending the large strip of bamboo before splitting it. Make and cover the rectangular balsa wing tips before gluing them to the bamboo spars. After the whole section is dry, glue on the adjustable wing clips, one at the exact center of each spar. The left surface receives washin and the right washout, the amount of each to be determined by experiment.

Place the rotor bearing over the axle protruding from the mast, secure it with a small balsa or brass washer glued to the end of the axle, and after all is thoroughly dry, you are ready for your first flight.

The autogiro is distinctly an indoor model. The flexibility of the rotor vanes demands still air. Give the motor 200 to 250 turns, and before launching it make sure by drawing the model through the air that the vanes rotate freely. If your autogiro climbs and stalls, make the same adjustments you would with an R. O. G.—move wing backward. If it lists to the left, put more washin on the left surface and turn your rudder a little more to the right.

New Champions--New Records!

MODEL aviation has a new roll of champions! They set three world's records and won the International Wakefield cup for America the third straight time, in the national meet held at Atlantic City, Sept. 9-10, by L. Bamberger Co., of Newark, for the Airplane Model League of America and the National Aeronautic Association.

With his rubber-motored fuselage ship, Gordon Light, Lebanon, Pa., captured the Wakefield trophy in 7 minutes 57:2 seconds, and exceeded by 3 minutes 32:3 seconds the former record set by Joseph Ehrhardt, St. Louis. In their attempt to regain the trophy for England, J. E. Pelly Fry and R. N. Bullock of London took third and eighth places with flights of 3:22:2 and 1:18:2.

Parham, left, won the Stout fuselage.

John Ginnetti, above, new outdoor champion!

John Ginnetti, Atlantic City, took the Mulvihill outdoor in 6:57:3, exceeding the old record by 32:3 seconds. The third record was set by Joseph Kovel, Brooklyn, in the Stout indoor. He flew his ship 13:3 in a hall with a lower ceiling than those of previous contests. The Stout fuselage went to James Parham, Indianapolis, in 4:57, and the scale model division was won by J. F. Roche, Kansas City, with a model of the Stinson Lycoming Junior—a model with over three thousand parts, with all controls movable.

In addition to the main trophies, boys won 26 silver cups and 47 gold, silver, and bronze medals. Following are the first five winners in each event and their records.

STOUT INDOOR: Joseph Kovel, Brooklyn, N. Y., 13:3; Emanuel Enderlein, Philadelphia, Pa., 12:50; Carl Goldberg, Purchase, N. Y., 12:38; Emanuel Radoff, Newark, N. J., 9:05; Jesse Jessen, Philadelphia, 9.

STOUT FUSELAGE: James Parham, Indianapolis, Ind., 4:57; John Zaic, New York City, 2:57; Henry Orzechowski, Newark, N. J., 2:38:3; Jesse Jessen, Philadelphia, Pa., 1:45:2; Gordon Light, Lebanon, Pa., 1:36.

WAKEFIELD: Gordon Light, Lebanon, Pa., 7:57:2; Arthur Rugger, 4:13:2; J. E. Pelly Fry, London, Eng., 3:22:2; Maxwell Basset, Philadelphia, Pa., 2:55; Vernon Boehle, Newark, N. J., 1:49.

Gordon Light, and his Wakefield ship.

MULVIHILL: John Ginnetti, Atlantic City, N. J., 6:57:3; Henry Orzechowski, Newark, N. J., 5:30; Vernon Boehle, Indianapolis, Ind., 4:50; Gordon Light, Lebanon, Pa., 3:55; Alton Du Flon, Ridgefield, N. J., 3:22.

SCALE MODEL: J. F. Roche, Kansas City, Mo., Stinson; Joseph Battaglio, Manhattan, Kan., Boeing; Frank Distler, Fort Thomas, Ky., Aronica; Robert Crawford, Philadelphia, Pa., Fokker; H. W. Owen, New Britain, Conn., Sirius.

Microfilm

enough in so the twisted part is under water. That means the water must be at least as deep as the diameter of the hoop. Then move the hoop, keeping it perpendicular, until it touches the film, and lift it out slowly and carefully, still in a vertical position.

"You let the film dry on the hoop for an hour before you try to use it. Don't touch it with the hands at any time—it's very fragile. To attach it to the wing frame, lay the frame carefully against the film, dip a toothpick in banana oil, and press the film lightly down on the frame with the point of the toothpick. The banana oil dissolves the film and sticks it to the frame. Once it's on the frame, it's fairly strong—much stronger than aluminum foil."

He Shattered Records

And Model Aviation Bows to the Gas-Motored Sky Climber

Bassett's gas-driven ships won these trophies.

AND now the gasoline-powered model airplane rules the skies!

When 165 contestants from 20 states and Canada gathered in New York City late in June to settle the model plane supremacy for 1933, the familiar rubber-driven models seemed to have the inside track. But Maxwell B. Bassett, 18, Philadelphia, brought along a fleet of ships powered with tiny gasoline motors, and with them he captured three outdoor titles!

He won the national Mulvihill trophy for outdoor stick models, hand-launched, with a flight of 14 minutes 55 seconds. He captured the Stout outdoor trophy for fuselage, rise-off-the-ground ships, in 22:22.5. He took the Admiral Moffett International contest for outdoor fuselage, rise-off-the-ground models with a cloud-piercing flight of 28:18. On this flight officials estimated that his ship reached an altitude of 5,000 feet and traveled seven miles.

Bassett used two ships, an open stick model for the Mulvihill and a cabin ship for the fuselage contests, both planes powered with Brown one-cylinder motors, two cycle, ⅛ horse-power. His cabin plane was of the high-wing type, with a wing spread of 6 feet and a wing area of 912 sq. in. The ship measured 3¾ feet from nose to tail and the cross section of the fuselage was 7½" by 4½". The total weight, including gasoline, was 3 lbs. 15 oz., and on the record flight of 28:18, the motor used 1¾ oz. of gasoline. The 14" propeller turned up 4500 revolutions per minute. The motor and gas tanks were entirely inclosed in an aluminum cowling, and the cabin had real seats, windows, and shock absorbers.

The stick model had a wing spread of 6 feet 2 inches, with a surface of 900 sq. in. and a fuselage length of 3¾ feet. The wing was tapered and had a pronounced dihedral.

The Stout Indoor contest for stick models, hand-launched, went to John A. Bartol, 17, Roxbury, Mass., with the world record time of 17:47:6, beating the old record by more than four minutes.

Albert Levy, 19, Toronto, Canada, won the Bloomingdale contest for indoor fuselage models, rise-off-the-ground, with a flight of 8:56, also a world record. With a score of 98 out of a possible 100, Joseph E. Geigan, Washington, D. C., won the Exhibition Scale Model contest. His ship was a Curtiss Falcon.

The meet was conducted by the Universal Model Airplane News under the supervision of the National Aeronautic Association. The outdoor events were held at Roosevelt Field, Long Island, and the indoor at the 258th Field Artillery Regiment armory.

section, one on each side. When dry, the pants are sanded to the streamlined shape shown in the drawing.

A ⅜" bankers' pin serves as an axle. This is pushed through the pants and wheel and cemented in place. The pants are assembled to the landing gear by means of the shock absorbing clip shown in the drawing. The square U of this clip is first cemented to the inner side of the pants in such a manner that the round U extends out in front and is parallel to the ground. The other end is cemented as shown.

Now we're ready to construct the tail group. The vertical surface is the rudder and the horizontal surface the stabilizer. Note that bamboo is used in the construction of the curved parts. Bamboo becomes quite pliable when heated to just below the charring point. Make full-size drawings of the parts, place them on the work bench, and fit the bamboo to the curves.

Use a bamboo piece 1/16"x⅛" to form the stabilizer, and split it later to form two halves identical in shape. It is not considered good practice to attempt to bend bamboo in smaller sizes than 1/32"x1/16", since it chars too quickly. Bend it first—then split it to size. Any open flame or heated metal may be used in bending bamboo.

Two 1/16" square balsa spars are cemented to the sides of the rear end of the fuselage. Their front ends should be 5/16" below the upper longerons, their rear ends even with the upper end of the stern post. (The drawing and the uncovered picture show these spars.) Since these spars determine the position of the stabilizer it is necessary that they lie parallel with the horizontal axis of the plane, so take care with them. The curved bamboo stabilizer frames are cemented to the front end of these spars, and the rear ends are joined to the stern post by means of the small balsa spars forming the V at the rear of the stabilizer. (See uncovered photograph.)

Next the 1/16" square balsa spars are cemented into the stabilizer. Two ribs, also 1/16" square, are fitted into the frame last.

The rudder frame is assembled in the same manner as was followed in the construction of the stabilizer. A 1/16" square balsa strip is cemented to the top of the fuselage between the rear post and the bulkhead FF. The front end of the rudder is cemented to the front end of this spar and the other end is cemented to the bottom of the stern post. A 1/16" square balsa spar is cemented between the top of the curve of the rudder and the upper end of the stern post.

Construct the wing over a full-size drawing laid on the table. Cut two 1/16"x⅛"x12" balsa spars with a razor blade to fit the drawing. Trace the ribs on 1/32" sheet balsa and cut them out—seven of them. A templet can be made by drawing ¼" squares as shown on the drawing on a piece of thin cardboard or sheet metal and carefully drawing in the curve of the rib. A slot 1/16"x⅛" is cut into the nose of the ribs and a piece ⅛" long is cut from the trailing edge. The front spars are fitted into the slot in the nose of the ribs and the rear spars are butted to the trailing edge.

A bamboo tip is bent to fit the drawing and then split to form two tips, as was done in the case of the stabilizer. The ends of the spars are cut away so that the tips and the ends of the spars will form a continuous curve. (See the drawing of the wing.) To give the wing the shape of a very flat V cut the wing spars partly through at their centers and bend the tips upward. The wing tips should be exactly 1" from the top of the work bench when the center of the wing rests upon it. The center rib is now inserted and the spars and rib cemented in place.

The two small V blocks shown in the drawing (below the front view) are fitted across the fuselage frame to support the wing. The V cut in these blocks must fit the V formed by the wing spars. Note that the front block is 3/16" higher than the rear block. The front block is cemented flat against the rear surface of bulkhead AA, the rear block is located 2½" back of the bulkhead AA between bulkheads BB and CC. A slot is cut into bulkhead BB to permit the center rib to fit down in place when the spars are resting on the V blocks. The wing can now be cemented in position.

Next fit two blocks, one on each side of the fuselage, between the front and rear V blocks. Notice that the drawing (and uncovered picture) shows the bulkhead BB cut away to receive them. A curve is sanded in the side of these blocks so that the curve of the fuselage sweeps into the lower wing surface.

The model is covered with Japanese tissue. Cover first the tail surface, then the fuselage, and last the wings. The same technique is used in covering all the surfaces; the frame is first painted with banana oil and a smooth piece of tissue slightly larger than the surface being covered is laid carefully upon it. Cover the two halves of the stabilizer separately. When the oil is dry, sand or trim the surplus paper around the frame and fasten the loose edges by painting with banana oil. Each of the four sides of the fuselage are covered separately, the lower surface first, the two sides next, then the wing, and last the upper surface of the fuselage. The front end of the paper on the upper surface of the fuselage is cut to a V which fits into the angle of the wing. (See covered picture.) Shrink the paper by spraying lightly with water.

The drawing shows five steps in the carving of propellers. No. 1 shows the ½"x⅞"x6" balsa block with diagonals drawn on the upper and lower faces and the ends. (The end diagonals run in opposite directions.) No. 2 shows the block after the stock has been cut away from the face diagonals. No. 3 shows the concave side of each blade carved from the center to the end diagonals. No. 4 shows the blades with the convex sides carved out as in operation No. 3. No. 5 shows the center of the propeller cut away to form a flat V, and the tips rounded.

The blade is sanded smooth and a small hole made through the hub by pressing a pin through it. The shaft made from .020 music wire is pressed through this hole and the end bent to a square U which is pulled back into the hub and cemented in place.

The propeller spinner is carved from a ¾"x⅞"x⅞" balsa block. Cut a slot across the rear face and fit the propeller into it. Two brass washers are slipped over the hook and act as thrust washers, permitting the prop to turn freely.

The thrust bearing is made from a small cotter pin cut to length, the end drilled, and the drilled end bent upward as shown in the side drawing. This is cemented in the cowling so that it will project ¼" in front of the nose.

If you have followed the dimensions given in the drawing the ship may be powered with two strands of 3/16" flat rubber. If you have built the ship heavily, you'll probably need four strands of ⅛" flat rubber.

If the model has a tendency to climb too sharply, warp the rear of the stabilizer slightly downward; if it tends to nose downward warp it upward. This can be done by holding the stabilizer over the steam from a slowly boiling teakettle.

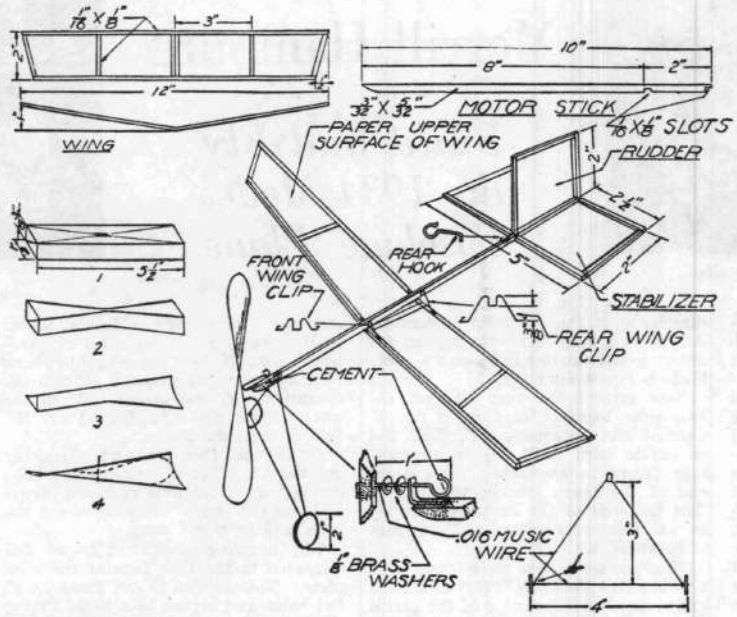
The American Boy fuselage ship, Model 1934, is not at all hard to construct. Once you're started on it, every step will unfold clearly to you. Build it—and fly it—and you'll feel like an airplane designer, creating a new, up-to-date ship!

March, 1934

Watch It Fly!

Here's the Model Plane for Beginners

By MERRILL HAMBURG



WHEN, a few years ago, a million boys on this continent were building every conceivable type of model airplane, one simple beginner's model held their fancy. Under the stimulus of the Airplane Model League of America, conducted by *The American Boy*, with trips to Washington and Europe as inducements for excellent work, these boys were turning out highly specialized and scientific flying and non-flying contest models. But no matter how far they advanced they continued to build and fly the Baby R. O. G.

R. O. G. means Rise Off Ground. Whether you're a beginner or an old-timer, you'll find the ship described in this article worth your time. It's sturdy, easy to construct, capable of rising from the floor and circling for three minutes before coasting to a landing.

Study the drawing before you begin. Note that there are no tricky bamboo parts to bend. If any of the metal parts seem too difficult you can buy them ready made, at any model supply house, for a few cents.

Start with the 3/32x5/32x10" balsa motor stick. Sand it and round the front end as shown in the drawing. For the thrust bearing flatten a small brad, drill a hole in it with a No. 72 drill, bend it to form an L and stick it to the front end of the motor stick with a coat of model airplane cement. No other type of cement will do.

Bend the rear hook from .016 (No. 16) music wire and cement it in place 2" from the rear end of the motor stick.

The rudder, formed from three pieces of balsa 1/16x1/8x2" is cemented to the top of the motor stick so that the rear edge is 1/8" off center to the right, when viewed from the front. This causes the plane to circle in flight.

Fit and cement the two stabilizer spars into notches cut into the motor stick for them. Cut the two short ribs to fit between the spars, cement them in place, and cover the stabilizer by painting the lower surface of its frame with banana oil and placing it on a piece of Japanese tissue stretched flat on the table. Immediately after you've done that, lift the entire piece from the table to prevent the banana oil from sticking to the table top.

Cover the rudder in the above manner and trim off extra paper with a safety razor blade.

Draw a full-size pattern of the wing on a sheet of blank paper. Cut the wing spars and put them in place on the drawing. Next cut the ribs and cement them in place. Construct the second half of the wing in the same manner, and cover both halves with Japanese tissue.

Join the two halves by placing one half flat on the table and the other with its outer edge resting on a book, so that the tip is two inches higher than the center. Cement the center ribs of the halves together.

Bend and cement the wing clips in place. Note that the rear clip is 3/8" higher than the front.

Carve the propeller from a 3/8x1/2x5½" balsa block. Step No. 1 in the drawing shows the blocks with diagonals drawn on the ½" surface and the ends. By following each step carefully, checking with the drawing at every stage, you can carve a satisfactory propeller. Note the long, flat V at the hub and the rounded tips. The finished hub is only 1/4" wide and 1/16" thick. The blade is only 1/32" thick at the tips.

Force your propeller shaft through the hub, bend the end U-shaped, and draw it back into the wood. Paint all sides of the hub with cement and let the cement harden. Slip two 1/8" brass thrust washers over the shaft to prevent friction.

Bend the landing gear from .016 music wire according to the shape in the drawing and cement it to the motor stick 1¼" from the end. The wheels are cut from 1/8" flat balsa. The power plant—a single strand of rubber tied to form a band 8" long—is looped over the propeller shaft and the rear hook. Put the knot at the rear.

Attach the wing in about the position shown in the drawing and glide the model gently toward the floor. If it dives sharply set the wing forward. If it tries to climb, and goes into a stall, set the wing back.

Wind the motor by holding the motor stick between the thumb and index finger of your left hand with the propeller toward you. Turn the prop with the index finger of your right hand in a clockwise motion until the rubber motor shows a double row of knots. Launch the ship with a slight forward motion.

If the plane has a tendency to slip sideways and go into a spiral dive, the front edge of the wing on the dipping side must be bent slightly upward. You can do that by holding the wing over the steam from a teakettle—not too much steam!—and twisting the wing with your fingers. A little steam makes balsa flexible.

But the Baby R. O. G. doesn't take much adjustment. It's a sturdy little scout with great performing ability and not much temperament. Watch it fly!

May, 1934

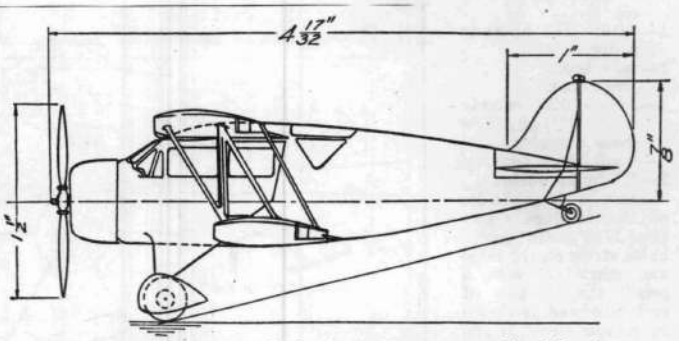
made by wrapping fine thread around the surface of the wing and painting first with cement, then with two coats of aluminum paint.

Lifelike propellers can be made with a piece of match stick and tiny strips of aluminum. Carve the match stick to the shape of the propeller hub. With a pair of shears cut out two propeller blades of aluminum and cement them to the ends of the hub, making sure that you have them set at the correct angle to each other. Push a small piece of wire through the center of the hub and insert the end of the wire into the front of the motor. A drop of cement on the outer end of the wire will prevent the propeller from slipping off. You'll find that the prop will turn freely on its axle.

The neatness of your model will depend upon your paint job. A good finish requires a clean, smooth surface. Sand out all scratches in the wood, using No. 6-0 wet or dry sandpaper. If you've used soft wood such as white pine or balsa, give the surface a coat of filler and two coats of primer before applying the finishing color. Lightly sand the model between each coat to remove any dust or dirt that may have settled on it while drying. Remember that too thick a coat of paint will cover up detail.

The fun of building mantel models is in figuring out ways of doing things. Since the model doesn't have to fly, weight is no consideration. You're merely trying to reproduce accurately some famous plane.

When you've built the first two or three ships in your fleet, put them on the mantel, call in your friend and hear him say just what you said to Bill: "Sa-ay! Where'd you buy the fleet?"



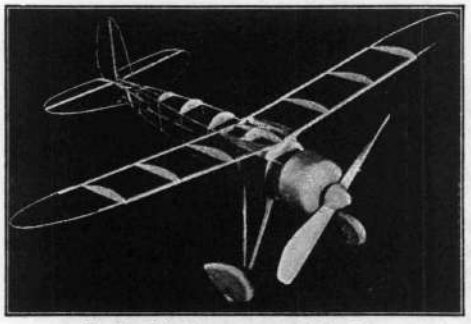
The side view of the U. I. C. shows a neat, streamlined fuselage.

A Streamlined Transport!

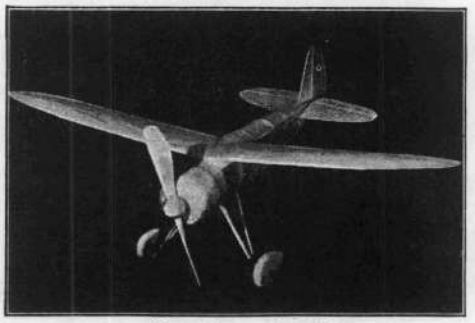
by

Merrill Hamburg

Build and Fly the 1934 Model Fuselage Plane



Study this for structural details.



All ready to take off!

FOR flying thrills, try *The American Boy* fuselage plane, 1934 model. It's streamlined down to the last strut and the design is up-to-the-minute. Fly it in your school gym and you'll think for a moment you're gazing at a 15-hour coast-to-coast cabin ship!

There's nothing hard about its construction. Take a careful look at the picture of the uncovered ship. Fix the parts in mind. Remember that the drawing will cease to look complicated once you've started construction. You'll be referring to it a section at a time, and you'll find that it answers all your questions on the sizes of parts and methods of attachment.

You'll need the following materials:

10—1/16"x1/16"x12" balsa strips for the fuselage.
2—1/16"x⅛"x12" balsa wing spars.
1—⅛"x1"x12" strip balsa for miscellaneous small parts.
1—1/16"x¼"x10" bamboo.
1—⅜"x⅜"x6" balsa wing fairing blocks.
1—¼"x1½"x7" balsa for center of wheel pants.
2—1/32"x2"x12" balsa for ribs, covering of wheel pants, and formers.
1—⅛"x¼"x12" balsa front landing gear strut.
1—3/32"x⅛"x12" balsa rear landing gear strut.
1—1¼"x2⅛"x2⅛" cowling block.
2—1" turned balsa wheels.
1—½"x⅞"x6" balsa propeller block.
1—sheet Japanese tissue.
1—tube of airplane cement.
1—2 oz. bottle banana oil.
1—3/16"—24" rubber motor.
1—rear hook.
1—front hook.
1—piece .020" music wire 6" long for shock absorbers.
1—small front bearing.
2—⅛" brass washers.

Start with the sides of the fuselage. Lay two 1/16"x1/16"x10¾" balsa strips on the table and mark off with a pencil the location of each bulkhead as shown in the side view. If you make a full-size drawing of the side of the plane on a sheet of paper, the two sides of the model can be built directly on it, thus insuring uniformity. All parts can be laid directly on the drawing and cut to length with a razor blade before assembling.

Now cement the rear ends of the two sides together to form a flat V. Cement the bulkheads FF, EE, and so on, in turn until the entire fuselage frame is assembled. The front end of the frame can be trimmed so that the ends of the longerons (front-to-rear members) extend 1½" in front of bulkhead AA.

The cowling or nose piece is cut from a solid balsa block 1¼"x2⅛"x2⅛", the grain running lengthwise of the plane. The nose can be turned up in a few minutes on a lathe. If you haven't access to a lathe you'll have to carve it out by hand to form a cylinder with a 2" diameter and 1½" in length. To round the nose, draw a 1" circle on the front face of the block. Around the outside of cylinder ½" from the front face draw a line. With this line as starting point, round the block as shown in the drawing. Make a tin or cardboard templet (see drawing) to check your curve as you proceed. Finish the operation with sandpaper. When the piece is properly shaped, drill a 7/16" hole through the center.

On the rear face of the nose piece lay out the 1 1/16"x1⅜" rectangular hole, making sure that it is centered accurately on the block. Now carve out the hole, making it ¾" deep.

The drawing shows bulkhead GG cemented to the rear face of the nose piece. This section is cut from 1/16" flat balsa and serves as a shoulder for attaching the paper to the nose when covering. After cementing the bulkhead the ends of the fuselage frame are fitted into the nose block and cemented into place.

The side drawing shows the shape of the rear hook. Push it through the rear post from the inside, bend the end to a square U, press this U into the rear post and cement it in place. Two small 1/16" square spars are next cemented, one on each side, diagonally between the bulkhead FF and the rear post. (See the side drawing.) These pieces serve as the rear attachment for the fuselage covering. The space in the rear of these spars is left open to permit the hooking of the rubber motor to the rear hook.

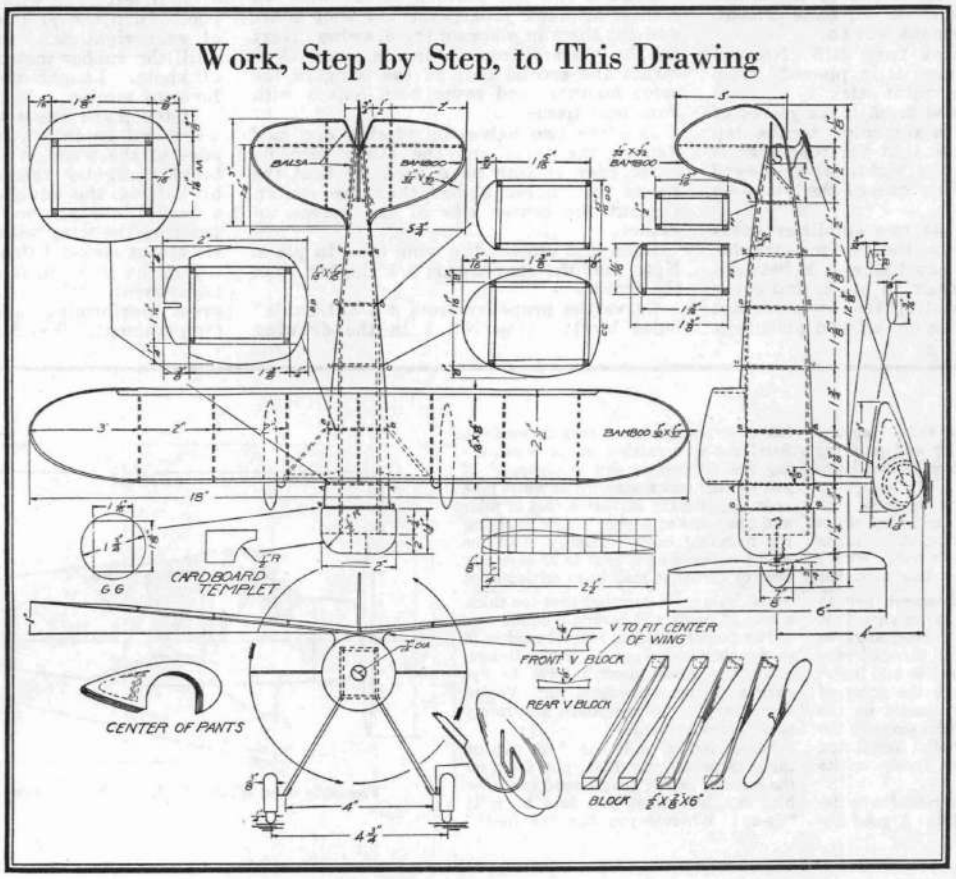
Carve the tail skid from a small scrap of balsa ⅛" thick and cement it to the under side of the fuselage between the two lower longerons.

Make full-size drawings of the bulkheads AA to EE and cut the curved "former" pieces to fit over them. These pieces are cut from 1/32" sheet balsa. Cement them in their places on the fuselage frame.

The two front struts of the landing gear are cut from ⅛"x¼"x2¾" balsa strips. These are ⅜" wide at the top where they are cemented to the fuselage but are curved to a 3/16" width just below this point and sanded to the streamlined shape shown in the drawing. The rear struts are sanded from 3/32"x⅛"x3" balsa strips and cemented in position between the lower longerons at the rear of bulkhead BB and the lower end of the front landing gear strut. While cementing the struts rest the fuselage horizontally on a pile of books or small blocks so that the ends of the landing gear struts will just touch the work bench. Be sure to check to see that the two front struts line up and have the same amount of spread.

One-inch balsa wheels with turned tires are used on this model. If these are not available cut the wheels from flat stock.

The wheel pants are built up from three pieces of balsa. The drawing shows how the center section is cut away to give the wheels clearance. This section should be 1/32" thicker than the wheels. An additional section shown by the dotted line is cut away from the rear of the center section to save weight on the model. The two outside pieces are cut from 1/32" sheet balsa and cemented over the center



Build up a fleet like this! Amphibians, trimotors, army ships, sky cars. The material costs only a few cents apiece.

Models for Your Mantel

Here's the New Fad in Model Aviation

by Merrill Hamburg

SCENE: The living room in Bill's home.

Characters: Bill and you. You're looking in admiration at the mantel over Bill's fireplace on which are resting a line of neatly painted model airplanes. There's an old army biplane, a replica of the *Spirit of St. Louis*, an amphibian, an up-to-date, streamlined cabin ship—all of them accurate reproductions of the life-sized ships.

You: "Sa-ay! Where'd you buy the fleet?"

Bill: "I made it. Copied the plans from old aviation magazines at the public library."

You: "Must have cost you plenty!"

Bill: "Nothing but time. In fact, the actual cost was less than ten cents a ship. Most of the material I picked up around the house. Before I'm through I'll have a fleet of twelve models each representing some big development in the history of aviation."

You: "What kind of material did you use? What tools? How'd you carve that motor—"

Bill: "Not so fast! Come on down to the workshop and I'll show you."

Conversations of that kind are taking place in thousands of homes over the country, making thousands of converts to the new fad in model aviation — building mantel models of famous airplanes.

This article gives you the plans for the Waco U. I. C. Like Bill, you may get other plans from the files of aviation magazines. Almost every plane that's ever been built has had its plans published in these magazines at some time or other.

If you buy your supplies for several ships at one time, the cost will be negligible. The only materials you'll need are: a large tube of airplane cement, a few small blocks of white pine and pattern mahogany (most pattern shops will donate wood from their scrap box); several small cans of colored paint; a spool of tinned hair wire No. 30; and a small sheet of thin aluminum.

The Waco drawings shown herewith are for a six-inch wing-span model. The front and top views are full-size and may be used as templates or patterns. The side view on the next page has been reduced.

If you're preparing your own plans from magazine articles, you'll want to reduce the dimensions to the proper scale. There are two methods of doing this—to reduce to a certain scale per foot, or scale the big ship down to a given wing span as we have done with the Waco.

If you're making a fleet, it's best to reduce to a certain scale per foot so that your models will be larger or smaller in the same proportions as the big ships. Suppose that the large plane has a thirty-foot wing span and you want to scale it down to ¼" per foot. Multiply ¼x30. The result is 7½", which is the span of your model. Get your other dimensions in the same manner.

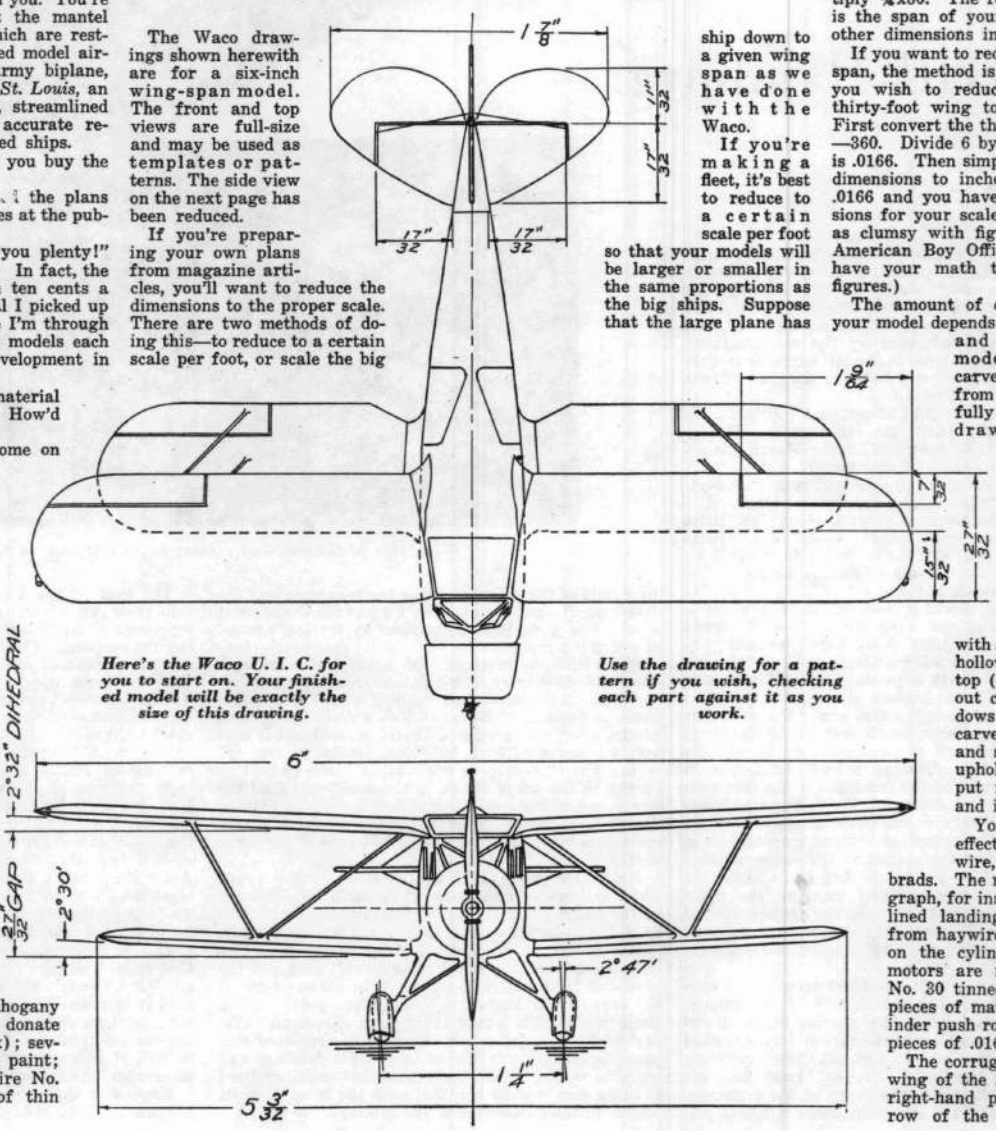
If you want to reduce to a given wing span, the method is different. Suppose you wish to reduce a plane with a thirty-foot wing to a six-inch model. First convert the thirty feet into inches —360. Divide 6 by 360 and the result is .0166. Then simply convert all other dimensions to inches and multiply by .0166 and you have the proper dimensions for your scale model. (If you're as clumsy with figures as Pluto, The American Boy Office Pup, you better have your math teacher check your figures.)

The amount of detail you put into your model depends upon your patience and ambition. Most model builders merely carve wings and fuselage from solid wood, carefully checking with the drawings. The models shown in the photograph have solid wood wings, and the ailerons are indicated by small grooves cut in the surface.

If you're a hound for detail, you can have fun with a fuselage. You may hollow it out from the top (as you would a dugout canoe), cement windows and roof in place, carve doors that open and shut on tiny hinges, upholster the seats, and put in dummy controls and instrument panel.

You can create lifelike effects with tinned hair wire, small nails and brads. The models in the photograph, for instance, have streamlined landing gear struts filed from haywire. The cooling fins on the cylinders of the radial motors are made by wrapping No. 30 tinned hair wire around pieces of match stick. The cylinder push rods are merely short pieces of .016 music wire.

The corrugations on the metal wing of the Stout Air Car (the right-hand plane in the upper row of the photograph) were



Here's the Waco U. I. C. for you to start on. Your finished model will be exactly the size of this drawing.

Use the drawing for a pattern if you wish, checking each part against it as you work.

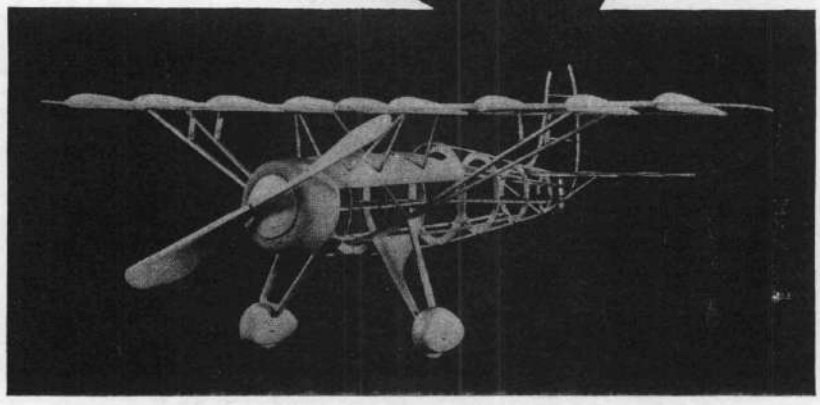
Build a Flying Scale Model!

You'll Like This Miniature Fairchild 22

by

Merrill Hamburg

An accurate duplication of the Fairchild—and it flies!



With this photo you can almost build the ship without drawing.

TRY your hand at model aviation's greatest thrill! The Fairchild 22, presented herewith, makes an ideal flying scale model. Its trim fuselage and high wing insure high performance and great stability. The model has been carefully scaled down from working drawings furnished by the manufacturer, with only slight variations in the tail surfaces and the propeller. A half inch was added to the span of both the rudder and stabilizers.

You'll find the Fairchild 22 not at all difficult. If you've successfully built one other model—for instance, the R. O. G. described in the March issue—you'll have no trouble with this month's ship.

Here's what you'll need to construct your Fairchild: 1—7/16″x⅝″x5¼″ balsa propeller block; 1—3/16″x1″x2″ balsa for nose plug; 1—⅛″x1″x6″ balsa for nose plug and wheel pants; 1—⅞″x2″x2″ balsa nose cowling; 1—¼″x1⅝″x1⅝″ balsa for ring K-K; 3—1/32″x2″x12″ flat balsa for fuselage sections, wing ribs and other small parts; 1—1/64″x2⅛″x3⅝″ flat balsa for fuselage cowling; 9—1/32″x1/16″x12″ balsa strips for fuselage and wing struts; 2—¾″ turned balsa disc wheels; 1—.020″ piano wire rear hook; 1—.020″ piano wire propeller shaft; 1—⅛-30x18″ flat rubber motor; 2 sheets Japanese tissue; 1 tube airplane cement; 1 bottle banana oil.

Before beginning construction study the drawings carefully and locate each detail both in the drawings and on the photograph of the uncovered model. To avoid confusion the drawing shows the longerons (front-to-rear braces of the fuselage) in the side view only, but the notches drawn on the full-size templets (patterns) page 37, give the correct location of the longerons. The lower set of notches may be cut in the bulkheads from the templets; the upper notches should be located by laying the longerons along the partly assembled fuselage and marking the point where each crosses the bulkheads. The cowling around the cockpits is made from 1/64″ balsa. If you can't buy wood that thin sand 1/32″ flat balsa to the required thickness.

On page 37 you will find full-size templets of one-half of the fuselage at each bulkhead. Each templet is lettered to correspond to the lettering on the drawing. A full-size drawing of the airfoil (cross section of the wing) is also given. Cut out these drawings, paste them on cardboard, tin, or brass, and cut the metal or cardboard to the shape of the drawings. By tracing around the curve on these templets you have half of the ellipse forming the sections along the fuselage. To get the other half just turn the templet over. The wing ribs are shaped by tracing around the airfoil templet.

Start with the fuselage. On 1/32″ flat balsa trace the cross sections at each bulkhead, making sure that the grain of the wood runs the long way of the ellipse. Since sections A-A, B-B, and K-K are cut from balsa blocks, start with section C-C and proceed to I-I. Cut out the center of each bulkhead, leaving a rim ⅛″ wide. For this purpose use a razor blade ground or broken to the shape shown in the drawing. Sand the edges and locate and cut out the lower three notches for the longerons. Note that bulkhead I-I has only six notches instead of eight as in the case of the other sections.

Next take three 1/16″x1/16″ balsa strips (your lower longerons) and mark off on them the locations of the bulkheads as shown on the drawing, beginning at J-J. Section J-J is a 1/16″x⅛″x½″ balsa strip, which serves as the stern post of the model. The rear motor hook is pushed through this post and the rear end bent over and cemented in place. Cement the three lower longerons to the stern post, holding them in place while they are drying with small bankers' pins. The bulkheads can now be cemented into place, beginning at the rear end of the fuselage and working to the front. Make sure that each bulkhead is in its proper place and that each one is set at right angles to the center line of the fuselage.

The rest of the longerons can now be cemented into place, their notches being located by laying the longerons along the edges of the fuselage and marking the sections. The two lower side longerons start at H-H instead of at J-J. Notice in the photograph that the three upper longerons end at section F-F where the cockpit cowling starts. When the longerons are in place sand them to form a smooth curve with the bulkheads.

Section A-A forms the front end of the engine cowling and section B-B forms the rear edge. Directly to the rear of the cowling we find another ring, K-K, cut from ¼″ thick balsa so that the front edge matches the templet K-K and the rear edge fits into the curve at section C-C. Cut out the center ellipse of K-K first, then roughly carve the outside to shape. After the ring is cemented to the rest of the fuselage, sand it to blend into the curve of the front end. The top surface of the ring will probably have to be finished when the cockpit cowling is fitted into place.

The balsa cowling around the cockpit should be first sanded to 1/64″ thickness and then the cockpits cut out. Cement the cowling to bulkhead F-F and hold it in place by inserting small pins at the lower corners, through the cowling into the bulkhead. Since the cockpit grows smaller toward the front from E-E to K-K it is necessary to slit the cowling along the top center line between these points.

Now cut a shallow depression in the top rear edge of ring K-K to take the

(Continued on page 36)

front end of the cowling, so that it will lay flat and flush with the rest of the ring. The cowling is now gently pressed into shape, the one edge of the slit being allowed to overlap the other. The surplus stock can then be cut away and the cowling cemented down. The finished cowling should be sanded smooth and the front end curved to fit the curve of the ring K-K.

The engine cowling can be either built up or carved from solid balsa. The cowling for the model shown here was turned up on a lathe. The outside was finished first, then the cowling reversed and hollowed out. Sand it to fit the templets, and to achieve the shape shown in picture and drawing. The completed cowling is cemented to the ring at K-K. If you wish, you may substitute a built-up cowling, constructed much as you did your fuselage.

The drawing shows the shape of the nose piece plainly. It's made of two balsa discs, the first one 1" in diameter and ¼" thick, the second one ¾" in diameter and ⅛" thick. Make a hole in the center of the nose piece for the propeller shaft by pressing a pin through it. A small brass washer is cemented to the nose over the hole to act as a thrust bearing.

Draw out the shape of the stabilizer and rudder frames on a series of 1" squares as shown in the lower left corner of the drawing. Notice that the frame for both the stabilizer and the rudder are made of balsa. It wouldn't be wise to try to cut these large curves from one piece of balsa—there'd be too much cross grain. By laying several pieces of 1/16" balsa over the frames, as shown in the drawing (between tail and wing of top view), you can build up a rough frame with the grain all running with the curve. Cement the ends of these pieces together and trim them to shape. The finished frames should not be more than 1/16" wide. The drawings show the shape and location of the rudder and stabilizer ribs. Fit and cement them in place.

The two stabilizer frames should be cemented to the fuselage at H-H and I-I parallel to the center line of the fuselage. The rudder frame fits around the end of the fuselage. Be sure that it's perpendicular.

You're now ready to cover the fuselage. Notice that the rear of the frame between the sections I-I and J-J is not covered but is left open to permit access to the rear hook when changing rubber motors. It is best to cover only small sections at a time—say the panels between two longerons. Paint the edges of the bulkheads and longerons with banana oil and lay the paper in place. The paper should be free from wrinkles but don't stretch it. Allow it to settle naturally in place. Trim the loose edges with a razor blade and fasten the paper down with another application of banana oil.

The tail surfaces are covered on both sides in the same manner except one whole side of the frame can be covered at one time. The number on the rudder can be printed before the paper is put on.

Now cement the two small stabilizer braces in place. These extend from the bottom of section I-I to the second rib in the stabilizer. Whenever a strut is to be cemented to a part of the plane that has been covered it is best to scrape the paper away at that point. Otherwise the joint will be weak. Make the tail skid of bamboo, using a wedge of wood to set it at the proper angle. The windshields can be made of thin celluloid, or cellophane and a frame of fine pieces of balsa wood.

The wing ribs are cut to the airfoil templet from 1/32" balsa. A small v is cut out of the nose of each rib to receive the front spar. The trailing edge of each rib is cut off to permit the rear spar to be butted evenly against the ribs. The two center ribs are cut to 2" in length.

The wing can be best assembled by building it over a full-size drawing of the wing laid flat on the workbench. The tips are made of balsa and are cut from several pieces cemented end to end as was done in the case of the tail frames. Cover the wing exactly as you did the fuselage, except that here you can cover a whole side at once. Notice that the wing of the model is made in two halves which are cemented together at the center.

To attach the wing to the fuselage you must support it in the proper position with relation to the fuselage while the struts are cut to fit and cemented in place. This can best be done by blocking the fuselage up on the work table with the tail skid raised ⅝" from the table. The wing is now placed in position over the fuselage with the tips resting on a pile of books so that the lower surface of the wing is just ½" above the top of the fuselage at section D-D. The leading edge should be 1⅞" from the front tip of the nose piece. Now cut the short wing struts that fit between the fuselage and the wing ribs and cement them in place.

As soon as the cement is dry turn the plane over on its back and fit the long wing struts in place. Notice how the Y formed by these long struts intersects the outer landing gear struts at the point where the two legs of the Y come together. A short strut extends from this point to the bulkhead D-D at the lower edge of the cockpit cowling. (See photograph.)

Next let's make the wheel pants. First cut out the center of the pants as shown in the drawing. The semicircle—having a 1⅛" diameter—is for wheel clearance. Two sheets of balsa cut to the outside shape of the pants are now cemented to the center pieces, one on each side. The pants are then carved and sanded to the shape shown in the drawing. Insert the ¾" turned disc wheels into the pants, press the ½" bankers' pins that serve as axles through pants and wheels, and cement the pins in place.

Now you're ready to attach the landing gear. Again suspend the plane by placing the wing tips across a pile of books so that the upper surface is exactly 4⅜" from the table. First cut and fit the inner landing gear struts between the plane and the wheel pants. These struts are 1¼" wide at the upper ends where they join the fuselage and curve to a width of only ¼" where they're attached to the wheel pants. Cut them from 1/16" flat balsa stock.

Next fit and cement the two outer landing gear struts. Also fit the two vertical wing struts that extend from the lower surface of the wing to the long wing struts. The drawing shows these in place between the second and third ribs from the wing tips. They're attached to short wing spars running between those ribs.

The propeller is carved from a block 7/16"x⅝"x5¼". The drawing shows the four steps in their order.

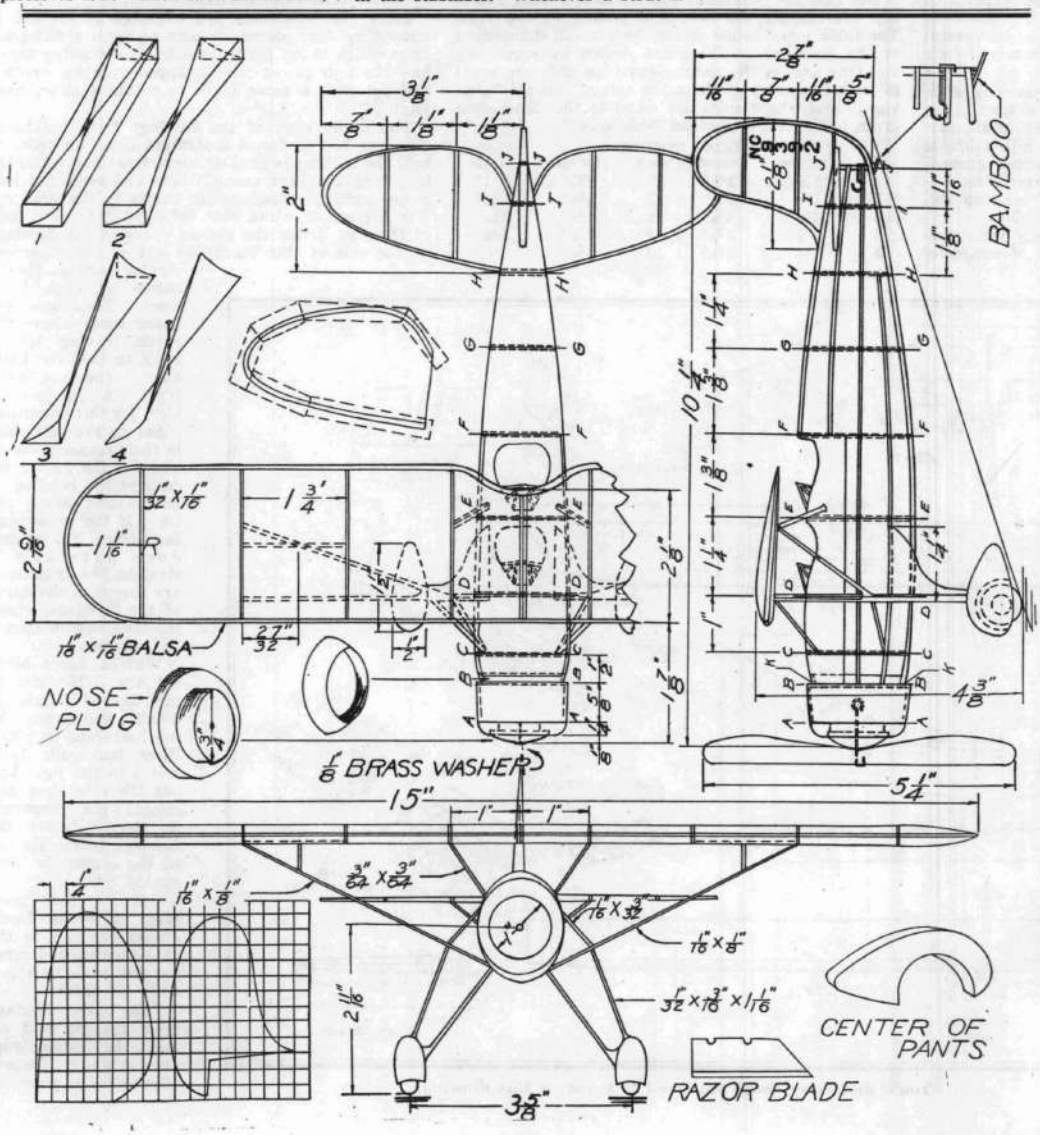
The propeller shaft is made from .020 music wire. Bend the eye first, then push the straight end through the hole in the nose piece. Slip two small brass washers on the end, push the shaft through the hub, bend the projecting end to form a square U, and pull the U back into the hub and cement it in place. Use pair of slender, round-nosed pliers in bending music wire.

The plane is powered by two strands of ⅛-30 flat rubber tied to form a band. The knot is dropped through the hole in the nose of the fuselage and looped over the eye of the rear hook.

Your model is now ready to fly. In winding, hold the model between the thumb and forefinger of the left hand at bulkhead E-E. Turn the propeller in a clockwise direction with the forefinger of the right hand. One hundred and fifty turns should be about right for the trial flight.

Launch the model with a slight forward motion as you release the propeller with the right hand. If the model is properly set it will soar off in a nice long flight, coming to earth in a dead stick landing. If your model has a tendency to dive, the nose is too heavy. This can be overcome by warping the rear edge of the stabilizer slightly upward. If the model climbs too sharply and falls into a stall, warp the rear edge of the stabilizer downward. To warp this surface, hold it in the spout of a slowly boiling teakettle to soften the balsa. A very small amount of warping will affect the flying of the plane.

There's work to the Fairchild 22, but as the neatly designed craft takes shape under your hand you'll feel a mounting thrill, and with the first successful flight you'll be repaid for every hour you spent on it.



Build a Darmstadt Konsul Glider

by

Merrill Hamburg

Here's an Eight-Foot Soaring Glider That Will Ride the Air Currents Like a Man-Carrying Ship!

WHEN the Allies, after the World War, limited the number of powered airplanes Germany could have, the Germans turned to gliders. They became the leading glider experts of the world, and the Darmstadt Konsul, reproduced here for your fun, is one of their most successful designs. Build this glider and watch it ride the air currents!

Perhaps you've wondered how man-carrying gliders can stay in the air for hours at a time. The answer is that they're supported by rising air currents. Wind blowing up the side of a hill, a breeze blowing off a lake and hitting the warmer ground, air coming off a wooded section to a barren stretch—these are some of the conditions that send up columns of air and help the glider to stay aloft.

Before you construct the Konsul, study the drawings and photos. Then, on long sheets of wrapping paper—your grocer will oblige—lay out full-size drawings of all parts. Build the glider over these drawings and you'll be sure of an accurate job. Here's the material you'll need:

8 3/16" x 3/16" x 30" balsa for fuselage longerons; 5 3/32"x2x12" balsa strips for fuselage bulkheads; 1 1¼"x1¾"x2½" balsa nose block; 1 1/16"x3"-x18" balsa for cowling; 1 ¾"x1⅞"x8" wing mounting block; 1 ⅛"-x2"x12" balsa for skid; 6 ⅛"x⅜"x12" balsa for empennage outline; 3 ⅛"x½"x12" balsa for empennage spars; 1 ¼"x¼"x2½" fuselage rudder post; 4 1/16"x2"x12" balsa for empennage ribs; 1 1/16"x¼"x12" bamboo for skid cap strip; 1 6" piece of .030 music wire for launching hook and ring; 1 5/16"-x5/16"x44" balsa for wing leading edge; 4 5/16" x 5/16" x 18" for leading edges; 1 ⅛"x-3/16"x44" balsa for trailing edge; 2 5/32"-x⅜"x26" balsa for trailing edges; 4 ⅛"x-3/16"x44" balsa wing spars; 8 ⅛"x3/16"x30" balsa wing spars; 24 1/16"x2"x12" balsa rib stock; 1 ¼"x18" birch dowel; 4 ¼" aluminum tubing 2" long; 1 large tube of cement; 1 2-oz. can of banana oil; 6 sheets of Japanese tissue.

The fuselage bulkheads are numbered from one to ten, starting at the nose and ending at the rear. The table given below shows the over-all dimensions of the bulkheads. These are drawn by combining two true arcs in the rectangles whose ends are equal to the dimensions given in the column headed "plan view," and whose sides are equal to the dimensions given in the column headed "side view."

FUSELAGE DIMENSIONS

NUMBER	SIDE VIEW	PLAN VIEW	NUMBER	SIDE VIEW	PLAN VIEW
1	2½"	1⅝"	6	5⅜"	3⅛"
2	4"	2⅝"	7	5⅛"	2¾"
3	4¾"	3⅛"	8	4⅜"	2⅛"
4	5½"	3⅜"	9	3¾"	1½"
5	5½"	3⅜"	10	3⅛"	¾"

The drawing shows how the arcs are drawn through the points A, B, C, and D. The centers for the arcs fall on the center line C-D. The inner arc is ⅜" from the outer arc.

Since the bulkheads are so large it is best to cement up four pieces of balsa to form a flat piece from which to cut the bulkhead. The drawing shows how the four pieces can be lapped over one another and cut with a razor blade to obtain a close, tight joint.

The upper edge of the fuselage from bulkheads No. 4 to No. 10 forms a straight line. In order to hold the bulkheads in their correct position while the longerons are bent around them and cemented into place, build the fuselage jig shown in the drawing. Use a piece of white pine ½"x3"x32" for the body of the jig. Draw the bottom curve of the fuselage on the side of this board, lay out and saw perpendicular slots at the location of each bulkhead. Then saw the board away above the curve, leaving ¼" of stock to hold the bulkheads. (See the drawing.) A jig saw is ideal for this operation.

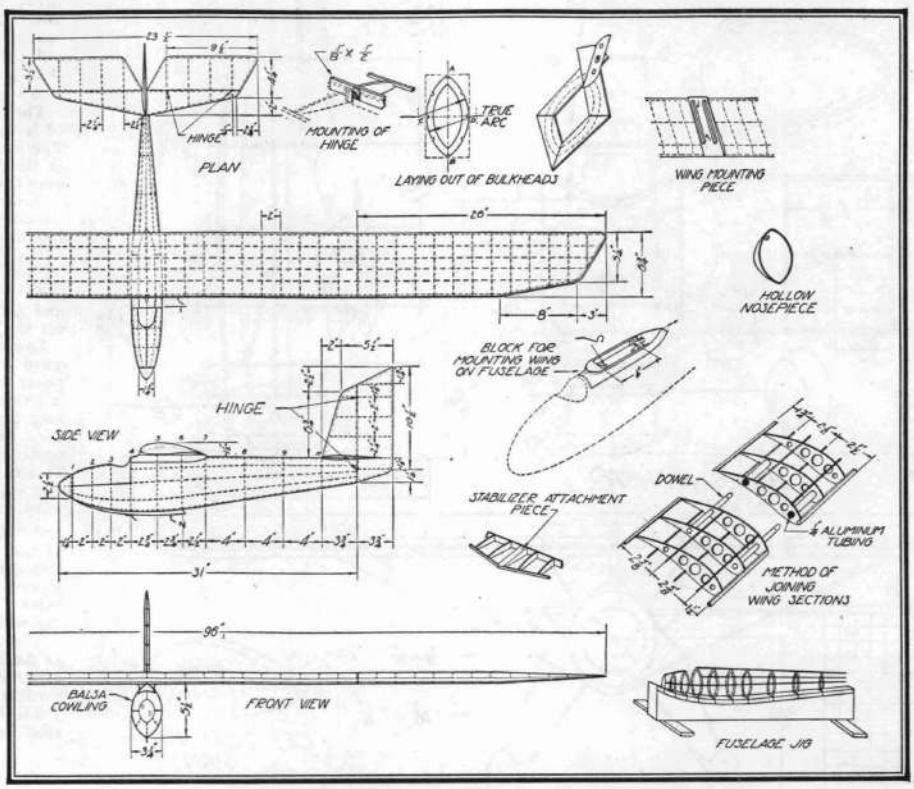
Set up the bulkheads in their respective slots and test the jig for accuracy by bending a small stick along the top. If the upper surface from No. 4 back does not form a straight line or if there are bumps in the curve of the fuselage, check the slots and bulkheads for accuracy.

With a razor blade cut the 3/16" slot in the top of bulkheads 4 to 10, and cement the top longerons in place. Place bulkheads 1, 2, and 3 in the jig. Lay out the side slots and cement the longerons in place. Leave the fuselage in the jig until the cement is thoroughly dry.

Cut the nose piece from a balsa block, 1¾"x2½"x1¼" to the shape shown, and carve out the inside to a thin shell ⅛" thick.

Take the fuselage from the jig and cement the bottom longeron in place. Cement

(Continued on page 37)



You'll find every detail you need to know on this drawing.

the nose piece in place against No. 1 bulkhead. The cowling is made in two pieces, one on each side of the center. First the upper edges of the bulkheads No. 1 to No. 4 must be undercut 1/16" to allow the cowling to fit down flush with the rest of the surface of the fuselage. The nose piece is also cut away to receive the cowling. Two pieces of 1/16" balsa are then fitted into place and sanded to form a continuous curve with the nose piece and the fuselage. After that, draw and cut out the cockpit with a pointed razor blade.

The stern post (rudder post) is a ¼" square piece of balsa 2½" long. Cement it in place, using small pins to hold the ends of the longerons in position while they dry.

The keel is cut from a ⅛" balsa, following the outline of the lower edge of the fuselage from bulkheads 1 to 6. When finished the keel is pointed in front and curves to ½" in depth at the rear. After the keel has been cemented into place, fit a cap strip of 1/32"x⅛" bamboo to the lower surface to form a hard skid for landing. Shape and cement the .030 music wire hook to the cap strip directly under No. 4 bulkhead.

Cut the wing mounting block from a balsa block ¾"x1⅞"x8". Carve its lower surface to fit over the top of the fuselage and the sides to sweep smoothly into the wing. Round the front end of the block to a streamlined shape and cut the sides to a point at the rear. Cut a rectangular hole 1½"x4" through the center of the block. Two small .030" music wire hooks are cemented to the under side of the block so as to extend into the open rectangle. These hooks are used to hold the wing in place. Small dress snaps may be substituted for the hooks if you prefer. The block may now be cemented to the fuselage.

The empennage surfaces are built up with the streamline section shown in the drawing. Each rib differs in length, but you may determine the size from your full-size layout.

Notice that both elevators and rudder are hinged. Cut these hinges from .010 sheet brass or thin tin, ½" in width. Bend them to form a letter N whose height is equal to the thickness of the section. (See detail near top of drawing.) This type of hinge is stiff enough to maintain the setting of the control surfaces while in flight but permits them to be easily adjusted.

Assemble stabilizer and rudder over your drawing. Cut the ribs in two, cement the two spars to their ends, and join the spars together with the hinges. Cement the trailing and leading edges to the ribs, cutting a V-shaped notch out of the leading edge of each rib to let the leading edge spar fit into it. Cement the stabilizer across the fuselage with the additional rib piece shown in the drawing under the title "stabilizer attachment piece." This piece is cemented along its entire length to the fuselage. The rudder and fin are made in the same manner and the rudder hinged to the fin and stern post.

A Gottingen 535 section is used on the wing. A drawing of this section is given below. Cut the ribs from 1/16" balsa, cutting out the holes first, then the outline. Cut out the notches for the leading edge and the spars—note that the leading edge notch is V-shaped.

The tip ribs, which vary in length, will have to be fitted. Build the wing in three parts—two 26" tips and the center section.

The wing mounting piece, to be cemented to the lower surface of the wing at the center of the center section, is cut from a ½"x1⅞"x6¾" balsa block and is shaped to fit the lower surface of the wing. This block fits on top of the wing mounting block on the fuselage. Cement two 3/16"x-3/16"x4" balsa blocks to the under side of the wing block so that they will fit snugly into the rectangular hole in the wing mounting block. These act as locating blocks and keep the wing from shifting on the fuselage. Cement two small hooks similar to the ones used on the wing mounting block to the block directly over the other hooks. Two small rubber bands are looped over these hooks to hold the wing in place.

The wing sections are assembled together for flying by means of two short pieces of aluminum tubing and two short sections of birch dowel. These are fitted into the ends of the section as shown in the drawing. The dowels must fit the tubing snugly yet must be loose enough to slip in and out freely.

Cover the glider with Japanese tissue. To do this, select a portion of framework to cover, paint it with banana oil and lay the paper over it. Don't try to stretch the covering. With ordinary care you can avoid wrinkles.

You can shrink the paper tight by lightly spraying the finished glider with water. A small hand-plunger type used for spraying insects around the home will do the job satisfactorily. The paper can also be shrunk and at the same time waterproofed by painting the plane with a mixture of five parts of acetone to one part of banana oil.

To balance the glider, drill a small hole in the nose and drop lead shot into it until the glider when launched from a height of five or six feet will glide smoothly to the ground. Then plug the hole with a small piece of balsa.

Use a spool of thread for a towing cable when you're launching the glider. Fasten a small ring bent from .030 music wire to the end of the thread and slip this over the launching hook so that when tension is relieved the ring will slide off. Use at least a hundred feet of thread and launch the glider in much the same manner as you would a kite.

Have your chum hold the glider in flying position while you hold the end of the thread. At an agreed-upon signal start across the field against the wind while your friend releases the glider. Walk—don't run. And don't fly your ship on a windy day.

If your glider is constructed correctly and properly balanced, it will climb rapidly until it's almost over your head. When it has climbed to the limit of the thread, release it by slacking off on the line and by letting the ring slip off its hook. If weather conditions are favorable and there are enough rising air currents you may never see your glider again. Boys have followed models for more than two miles until they have literally disappeared into the blue! But it's more likely that after a long flight the graceful ship will coast earthward to give you many more hours of rare fun.

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....., 192.....

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Airplane Model League of America

The A. M. L. A. MANUAL *for* Model Plane Builders

by

Merrill Hamburg
Secretary, Airplane Model League of America
Airplane Model Editor,
THE AMERICAN BOY MAGAZINE

THE AMERICAN BOY MAGAZINE
550 Lafayette Boulevard
Detroit, Mich.

PRICE - - 5 CENTS

A FOREWORD

from the Editor of THE AMERICAN BOY to builders of airplane models.

We are living in an air-minded world—a world that is traveling and doing business, exploring and playing in the air. That is the reason THE AMERICAN BOY, in September, 1927, organized the Airplane Model League of America, and that is the reason that more than 200,000 builders of model planes joined the League in its first year. For years THE AMERICAN BOY has been aiding its readers to keep up-to-date on aviation, and the job is becoming increasingly important.

So, for this year and the years to come, THE AMERICAN BOY has planned a program that will appeal to every air-minded magazine reader. There will be Mr. Hamburg's brand new articles on airplane models, with hints on ships that will win championships. There will be a series of talks on aerodynamics by one of the nation's leading aeronautical experts, Professor Alexander Klemin. There will be vivid, fast-moving fiction stories of flying cadet life at Brooks Field by Frederic Nelson Litten; tales of aviation adventure by Thomson Burtis; air stories by Laurie York Erskine and others who know planes and flying from joy-stick to tail skid. There will be an opportunity to render service to aviation through the AMERICAN BOY Air-marking Campaign. There will be dozens of other aviation features.

All of these you can find only in THE AMERICAN BOY. Remember that we believe air-mindedness is the duty and the privilege of every American, and that we want to help you in any way possible to achieve it. The boy who reads THE AMERICAN BOY regularly each month is going a long way toward an up-to-the-minute, one hundred per cent understanding of the fast-moving progress of aviation.

Griffith Ogden Ellis

Editor, THE AMERICAN BOY.

The
A. M. L. A. MANUAL
for Model Plane Builders

BY

MERRILL HAMBURG

Secretary, Airplane Model League of America, which is sponsored and conducted by the American Boy Magazine.

MODEL airplane building and flying is more than a sport, though it pays big dividends in fun. It is a short cut to understanding the principles of aeronautics. Boys who know about model planes know, automatically, about man-size planes. William B. Stout, designer of the Stout all-metal monoplane, learned about aeronautics from the models he started building more than thirty years ago. Commander Richard E. Byrd, Clarence Chamberlin and other air-leaders have profited by studying models.

Boys of to-day get not only the fun and knowledge that building planes gives them, but may also compete for national championships in the sport, for cups, medals, trips to Europe offered through the Airplane Model League of America by THE AMERICAN BOY, and other prizes in national and local contests.

This Manual is a general guide to builders. It describes the tools needed, the materials used and the fundamental operations on which the construction of scientific flying models is based. It defines common airplane model terms. Every builder should familiarize himself with it thoroughly before he commences his work. *The articles in THE AMERICAN BOY take for granted a knowledge of everything that is contained in this Manual.*

TOOLS

You will not need expensive tools in model building. Most operations can be accomplished with your pocket knife, your smallest set of pliers and some sandpaper.

Nevertheless, the fellow who wants to rank high in contests usually outfits himself with exactly the right kind of knife, pliers, block plane and so forth. The right tools help toward good workmanship, and workmanship wins in competition. Here is a list of the few tools an expert will use:

Three pairs of pliers—6 inch round nose, 6 inch half-round, wire cutting.
Small block plane.
Flexible steel rule.
Good extra-sharp jackknife.

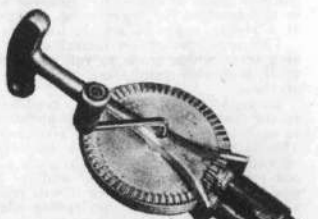
Bought separately from your hardware store, or a model supply house, the pliers cost 60 to 75 cents each, the plane 50 cents, the rule 60 cents, and the jackknife $2.50 or $3.00.

The Knife Is Important

Of all the tools, the jackknife is the most important. You will find that that old pocket knife you've carried for a year probably hasn't a keen enough cutting edge. A hand-forged blade is the kind you'll want to build championship models.

In addition to the tools named, you'll want to supply yourself with a packet of sandpaper of varying coarseness, razor blades, needles, silk thread and such easily-obtained accessories.

An egg-beater winder is an important part of every expert's equipment. You can buy a winder from an airplane model supply house, already made up; or, if you are an expert workman, you can get an egg-beater and make your own winder. Plans for a good one were given in the January, 1928, AMERICAN BOY. This is a difficult job, however. A very strong, well-built winder is necessary for such a model as the outdoor twin pusher.



Doubtless you will want to make model carrying cases—one for your indoor models, one for the larger outdoor planes. A case may be built of standard wall board, with 5-16-inch white pine or bass for ends, top and bottom. Imitation leather covering waterproofs and strengthens a model case. Some boys have bought inexpensive suitcases and converted them into excellent model carriers.

MATERIALS

Wood

Balsa is the wood now used by expert model builders everywhere, in place of the heavier pine, spruce and other woods. Balsa, grown only in the tropics, is half the weight of cork, and very strong for its weight. Its use for propellers, motor sticks, wing spars, fins and so forth has turned the trend of model building from heavy, fast-flying ships to very light endurance planes.

Balsa must be specially selected—the League pays a premium for extra good stock and furnishes you, in kits, the best balsa to be found. For fuselages and propellers a medium hard, straight-grained wood should be used. For other balsa parts a softer—hence lighter—wood is advisable.

Bamboo, though less used now in contest models than formerly, is excellent for wing tips, rudder frames and so forth where strength rather than lightness is a point. You can get straight strips of bamboo from the large end of a fishpole or other bamboo pole, or you can buy the strips inexpensively from model supply houses. A strip should be at least 10 inches long, to be practical.

Cement and Papers

The cement most commonly employed is ambroid, a commercial product. Ambroid dries rapidly, is water and oil proof, and exceptionally strong—you'll use it wherever glue is needed on models. It is specially useful for repairing breaks in wood and bamboo, for attaching small metal parts to wood without the use of thread binding, and for similar purposes.

Be sure to keep the ambroid container closed except when you are actually using the cement. Ambroid thickens so rapidly when air strikes it that a few minutes' exposure causes serious deterioration. Builders who plan to do considerable work usually get two-ounce cans, which are more generally satisfactory than small bottles.

For scientific flying models, designed for duration, nothing is so satisfactory a covering for wings and other surfaces as Japanese imperial tissue paper. This is very strong and light, and is easily applied.

Other coverings less in use for flying models, progressively heavier and therefore less desirable, are rice and bamboo paper, goldbeater skin and China silk. For models in which duration is not a point, silk is excellent. For scale models (which do not fly) any covering that gives the proper appearance may be used.

"Dope"

Banana oil and acetone are "dopes" or shrinking fluids for wing coverings. Both may be obtained from model supply houses, or from drug stores, as well as from the League. Banana oil is also useful as a glue for fastening Japanese tissue to balsa and bamboo, and as a waterproofing fluid. It should usually be diluted with acetone (four or five parts acetone to one banana oil) for shrinking tissue; otherwise it is too strong. Indoor planes are never doped, as the added weight is too great a handicap.

Commercial airplane dope, which may be obtained from airplane supply houses or most flying fields and thinned with acetone, should be used on cloth wing coverings.

Metal Parts

Music wire is the material now employed for making metal parts on models—hooks, cans, propeller shafts, wing clips and so forth. This is very light, very strong and very stiff. It may be obtained in coils of 1-4, 1-2 or 1 pound—a 1-4-pound roll should furnish enough wire for 25 boys for a year—in a variation of sizes. The most useful sizes are No. 6 (.016 in.), for all Baby R. O. G. parts and for light cans; No. 8 (.020 in.), for indoor endurance models and wing clips and cans on outdoor models; No. 13 and No. 14 (.031 in. and .033 in.), for other outdoor model parts.

Thrust bearings, the small metal bearings for propeller shafts, may be made from small brads, flattened and drilled. In bending a flattened brad, remember that most of the brad should lie along the motor stick, to which it is ambroided. The other end is bent in a curve so that, when the propeller shaft is put through the hole drilled in it, it rests parallel to the motor stick. Be sure, too, that as little as possible of the bearing is in such a position that it will touch the washers separating it from the propeller. Reduction of friction may add ten per cent to the endurance of a plane.

The prepared bearings may be bought from the League, if you don't care to make your own.

Washers to reduce friction between propeller and thrust bearings are made of bronze or brass, 1-8 inch in diameter for indoor models and 3-16 inch for outdoor.

Rubber Motors

Rubber is by all odds the best power plant you can obtain for your scientific models; more energy can be stored in it, ounce for ounce, than in any other small power plant. Rubber strands, or "rubber thread," may be bought in a great variety of sizes. The sizes most used are .045 inch square rubber for Baby R. O. G. models, 1-8 - 30 for duration and light commercial models and 3-16 - 30 for very heavy planes.

Light and heat both cause rubber to deteriorate. To preserve your extra motors, put them in an airtight, opaque jar—a large crock with a spring cover is an excellent container. Many boys use big glass jars painted black, also. The rubber should be dusted with powdered soapstone or talc, which a tire shop can sell you, before being put in the jar, then kept in a cool room.

Keep this table for winding rubber motors in mind:

An indoor endurance motor of 15 inches, two strands, will take about 1300 turns, if the rubber is fresh and has been "pre-wound" twice for a few hundred turns. Good rubber in a two-strand motor should be stretched to four times its length before the winding commences. An egg-beater winder, of course, is used for this kind of work. Attach the winder, with an S-hook, to the motor at the end opposite to the propeller.

An outdoor twin pusher motor of 40 inches, six strands, will take about 1200 turns, under the same conditions as above (except that the two motors should be stretched to about one and one-half times their length, instead of four times).

A Baby R. O. G. motor of 8 to 10 inches, two strands, will take 300 to 500 turns.

Be sure, before you wind your motors, that the wire fittings are made and bent just right. If they're not, they may cut the rubber when it's tightly wound.

THE CONSTRUCTION JOB

You'll find, as you get into model building, that there are a certain number of standard operations. Balsa cutting and bending, making wire parts, propeller carving and a number of others are a part of nearly every model you'll build. The Manual gives you hints that will help you in these operations.

Remember that careful workmanship is the fundamental of successful model building. When a drawing for a model calls for a wing spar of 1-16 x 1-32, you must see to it that your spar is planed and sanded to exactly those dimensions—otherwise you will sacrifice either lightness or strength. *Make your work accurate.*

Look for short cuts, too—methods to make your work easier and faster, without losing accuracy. A skillful worker develops a lot of tricks in model building that are peculiarly his own.

Carving and Shaping Balsa

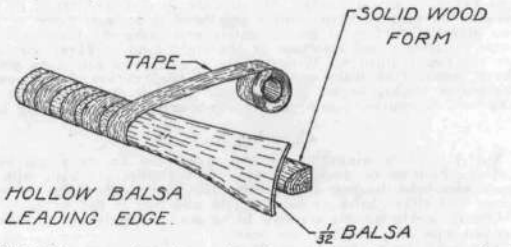
Preparation of balsa parts is one of your jobs. The best way to split off from balsa strips the long, thin, narrow pieces you'll need for wing spars, ribs and so forth, is this: lay the strip flat on your work bench (a plate glass makes an excellent working surface) and, with a steel rule as a guide, use your knife to slit the pieces you want. Remember that, unless the strip is exceedingly thin, you should make repeated cuts. Don't try to slice through the wood in one cut—you'll probably split the wood, instead of cutting it, if you do.

With a sharp blade, carefully handled, a perfectly straight edge may be obtained. Be sure that your ruler is laid so that the width of the piece you're splitting will be uniform.

Though a knife will also cut end grain, a razor blade is the best tool. A razor blade with a portion of one edge ground out, leaving a short blade about 1-4 inch long, may be used for cutting grooves and slots such as are found in the balsa ribs in built-up wings.

Balsa is most easily bent by holding it in steam until it becomes pliable, then forcing it into the desired shape and holding it rigid or placing it in a simple mold until it dries. It will then retain its new shape. For bent wing spars, curved ribs and such small pieces of balsa you can easily construct a mold or jig of small brads driven into a pine base in such shape as to make a "form" of the exact curve or angle you desire. When you have steamed the wood (the spout of a tea kettle is an excellent steaming device) bend it approximately to shape, then place it in the jig to let it dry.

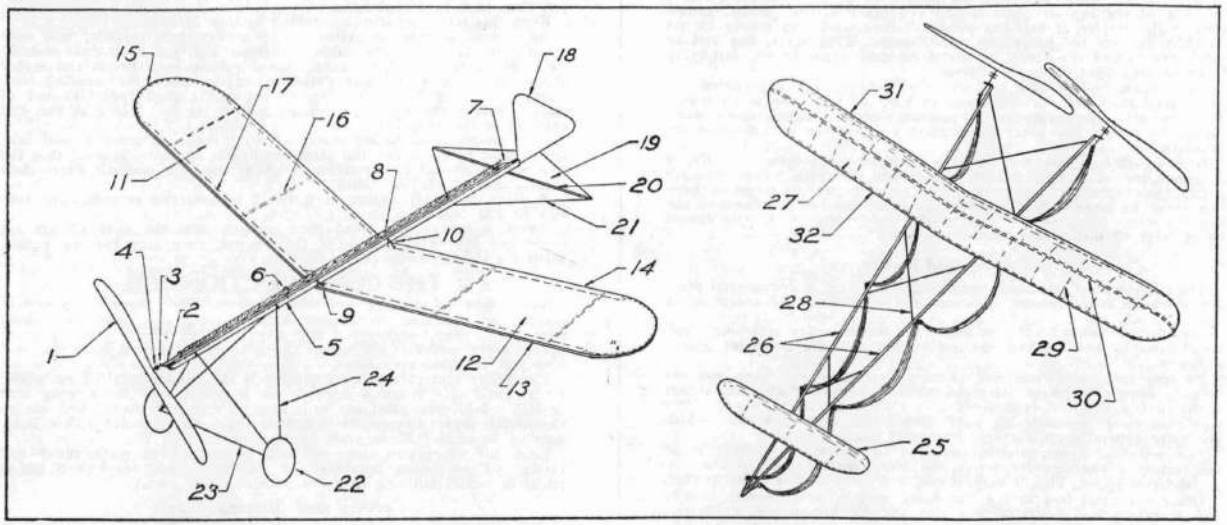
To make the hollow balsa leading edge for a built-up wing, or the hollow balsa tube some boys have used for motor sticks, you'll need solid forms. A steel rod will do to make a balsa tube. Steam the thin strip of flat balsa, then bend it closely around the steel rod, in a steep spiral as though you were taping the rod. Wrap the wood tightly with cloth tape to hold it in shape until it dries. Then remove the tape and ambroid the edges. Make a balsa leading edge on a form with tape in the same manner (here the edges of the bent strip do not meet).



You'll find it convenient, in making bent balsa wing spars, to bend a double size strip so that, once it has the necessary dihedral angle,

THE PARTS OF YOUR MODEL

Do you know what a "rib" is? Can you name the other parts of your models? Here you are given a pictorial dictionary of model airplane terms. To understand it, refer to the key below. The plane on the left is a typical indoor tractor, that on the right an outdoor twin pusher.



1. Propeller
2. Propeller shaft
3. Front or thrust bearing
4. Brass washers
5. Fuselage (motor stick)
6. Can
7. Rear hook
8. Rubber motor
9. Front wing clip
10. Rear wing clip
11-12. Paper wing covering
13. Leading edge
14. Trailing edge
15. Wing tip
16. Rib
17. Wing spar
18. Fin (rudder)
19. Tail surface (stabilizer)
20. Tail cross piece or spar
21. Thread outline of tail
22. Wheels
23. Axle
24. Landing gear struts
25. Elevator
26. A-frame
27. Built-up wing
28. X-bracing
29. Rib
30. Center spar
31. Trailing edge
32. Leading edge

you can split it into two pieces with exactly the same angle. Expert builders sometimes make wing spars by ambroiding two pieces at the center at the proper angle; this makes bending unnecessary.

Balsa may also be bent over an open flame—a candle or a small alcohol lamp. This often results in charring, however. Steam is usually more satisfactory.

Bending Bamboo

Bamboo is bent over the open flame—a very hot, very small point of flame is best. Many builders, however, prefer to bend it around a heated metal rod or can, as this method is very easy. You'll do best to bend larger strips—as wide as 3-8 inch, perhaps—to the desired shape, then slit off the slim 1-32 inch pieces you need for wing tips, rudder frames and so forth. This method makes wing tips identical, and it furnishes parts for a number of planes in one operation.

Remember, in preparing bamboo, that the inside of the strip is pithy and has little strength. The 1-16 inch at the shiny side of the strip is the part you'll use.

Bending Wire

Wire bending is a little difficult for the new hand at model making, but skill comes easily. Music wire is stiff and tends to spring back to its original shape unless you bend it at least twice as far as you actually want it to go, or unless you make the bend at a sharp angle. Patience and selection of the right kind of pliers for the job are the two requisites. With a little practice you can make propeller shafts, cans, (the little wire eyelets to keep rubber motors close to the motor stick), hooks, landing gear and all the other wire parts. You can, of course, obtain them ready-bent from model supply houses.

Covering Surfaces

Model airplane wings are of two types—the flat or single surface, and the built-up or double surface. The frames are built with balsa spars and balsa leading edges, balsa ribs and bamboo tips in built-up wings and either balsa or bamboo ribs and tips in flat wings.

Championship models are now being made entirely of balsa, because bamboo tips and ribs are too heavy.

The wing frame must be constructed first, according to plans for the particular model you are building. Parts are glued together with ambroid. When the frame is dry, you are ready to apply the covering.

First see that all wrinkles are removed from the fabric. If the covering is to be of Japanese imperial tissue, as in most cases, it is well to iron it carefully. Expert builders sometimes use an ironing board as their workbench for wing covering, keeping the pad warm with a hot iron. Thus, they say, they prevent the paper from warping the wing out of shape when it gets into the heat always present high up in an auditorium.

Start, in covering a wing—either flat or built-up—at the center. Apply a plentiful coat of banana oil to the center spar or rib—enough oil to soak through the paper when it is laid in place. When the oil dries, fasten the paper to succeeding ribs and spars in the same manner, painting them section by section. Draw the paper lengthwise and hold it tight to prevent wrinkling while drying. Do not attempt to cover the entire half of the wing at once, for it is impossible to get a smooth job on the paper this way.

Cover a built-up wing in the same manner as a flat wing—top first, bottom later. Trim extra paper off, after it is completely dried, with a razor edge or fine sandpaper. An extra coat of banana oil will fasten all loose or rough edges to the spars.

Pontoon covering, fin and elevator covering, and body covering on commercial models follow the same proceedure. Five or more coats of banana oil serve to waterproof pontoons and other parts of "seaplanes" which might be subject to water. Several coats of dope should be applied to wing and elevator of outdoor models.

Carving the Propeller

If you're building for duration—and usually you are—your propeller is the most important single part of your plane. A propeller of the wrong pitch, weight or length will greatly decrease the lasting power of an otherwise expertly built model. Here are a few simple rules about propeller carving—keep them in mind in your work:

Medium-hard balsa is the wood to use.

The leading edge is always the straight edge.

The hub section does no work and should be cut away as much as is consistent with strength.

The hub should be ambroid-painted to increase strength and to provide a hard surface for the washers.

Since the efficiency of a propeller depends on the mass of air set in motion in a given revolution, it follows that the larger the diameter the more efficient will be the propeller.

Increase of pitch also increases "drag," which requires, in turn, an increase of power.

The widest part of the blade should be two-thirds of the blade's length from the hub toward the tip.

The diagram shows the steps in carving a right-handed propeller (a right-handed "prop" is one that revolves in a clockwise direction when viewed from the rear of the plane). First be sure that the propeller block, of balsa, is trued up to size, and well sanded. Then lay out diagonals on the wide faces and ends (in opposite directions on opposite ends) as shown. At the intersection of the long diagonals drill the hole for the shaft—by pushing a pin through, or with a special drill. Be sure that the hole is at right angles to the face of the block, else it will not lie in the center of the hub.

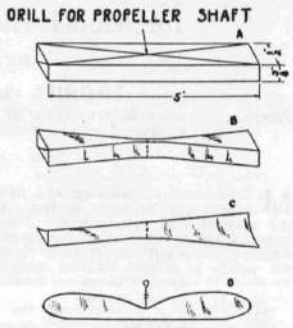


FIG. IV

Then carve out the block as shown in the second picture. Follow the diagonals closely, except at the center, where a section at least 1-8 inch wide is left. And remember that a sharp knife cuts balsa almost as though it were butter. Don't slash into the block hastily—take it **slow and easy!**

The third drawing shows one face, the concave face, of each blade carved out. Cut most of the wood away with your knife, then sand out the "camber" or curved surface (a "dish" that covers the whole blade) with sandpaper. The depth of the camber should not exceed 1-32 inch—check this with a straight edge laid across the prop's face. Don't forget that when the concave side of one blade is toward you, you see the convex blade of the other. This means that you carve off diagonally opposite corners of the block first.

Now carve off the backs of the two blades, making them convex to correspond to the fronts. Leave the whole prop about 1-16 inch thick. Sand the blades down, then, until they are no more than 1-32 inch thick at the tips and through most of the blades, tapering to 1-16 inch at the hub. Now cut from the trailing edge a flat V, so as to reduce the size and weight of the center inefficient portion of the prop. And be doubly careful that your knife doesn't slip!

Now you are ready for the finishing touches. Round the tips with a knife, and sand the whole prop smoothly. A well-made prop is *translucent*—light may be seen through it when it is held before a window or an electric globe. Push the propeller shaft through the hole from the trailing edge forward, bend the protruding end into a U and pull the shaft backward again so that the U imbeds itself in the leading edge. Paint this and the whole hub with ambroid, and you have a finished tractor propeller.

To make a left-handed prop, used on the twin pusher to balance one right-handed propeller, draw the end diagonals in directions opposite to those you have used for the right-handed prop. The shaft for the pusher propeller is inserted from the leading edge, just the opposite of the tractor.

Stability

Most model builders at one time or another have considerable trouble in gaining lateral stability—that is, equilibrium so that their models will ride on an even keel. There are two ways of obtaining this. First, by dihedral angle on the wing—that is, instead of making a straight, flat wing you bend it at the center to form a flat V. This angle in a full-size plane seldom exceeds 3 degrees; in models it is often larger. When the airplane rolls off an even keel, its weight tends to make it side slip. As soon as the plane gains speed sideways in this position the lower wing, because it is meeting the relative wind at a higher angle of attack, has more lift and will right itself.

You may also obtain lateral stability by using a high fin. This acts as a lever which tends to roll the plane back to an even keel as soon as it begins to gain speed sideways. Most duration planes use both of these.

Because of torque, the tendency of a whirling propeller to rotate the entire plane in the opposite direction, it is often necessary to warp the wings so as to give one wing more lift than the other. This is done by warping the leading edge. Do this in light models by twisting the entire wing in such a manner that the leading edge of one end will be bent upward and the other downward. If held in this position for a few minutes it will retain a slight amount of the twist when relieved. When the leading edge is warped up, the wing is said to have washin and when warped down it is said to have washout.

Washin and washout may be given to a wing permanently by bending the wing clips very slightly.

On a tractor with a right-handed propeller, seen from the rear, the right wing will have washin and the left wing washout. The speed of the plane and the size and speed of the propeller are the factors that determine the amount of warping necessary. As no two planes will

correspond exactly the trial method is the only way of getting the proper adjustments.

See How It Glides

All of that is lateral stability. To keep the plane riding smoothly, neither climbing nor diving too sharply, you need only shift the wing backward or forward.

Before you wind up the motor, let the plane glide from your hand to the floor. If it dives too rapidly, set the wing forward a bit and try again. If it tries to climb and then settles back on its tail, in a stall, set the wing back. When the plane glides evenly, it's ready for a flight.

If you're flying outdoors, keep the rudder straight. If you are flying in the house, curve the rudder to the left (for a tractor) by holding it close to your mouth and breathing on it while you bend it slightly with your fingers. The amount of bend depends entirely upon the size of the room you're going to fly in. The plane won't be injured by striking the wall. If you've followed directions the model will be so light that it will glance off without damage.

To wind a tractor motor, with a right-handed prop (if you aren't using a winder), hold the fuselage between the thumb and forefinger of the left hand, with the propeller toward you. With the forefinger of the right hand, turn the propeller clockwise. When the rubber strands show a thick row of knots they are tight enough. Turn the plane away from you, still holding the propeller. When you're ready, release the propeller with the right hand and let go the plane with your left.

Don't chase it or grab it. Just watch it shoot away from your hand, and then circle and climb. In no time at all it reaches the ceiling, hits it, swoops downward, and climbs again. If flights don't seem long enough, you've probably made parts too heavy! Try again. No expert model builder—no national contest winner—ever made a perfect plane on his first attempt.

TYPES OF MODELS

Airplane models are of two types—the scale, or non-flying, and the "flying sticks."

The scale model is an exact reproduction, in miniature, of some large airplane. It is constructed exactly to scale. Its builder is striving for neatness and accuracy of workmanship, for close resemblance to the large plane he is copying and for fidelity to detail. Since the scale model doesn't fly, this Manual does not give special instructions for its building or materials. It may be made of anything you choose to use, and by whatever methods.

The "flying stick" is so called because the fuselage is usually a single stick of wood. The Baby R. O. G., the indoor pusher, the outdoor twin pusher, the championship indoor tractor—all are "flying sticks."

The commercial model is a variation of the "flying stick" in that it uses a single motor stick inside the built-up fuselage to carry its rubber motor. It is heavier than endurance models, hence won't fly so long. But it makes a splendid appearance in the air.

Here are a few of the terms you'll need to know to understand model aviation and aeronautics, with definitions:

Airfoil

Any surface designed to give lift while being projected through the air is called an airfoil. The most common airfoil is a wing.

Chord

A straight line drawn from the leading edge to the trailing edge of an airfoil is called its chord.

Span

The distance between the tips of an airfoil—that is, its length—is called the span of the airfoil.

Lift

The sum of all the forces acting on an aircraft or airfoil which tend to raise it perpendicular to the direction of the airstream is called the lift. It is necessary to specify whether it applies to the entire aircraft or only parts of it. The airplane derives most of its lift from its wings.

Drag

The sum of the forces acting on an airfoil in a direction opposite to that in which the airfoil is moving is called the drag. The drag of an airfoil may be explained as the resistance it offers to being projected through the air. The lift of an airplane overcomes the weight and the thrust of the propeller overcomes the drag.

Angle of Attack

The lift of an airfoil not only changes with the area and velocity but also with the angle that the airfoil makes with the wind. This angle is known as the angle of attack and must not be confused with the angle of incidence.

Angle of Incidence

The airplane wing gives more lift when tilted at an angle to the airstream so that the leading edge is slightly higher than the trailing edge. This angle, formed by the chord of the wing and a line parallel

to the propeller shaft, is known as the angle of incidence. The angle of incidence varies on different planes. Racing planes use very little while slow transport planes have anywhere from 3 to 5 degrees. The angle of incidence could be called the angle of wing setting.

Aspect Ratio

The aspect ratio of an airfoil is the ratio of the span to the chord. It has been proven that the airfoils with high aspect ratio are more efficient than those with a low aspect ratio. A wing with a span of 36 inches and chord of 6 inches has an aspect ratio of 6 to 1. This wing would not be as efficient as a wing with the same area but with an aspect ratio of 7 to 1.

Median Line

A line drawn through an airfoil section in such a manner that every point in that line lies equally distant from the upper and lower surfaces is called the median line. The median line may be located by drawing a number of circles within a section just touching the upper and lower surfaces. A line connecting the centers of these circles will be the median line.

Pitch = $\pi \times$ dia. $\times$ thickness / chord

The distance that a propeller would move forward if slipping—that is, the prop's tendency to thrust air backward rather than to move forward itself—could be eliminated is called the theoretical or geometrical pitch. This distance minus the amount of slip is called the actual or effective pitch. The tip of a propeller in revolving forms a circle. The diameter of this circle is called the diameter, or length, of the propeller.

HELPS IN MODEL BUILDING

Offered by the A. M. L. A.

The purpose of the Airplane Model League of America is to supply you *everything* you need to build and understand scientific model airplanes. The League was organized in 1927 by THE AMERICAN BOY Magazine to help you gain knowledge of aviation, and you should use it in any way possible. So important to the future of aviation in America do leaders in the science think the League's work that the National Aeronautic Association has given its activities enthusiastic approval and giants of the industry have lent it their backing as officers. The officers are:

Honorary President—Commander Richard E. Byrd.
President—William B. Stout, president Stout Air Services, Inc.
Vice-presidents—Clarence D. Chamberlin, New York to Germany flyer; Maj. Thomas G. Lanphier, former commander First Pursuit Squadron, U. S. Army; Alvan Macauley, president Packard Motor Car Company; Eddie Stinson, president Stinson Aircraft Corporation; Eddie V. Rickenbacker, famous American ace; Thomson Burtis, flyer and author; Frank A. Tichenor, publisher *Aero Digest;* Griffith Ogden Ellis, editor THE AMERICAN BOY Magazine.
Secretary—Merrill Hamburg, airplane model editor THE AMERICAN BOY Magazine.

The work of the League is conducted by THE AMERICAN BOY Magazine, and every member should watch the magazine for new developments in model building and flying, for hints on making contest models and for announcements of new kits for model construction, of plans for the Second National A. M. L. A. Contests to be held in Detroit in June, 1929, and for other matters of interest to model builders. You may write to the League for any information or help you desire—you need only to enclose a two-cent stamp with your letter for return postage. Among the League's services are:

The Free Question and Answer Service

That two-cent stamp will bring to you an answer to the knottiest kind of aeronautical problem. Though the League is most concerned with model aviation questions, it will help you with puzzlers in commercial aviation or anything else connected with the science. Let the League be your adviser. Remember that headquarters receives thousands of letters a day, and that the question and answer department replies, at longest, within less than a week of receipt of letters.

Reward for Superior Work

The League issues Honor Certificates, with signatures of Commander Byrd, Mr. Stout, Mr. Ellis and Mr. Hamburg, for better-than-average duration records with scientific models built according to League plans. To gain an Honor Certificate you must make a flight surpassing 30 seconds with a Baby R.O.G.; 65 seconds with an indoor pusher; 100 seconds with an indoor endurance tractor; 120 seconds with an outdoor twin pusher; 50 seconds with a hydroplane; 15 seconds with a commercial model or a Baby R.O.W.; 30 seconds with an all-wood indoor pusher; 120 seconds with a championship indoor tractor. Send in a certification of your record, signed by an adult, with 10 cents in stamps, and the certificate will be issued to you. Indoor planes must be flown indoors, the outdoor pusher outdoors.

A winner of four certificates also wins an autographed photograph of Clarence Chamberlin, and a specially-signed League membership card.

Parts at Cost

So that every model-builder may have exactly the right materials with which to build miniature planes, the League has installed a parts-at-cost service. Through this service you may obtain complete kits for the models suggested by Mr. Hamburg in THE AMERICAN BOY, or individual parts for them. The kits contain balsa, bamboo, Japanese imperial tissue, rubber, ambroid, banana oil, metal parts and other requisites—each kit contains enough for a specific model.

Builders who buy kits should remember that this material, specially selected, specially cut and prepared, and specially packed, naturally is somewhat more costly than the same material bought in bulk. For example, all the wire used in the outdoor twin pusher kit could be bought, unbent, for a few cents; but bent to proper shape—by specially-built jigs and other machinery—it costs about a dollar. The League goes to this expense because many boys have not the tools necessary to bend wire properly.

If you want to buy one or more complete kits, send a check or a money order (payable to Merrill Hamburg) for the complete amount of your order to the Supply Department, Airplane Model League of America, American Boy Building, Second and Lafayette Blvds., Detroit, Mich. If you want separate parts, send the cost of the parts, plus ten cents for packing and mailing, to the League. Prices of separate parts are listed in THE AMERICAN BOY with announcements of the kits (a reprint with this information and instructions for building the model goes into each kit). Order kits by number. The League cannot accept stamps in payment for parts or kits.

Here is a list of the kits furnished by the League, up to and including the December, 1928, AMERICAN BOY. For subsequent kits, see THE AMERICAN BOY during the winter and spring of 1929:

1.	Baby R. O. G.	$ .65
2.	Indoor Pusher	.65
3.	Indoor Endurance Tractor	.75
4.	Outdoor Twin Pusher	3.00
5.	Hydroplane	2.50
6.	Commercial Model	1.75
7.	Baby R. O. W.	.65
8.	Two-in-One All-wood Kit (Glider and Pusher)	.65
9.	Experimental Kit	.95
10.	Championship Indoor Tractor	.85

Other Services

The League offers special aids to clubs of airplane model builders —write to headquarters, enclosing a two-cent stamp, for suggestions about meetings, constitution, contests and other activities

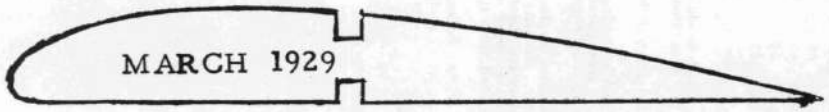
Official National Aeronautic Association rules for contests may be obtained from the League for a two-cent stamp.

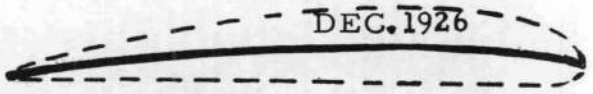
A special two-reel motion picture showing methods of making models, champions in the sport and officers in the League may be rented from the League. It is made in regulation size film. Write to the League for a booking or a circular describing it.

For more complete description of the methods and theories involved in model airplane work, the League recommends Mr. Hamburg's book, "Beginning to Fly." This has chapters on the history and theory of aeronautics, tools and materials, construction of various types of planes, club organization and so forth. It may be obtained from the League Supply Department for $2.50, plus postage.

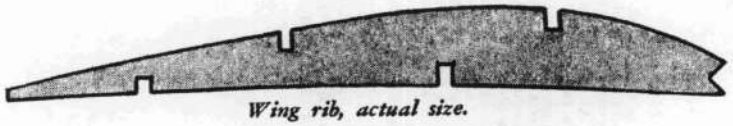
The League emblem—gold-plated wings with A. M. L. A. in gold on a blue enamel field—may be obtained from the League for 50 cents.

AIRPLANE MODEL LEAGUE OF AMERICA
American Boy Building,
Second and Lafayette Blvds.,
Detroit, Mich.





Bend your wing-ribs to correspond to this exact-si drawing of the wing-curve used by Abgarian.

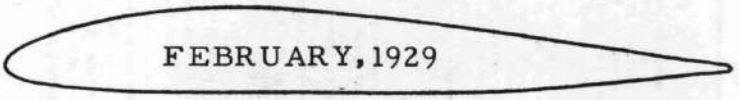


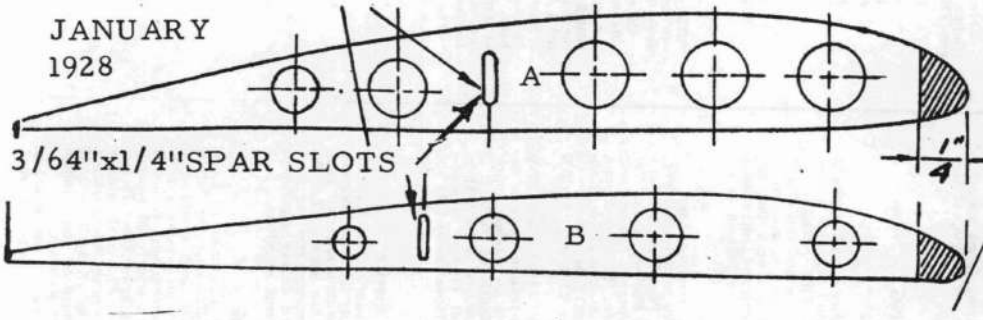
Wing rib, actual size.

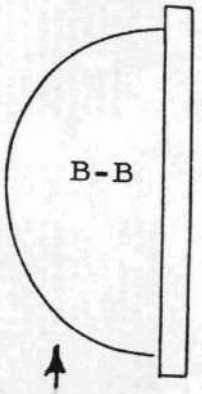
Full Size Templates

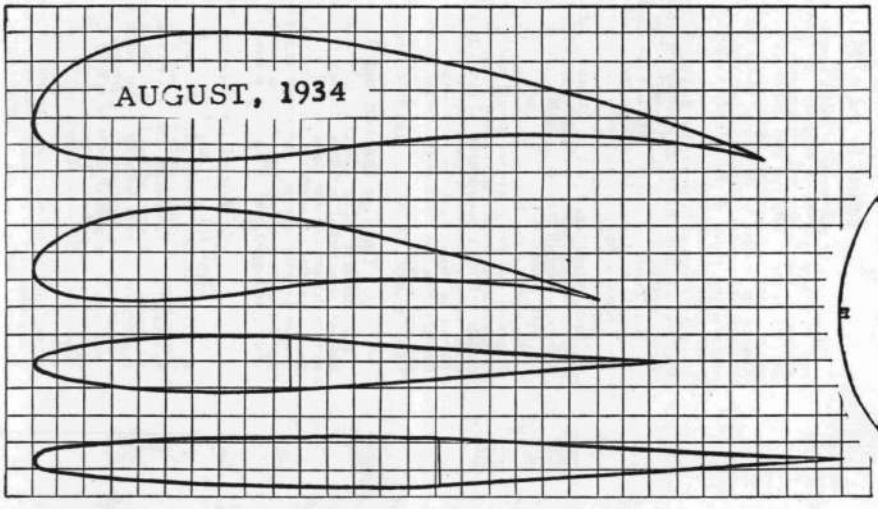
JANUARY, 1932

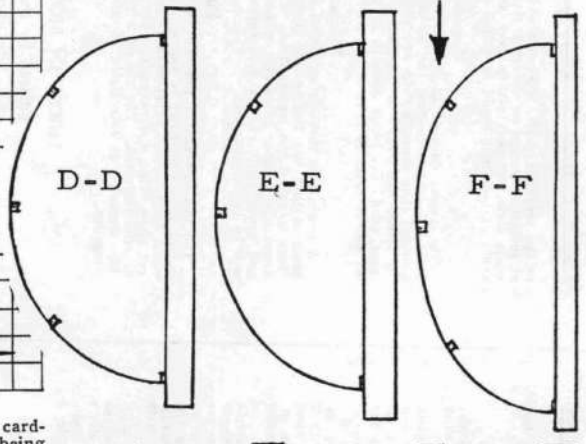
Stabilizer rib, actual size.



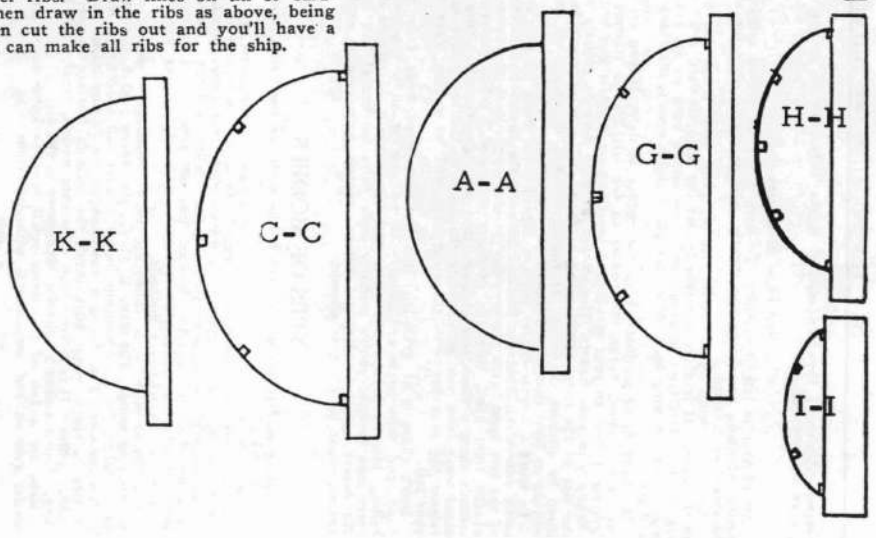








HERE are your wing ribs (top two), elevator and rudder ribs. Draw lines on tin or cardboard forming squares one-quarter inch on a side. Then draw in the ribs as above, being careful to cross each line exactly as in the drawing. Then cut the ribs out and you'll have a cardboard or tin template (pattern) from which you can make all ribs for the ship.



The YOUTH'S COMPANION combined with American Boy Founded 1827

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October, 1930 Vol. 104; No. 10

Friendly Talks With the Editor

The Shadow

WE know a young man who started life with promise. In college he was a great football player, but succeeded in getting himself expelled before he played an important game. He had charm of manner; people liked him. He played other games well after he was expelled from a few other colleges. As a matter of fact, he seemed to do nothing but play games, and people wondered how he managed it, for he had no fortune. He was seen everywhere. But people, though attracted by his pleasant personality, lifted their brows. He was under the Shadow. As the saying goes, he lived by his wits. He was suspect. No matter where he went or what he did people only tolerated him and kept a weather eye on him. To the world at large he seemed to lead a mighty pleasant life, but those who knew him were aware that he was just a little off color. He had no foundation of respect upon which to rest. The Shadow was always on him. He was not trusted. The result was that he lived on the fringe, in the borderland. He did not belong. It must be a rather terrible thing to go through life knowing that such a Shadow is on you.

Friends

WE were talking to a boy the other day—he is sixteen. He told us he couldn't see any use in making friends at his age because the friendships did not last. He claimed to have studied the matter and arrived at the conclusion that only friendships formed after one has grown to manhood are fine and lasting. We told him it was better to have a friendship that lasted for a year than to have no friendship. We told him that we, at our almost miraculously advanced age, still value friends we made before we were ten years old. A friend for a year is a friend always, even though you may never see each other afterward. You are alive in each other's memories.

Weather

WE find it very difficult to work when the weather is too hot; we find it hard to work when the weather is too cold; we find it almost impossible to work when the weather is perfect because we want to be out in it. So we have found it necessary to forget about the weather during working hours.

Singing

WHY do fellows like to sing? We don't mean stand up and let loose a solo, but just stand around in a crowd and make noises that resemble "Sweet Adeline." Singing seems to do something for you inside. The human race seems to have an appetite for it just as it becomes hungry for food or thirsty for water. Even the most dignified will let down the bars and howl, and we think it is grand. We are all for more and louder singing. It makes better men and citizens of us all.

Criticism

ANYONE can knock; but the only fellow who is entitled to knock is the one who is willing to jump in and help cure the thing he complains of.

Importance

WE know a chow dog and a dachshund and a Persian cat, who are all very friendly. But every time we pet the chow he bristles up and growls at the cat just to notify her of his importance. We can pet the cat and he pays no attention, but let us only lay our hand on his head and he rumbles at pussy like an approaching thunderstorm. Self-consciousness takes strange forms in dogs—and in fellows.

Personality

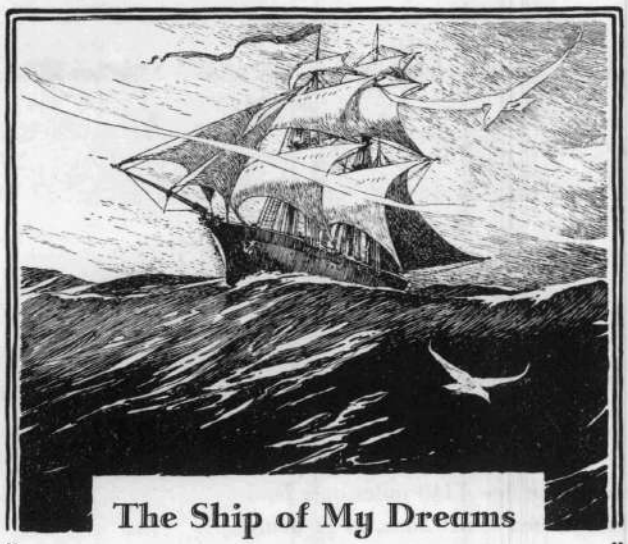
WE hear a lot about personality lately. It is one of the catchwords. We are told that such and such a fellow hasn't even a glove, but that he gets by on his personality. We hear that an actor is no good, but his personality does the trick; we hear a singer has no voice, but that this same intangible thing makes people pay to hear him. It seems to go in every profession and calling, from the taxi-driver's to the college president's. Which set us to wondering what personality is. And if we can develop it if we don't have any. We came to the conclusion that personality is nothing but intelligent window dressing. Just as the owner of a good shop puts some of his attractive things in his windows, so the fellow who has good stuff inside him may put some of his attractions out where people can get a look at them. Then he is given credit for having personality. Perfectly legitimate credit and pleasant to have. Of course you don't thrust your attractions on people or wave them round ostentatiously; you use sense in showing them. But we're convinced that personality is the ability to advertise with charm the worthwhile qualities you keep in stock. And we believe it is a fine art and that almost anyone can master it.

Hurry

FELLOWS nowadays are in a terrible hurry to amount to something. They want to leave school or college and be tremendous successes right away. They want to jump into something in a minute that will give them position and money. But we notice from reading a lot of history that pretty few great men have done it that way. Most of them fumble round for quite a while and try this and try that until they find their place. Take Abraham Lincoln, for instance. He spent almost all his life fumbling round, getting nowhere in particular and seeming to be a failure in life. But into five years at the end he crowded so much of greatness that his name will live forever. Probably he was pretty discouraged and despondent at times—but he came into his own.

Good Times

WE hope you are all having plenty of good times this fall. We like to see fellows having a good time. We believe as much sound value can be got out of a rousing good time as out of anything else. We are all against the theory that misfortune and pain build character. On the contrary we think more character is built by sane happiness than by any amount of agony suffered. Pleasure broadens one, we think, and improves your mind and your character. Honestly, we don't believe anyone ever had too much real pleasure, and we know plenty of people who have had altogether too much of the other thing. It is right to enjoy yourself and it is wrong not to enjoy yourself, and when we say that we're giving you fellows credit for knowing a lot of top-notch ways of having good times. Go to them!



The Ship of My Dreams

By William Kimball Flaccus (age 12)

Sailing over the emerald sea,
The ship of my dreams is waiting for me;
Riding about on the sparkling crest,
Like an albatross wandering, never at rest

The gray gulls are calling,
The wild waves swaying,
Now they are rising and now they are falling,
Waving, beckoning, calling to me.
My heart's on the shore, but my soul's on the sea.

From "Singing Youth," published by Harper and Brothers.

Bills

WE know a fellow who didn't have his accustomed summer camping trip last August, and we asked him why. "Well, times were tough for the family," he said. "I was working, and if I had given up the job and taken those two weeks, some bills would have had to go unpaid for a month. Seemed to me the bills should be paid. And—I had all summer off from school, anyway!" The world's going to like that fellow.

Football

A GREAT football player whose name you all would recognize, told a couple years ago about a player on a high school team. "He was a big ox, strong and fast and courageous. Had all the makings of a great plunging fullback. When I saw him sock the line, I was glad I wasn't playing against him. But somehow or other he never made yardage —always stopped at the line. I watched him, and I found that the trouble was that he didn't hold his head up. His technique was simply to get going, lower his headgear like a goat, and ram. All his power went for nothing because he wouldn't learn to pick his holes and to sidestep tacklers. You can't gain ground through a wall." In football and in a lot of other things in this world it's the player who watches where he's going who makes the touchdowns. They shoot sixteen-inch guns behind sixty-foot parapets; but they shoot over the parapets, not through them.

Two Looks

TWO heads are better than one, two dollars buy more groceries than one, and two looks at a problem are a lot more likely than one look to find the right answer. Or three looks!

RECORDS ...UNHERALDED!

Over sea or over land . . . safely and swiftly to the destination

WITH airplanes flying a total of 83,000 miles daily in the United States, it is not surprising that records frequently go by the board unheralded by newspapers. Several recent performances of Ford commercial planes deserve to be emblazoned on the records as evidence of the efficiency of the tri-motored, all-metal transport. . . .

A Ford all-metal, tri-motored Army plane flew 1140 miles over land and sea from Miami to France Field, Panama Canal Zone, in 11 hours and 20 minutes, with a crew of four. In this record flight it passed through two rain squalls and dodged another. The official report said: "Plane and engines functioned perfectly, so the flight was made without particular incident."

The "Firestone," a Ford all-metal, tri-motored transport plane, carrying five passengers and two pilots, flew from Jacksonville, Florida, to Akron, Ohio, 1015 miles, with two stops, in 7 hours and 50 minutes actual flying time, an average within a fraction of 130 miles an hour!

Most notable of all is the record of Stout Air Lines which has completed 1,000,000 miles of safe flight, carrying 107,000 passengers.

These are additional reasons why both operators and public approve the Ford tri-motored, all-metal planes.

THE FORD PLANE

The Ford plane is planned, constructed and operated as a commercial transport. Built of corrugated aluminum alloys, it has great structural strength and durability, and is most economical to maintain in operation. The uniformity of its material is determined by scientific test. All planes have three motors in order to insure reserve power to meet and overcome emergencies. The engines may be Wright, Pratt & Whitney or Packard Diesel, totaling from 675 to 1275 horse-power. Ford planes have a cruising range of from 580 to 650 miles at speeds between 55 and 135 miles per hour. Loads carried from 3630 to 6000 pounds.

The capacity of these planes is 9 to 15 passengers and a crew of two (pilot and assistant). Planes can be equipped with a buffet, toilet, running water, electric lights, adjustable chairs.

The price of the Ford tri-motored, all-metal plane is exceptionally low—$40,000 to $50,000 at Dearborn.

Ford branches will be glad to give you information on the Ford tri-motored, all-metal plane in all models.

The Ford Plane

FORD MOTOR COMPANY

Visitors are always welcome at the Ford Airport at Detroit

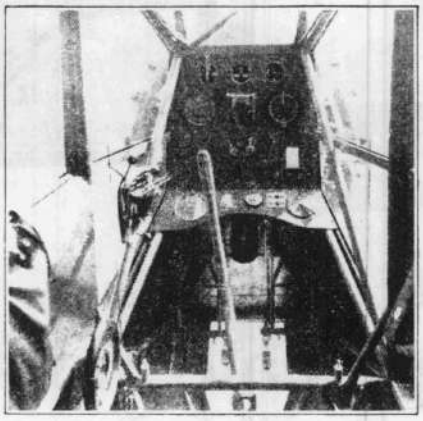
What Makes It Fly?

The Seventh Talk on Aerodynamics

By ALEXANDER KLEMIN

DIRECTOR OF DANIEL GUGGENHEIM SCHOOL OF AERONAUTICS
NEW YORK UNIVERSITY
ILLUSTRATIONS BY WILLIAM HEASLIP

You've seen an airplane close by, probably, but do you know what it looks like from the inside? Or what the pilot's instruments tell him? Or what happens when the joystick is pushed to the right? Professor Klemin answers these questions for you, and a whole lot more. Be sure to follow the drawings carefully.



AN airplane is probably the most refined engineering structure of the day. The principles on which its construction is based are not new. A bridge builder understands thoroughly all the methods of bracing used in aircraft. But a bridge truss, unlike the trussing of a wing, does not have to perform a loop in the sky from time to time, so that its strength can be calculated more readily than the strength of a wing. Also, in a bridge the weight of the structure is not so very important. If there is a little uncertainty as to the strength of a girder, it can be made larger and stronger at comparatively little expense. In an airplane, weight must be kept down vigorously. If the parts of an airplane were to be made too strong and too heavy, the plane would end up by being commercially useless.

Therefore, in the airplane, the structure must be designed with the utmost care. Loads must be carried very carefully from point to point. All parts must be sufficiently but not excessively strong, and all parts should have approximately the same factor of safety; which means the ratio of the strength to the load likely to be imposed in flight.

In these days of the automobile few of us see an old-fashioned "shay," a two-wheeled carriage famous a century ago. There is a beautifully humorous poem of a deacon who built a "shay" so well designed and of such carefully chosen materials that all its parts were equally strong. It ran without a crack or harm for a hundred years. Then, one day, it collapsed in every part at once.

The deacon would have been a splendid aeronautical engineer, for such engineers now make their structures so strong that structural failure in the air is almost unheard of. For a plane correctly designed to lose a wing is a sign not of bad engineering, but of dreadful negligence in the maintenance of the airplane.

Talking With a Compass

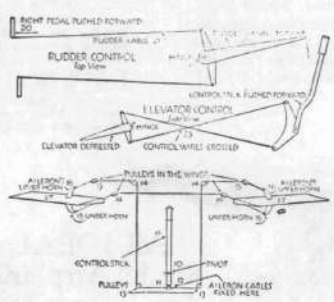
AN engineer has to have the power of "visualizing"—of seeing a thing from just looking at a drawing. He also has a special sort of drawing of his own. He represents an object not by a single perspective drawing as an artist does, but by three distinct drawings or views. In each of these views he looks straight at the object and sets down only the lines defined by this direct vision. If he stands in front of an airplane, he sees the "front elevation;" from the side he gets the "side elevation;" from above, he obtains the "plan." The typical airplane our artist shows in this article is represented by these three views, front elevation, side elevation, and plan view.

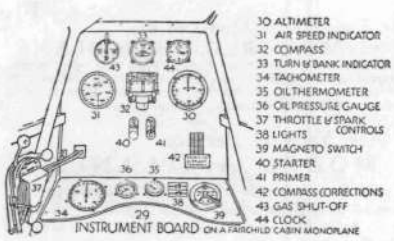
Drawings of this character constitute the engineer's language. A boy with mechanical instincts may be a poor speaker, and write wretched language, yet excel in this language of the straight edge, ruler, and compass.

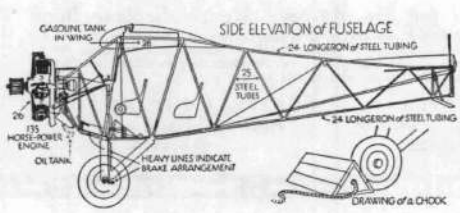
To a student of language the nomenclature of the airplane would offer a fascinating study. "Aileron" is of French origin and indicates a little wing. "Chassis" also is French, although landing gear is now more frequently employed. "Dihedral" is of Greek origin. Other terms, though not of foreign origin, are expressive and picturesque. For example we have "joystick" for control stick, "flippers" for the elevators.

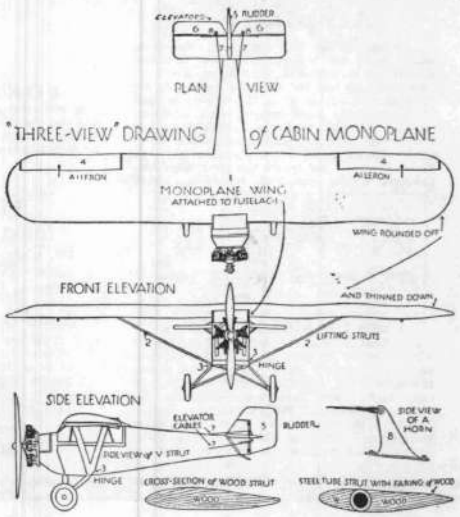
Without attempting any alphabetic or complete listing of the parts of the airplane, let us examine the "three-view" drawings of the cabin monoplane shown by our artist.

This is a design submitted by H. K. Baisley, of the Daniel Guggenheim School of Aeronautics, at New York University, which won a second prize in the Fairchild Design competition. The three prizes offered annually stimulate the students to an extraordinary degree. In the last stages of the competition students have been known to stay up till three and four in the morning! The Baisley design is not perfect, but good nevertheless and fairly typical of modern practice. (*Continued on page 59*)









IDEAL MODEL AIRPLANES

What could be finer—
A Flying Scale Model of a Real Airplane
with all the fun of Building and Flying it Yourself!

GET the thrill of Model Building and Flying with an accurate Model of a Real Airplane. Build it the IDEAL way—the easiest and surest way to build a good model. If you have built Racers, now try your hand with a Scale Model!

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A Perfect, 3 ft. Flying Model of the SPIRIT OF ST. LOUIS

An exact Model-reproduction of the most famous Airplane in the world! Has all the constructional features of wings, fuselage, tail, landing gear and other parts. 36 in. wing span; weight 10½ oz. Equipped with 10 in. propeller carved from solid wood, stream-line aluminum disc wheels with brass bearings and rubber tires, ball-bearing propeller shaft, burnished aluminum cowlings and nosing, and many more miniature parts. Plans, Diagrams, Patterns and complete Building-Flying Instructions, with all materials and supplies required, are included in the **Complete Construction Outfit** shown above.....**$7.50**

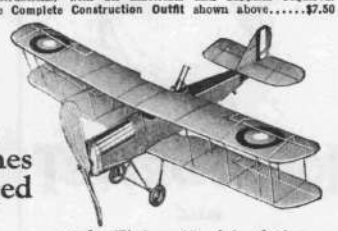
Every Boy's IDEAL Airplane

A handsome, 42 in. wing span Monoplane which, while not a duplicate of any particular aircraft, is a wonderful flier. Made largely of aluminum and can be assembled and ready for flight in a couple of hours. Every part is completely finished; wood cut to size, aluminum fuselage bulkheads ready made, aluminum ribs finished—all parts and fittings are perfect. Guaranteed to fly when correctly assembled. No Plans required; just follow the clear directions. **Complete Outfit,** containing everything....**$6.00**

A 3 ft. Flying Scale Model of the FOKKER TRI-MOTORED MONOPLANE

A wonderful Model of Commander Byrd's North Pole 'Plane; 36 in. wing span, weight 11½ oz. All the distinctive constructional features of the original are faithfully duplicated in this Model. The parts and fittings are very realistic and the Model is guaranteed to fly when correctly constructed. **Complete Construction Outfit,** containing everything **$8.50**

All IDEAL Model Airplanes Are Guaranteed to Fly!



3 ft. Flying Model of the De Havilland Biplane

This Model is 1-14th the size of the famous original. Has 36 in. wing span. Every typical feature of the big machine is copied in this miniature, and it is a wonderful example of the Biplane type of aircraft. **Complete Construction Outfit** containing everything necessary to build and fly this Model **$7.50**

Plans for Model Airplanes

For those desiring to build IDEAL Models with materials at hand or ordered as needed, we supply complete Plans with Building-Flying Instructions for the following Models for 25 cents each: New York-Paris (Spirit of St. Louis); FOKKER; DeHAVILLAND; Curtiss JN; NC-4 Seaplane; Blerlot, Taube or Nieuport Monoplanes; Cecil Peoli Racer. 64-page Model Airplane Book included free with each Plan.

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IDEAL Model Airplanes and Supplies for Model Builders are sold by Toy, Sporting Goods, and Department Stores. Ask for them by name—IDEAL. If unobtainable, order direct from us. (West of Denver, Colo., and in Canada, add 50 cents to each of these prices.)

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Tells how to build Gliders and Racers, gives full information about Scale Models, and contains most complete catalogue of Parts, Supplies, Fittings and Materials for all kinds of Model Aircraft. The biggest, best catalog obtainable; no library of information on model airplanes is complete without this book.

CECIL PEOLI 36-in. Championship Racer

This is an American Racer which has broken records for distance and duration. When correctly built it will make long, fast flights. Furnished in **Complete Construction Outfit** containing all materials, parts and fittings with Plans and Instructions for building and flying..**$3.75**

IDEAL AEROPLANE & SUPPLY COMPANY, INC.
Largest Manufacturers of Model Airplanes—Established 1911
22 West 19th Street New York City

What Makes It Fly?

(*Continued from page 36*)

The monoplane wing 1 is placed above the fuselage. The lift of the wings acts upward, of course, and supports the fuselage and its contents and all other parts of the machine. A weight carried at arm's length tends to bend the arm down, and imposes a bending moment at the elbow and at the shoulder. In similar fashion the wings tend to bend, but to bend upward. To relieve the wings partially of this bending strain, lifting struts 2, two on either side, are attached to the wing at their upper ends, and carry the lift loads down to hinges 3 at the fuselage. The struts meet at one point at the lower end, so that they give the appearance of a V in side view. These struts are streamlined in section so as to offer the least resistance to the motion of the air. Sometimes they are built of solid wood; sometimes they are built up of a hollow steel tube, with a wooden fairing. These methods of construction are shown in the small sketch.

Why Wing Ends Are Rounded

THE reader will notice that, as in almost all designs, the ends of the wing are rounded off and thinned down. This is the case in Baisley's monoplane, as can be seen from the plan and front view. This gives the wing a trifle more efficiency than a blunt, rectangular end. In some airplanes, rectangular ends are employed because they are cheaper and easier to make.

As in all airplanes, there are three sets of control surfaces; the two ailerons, 4; the rudder, 5; and the elevators, 6. From the pilot's cockpit, cables run over pulleys to these surfaces. It is good practice to hide these cables inside the fuselage or the wing. In this particular design the aileron and rudder cables are hidden, but the elevator cables, 7, project outside for part of their length. The control surfaces are free to swing about hinges at their front or leading edges. The cables evidently cannot attach directly to the surfaces. They must fasten to projecting arms or horns 8, so that they have some leverage about the hinges. These horns are generally made of sheet metal, carefully shaped and welded together. Again a small sketch illustrates construction better than words.

In a previous article we have seen how the control surfaces act. Anyone learning to pilot a machine must also learn to inspect and test his controls. In other parts of the airplane minor imperfections may not lessen the safety. But the controls must function perfectly. Before flight the pilot tests his controls—elevator, rudder, and ailerons—to see that they are easy and free, that there is no binding or excessive friction anywhere.

Controlling the Plane

LET us follow the control system through by means of our diagrams.

Take the aileron system first. The control stick 9 is pivoted at the hinge 10. At its lower end 11 are fixed the aileron cables 12. They pass over pulleys 13 in the fuselage. From there the cables pass over pulleys 14 and 15 in the wing. Then they go to the aileron horns 16, on the upper surface of the ailerons 17. On the under surface of the ailerons are the horns 18. From the horns 18 the cables pass over pulleys 19 in the wing, and meet. The aileron control system is thus a continuous one. If the control stick is pushed to the right, it evidently pulls down the aileron on the right and raises the aileron on the left. The main advantages of this interconnected system are: first, the two ailerons act together, and therefore more powerfully than they would separately; second, the upgoing aileron tends to go up automatically due to the suction forces on the upper side of the wing, and so lessens the force exercised by the pilot in bringing the other aileron down.

The rudder control system is much simpler. If the pilot pushes on the pedal 20 at the right, he introduces a pull in the cable 21 and so swings the rudder 22 to the right.

In the elevator control, matters are equally simple. The elevator control wires 23 are crossed. Accordingly, when the control stick is pushed forward, the elevator is depressed and the nose of the airplane lowered, as it should be.

An airplane must be efficent, stable, and structurally strong. But even with these qualities secured, there remain the equally difficult problems of installing the power plant correctly, of giving the pilot and passengers suitable accommodation.

We will now turn to three other drawings that illustrate these internal arrangements of our craft. Incidentally we shall learn something of the fuselage construction. This is built up of hollow carbon steel tubing, with four long members 24 termed longerons, and tubes 25 which form a regular engineering truss on the top, bottom, and sides of the fuselage. There are no bracing wires employed. Wires need frequent adjustment and tightening. Whereas, when all these hollow steel tubes are welded together at the junction points, the fuselage stays put. In most American airplanes wood has disappeared. In case of a bad landing, or a crash, tubes bend but do not break or splinter as wooden members are apt to do. The steel fuselage construction has been instrumental in saving many lives.

The air-cooled engine 26, of 135 horse power, is bolted to the edge of the fuselage by means of a special mounting ring. The oil tank 27, is mounted immediately below and behind the engine. The closer the oil tank is placed to the engine, the less chance there is of trouble in the leads. The lower part of the oil tank is exposed to the stream of air so that the oil never becomes too hot and loses its lubricating qualities.

There is frequently much discussion as to the proper location of the gasoline tanks 28. In Lieutenant Baisley's design, all the gasoline is placed in two tanks in the wing. This has several advantages. The gasoline is at least two feet above the carburetor so that the gasoline flows to the carburetor under gravity; there is no need for a gasoline pump, which, however good, can never be as reliable as gravity; there is no gasoline in the cabin; and, in case of a crash, the greatest protection against fire is provided.

One of the most important things from the pilot's point of view is vision. Triplex (a transparent material that does not splinter or break) windows at the front and sides of the fuselage give the pilot good vision ahead and below. For the passengers in the back seat there are sliding side windows, also of triplex, which can be moved at the will of the passengers. In the early days of flying, open cockpits were invariably employed. Now that there is more general flying by the public, enclosed cabins are becoming much more popular. Instead of muffling themselves up in heavy flying suits, donning helmets and goggles, passengers can step into cabins in their ordinary clothes.

With ample sliding windows, exhaust gas heaters, cabin walls insulated as far as possible against cold and noise, comfortable seats, and a high, spacious cabin as in this design, flying can be made perfectly comfortable under the severest weather conditions.

(*Continued from page 59*)

Large doors are provided on either side of the cabin. For passenger planes, the Department of Commerce quite rightly insists on the provision of doors on either side of the cabin. In large planes, and particularly in flying boats, emergency exits at the top of the cabin are also provided.

It is extraordinary what a large amount of equipment and instruments an airplane has to carry. Some of these instruments will be described more fully in a later article. But we will list them now and give the purpose of each.

Parachutes for Everybody?

ALL seats in the Baisley monoplane are designed for use as seat pack parachutes. There is much debate as to whether parachutes should be provided for passenger planes or not. If all the passengers are professionally engaged in aviation, and capable of using parachutes, then certainly all of them should be provided with a seat pack parachute, which is not in their way, and is so harnessed to their bodies that they can jump with ease. But if only the pilot can use a parachute, then when passengers are carried even the pilot should be without a chute. In case of approaching disaster, the pilot cannot then desert his ship. It can safely be said that the overwhelming majority of pilots would remain at their posts anyhow. The tradition of duty among airplane pilots is just as high as at sea.

REAR VIEW SEAT TYPE PARACHUTE FOR PASSENGERS

No one would think of operating an automobile without brakes, and almost all commercial airplanes in the United States are now provided with brakes. The brakes most frequently used are the Bendix, which can be seen on many motor cars. The brake levers are attached to the outer sides of the rudder pedals. The pilot can operate them by pressing down with the heel without removing his feet from the rudder bar. The side elevation drawing shows the brake arrangement.

Wheel brakes are proving of great value in airplane operation. Applied on landing, they may shorten the run to half its length. In some airplanes when taxiing on the ground, the rudder is insufficient for steering. Since the wheel brake can be applied to both wheels together or to one wheel at a time, the pilot can steer by applying the brake on the side towards which he wishes to turn. When starting off on a flight it was formerly necessary to apply wooden "chocks" to the wheels when the engine was switched on. These chocks had to be skillfully removed just as the pilot wished to get under way. With the use of brakes, the pilot can dispense with the chocks.

Some of our readers will remember the days when they helped start the family car by painful cranking. Now all cars are equipped with self-starters. So are airplanes, and the Baisley design is no exception.

"Study the pilot's convenience," is the slogan of every airplane designer, and in this monoplane everything has been done to make instruments easily read and engine controls accessible. The instrument board 29 is inclined at a convenient angle. The instruments have circular dials. The instruments are grouped according to their functions. Thus to the right are placed the altimeter 30, which shows height, and the air speed indicator 31, which shows flying speed, as its name implies.

The compass 32 is placed at the center of the board. Over the compass is placed the turn and bank indicator 33. The turn indicator warns the pilot of any slight deviation from straight flight. The bank indicator tells him whether his plane is flying on a level keel or tending to tilt sidewise. The fore-and-aft inclinometer warns him that his plane is nosing up or down instead of maintaining a constant attitude. On the left side of the instrument board are grouped the engine instruments. On the tachometer dial 34 he can read the revolutions per minute of the engine. The oil thermometer 35 shows him that the engine is running neither too hot nor too cold. The oil pressure gauge 36 indicates whether or not sufficient oil is being pumped through the engine for correct lubrication. At the left are conveniently located the throttle and spark controls 37. The gasoline level gauges are located at the bottom of the gasoline tanks in the wings. Particularly on cross-country flights the pilot must always be on the alert as regards the amount of gasoline he still has.

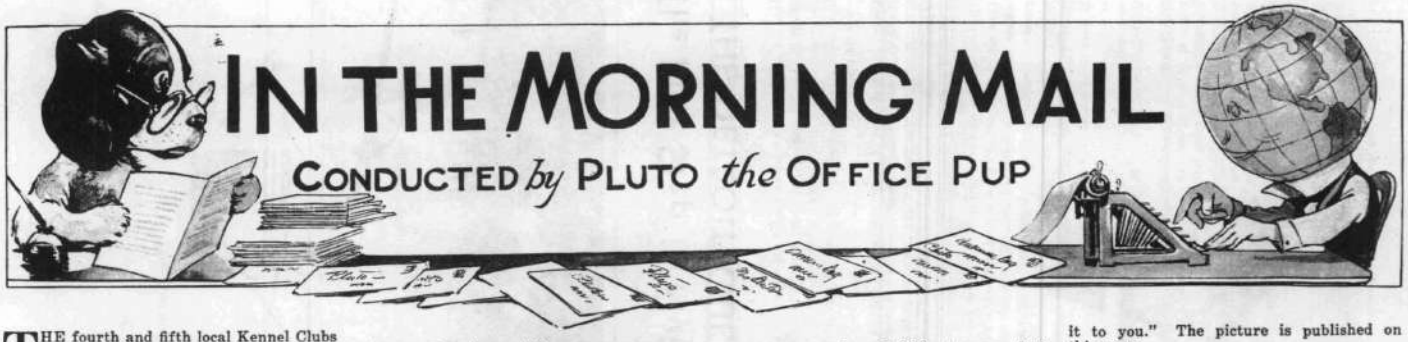
Now let us turn to the control stick details, with some explanatory remarks, which the reader will grasp readily. One of the control sticks is removable. The advantage of a removable control stick is that the plane can be used either for instruction purposes or purely as a passenger plane, with no stick in front of the passenger. Sometimes in dual control planes, inexperienced passengers can give serious trouble to the pilot.

The best way of all to get familiar with the interior of an airplane is to fly in one, or at least to inspect one on the ground. Perhaps our readers will be interested in the photograph of the pilot's cockpit of the Fairchild Cabin monoplane.

Finally we come to wing construction. Long beams or spars carry the main loads of the wings. They are hollowed out at the sides to reduce weight, since it is the upper and lower portions of the wing beam that contribute mainly to its strength. The delicate looking ribs, to which the fabric is sewn, maintain the contour or camber of the wings and transmit the pressure of the air on the fabric to the wing beams. Just as the wing was reinforced against lift loads by the external struts running from wings to fuselage, which we spoke of previously, so internal struts and wires strengthen the wing beams against drag loads which tend to swing them backwards.

Space will not allow us to describe in detail the construction of the wings, nor the way in which the landing gear is built so that the landing shocks are absorbed by rubber shock absorbers. Since engineers devote their lives to the study of such construction, it is impossible to learn it all from one short article.

EDITORS' NOTE—*You've learned about the intricate structure of the airplane in the foregoing article, the seventh of the Klemin series. The first, published last November, told why an airplane can fly; the second, in December, discussed experiments with wings; in January the third article treated wings and airplane design; the fourth, in February, dealt with the three main types of wings; the March article, fifth in the series, told how man learned to control the airplane; last month Professor Klemin explained how a designer can plan an airplane that will fly itself. Watch for the June issue, in which he will introduce you to "The Wonderful Aircraft Engine."*



IN THE MORNING MAIL

CONDUCTED *by* PLUTO *the* OFFICE PUP

THE fourth and fifth local Kennel Clubs are now under way! In the Mill Valley, Calif., club the following members have banded together to discuss hobbies, reading, and *American Boy* stories and articles: Wallis Wenner, Jack Martin, Corwin Frazier, Ned Cory, Walter Watkin, Frank Gomez, Irving Stout, Charles Hansen, John Prew, Bob Manning, Jim Patterson, Harvey Worne, Herbert Baslee, Wayne Sterne, Philip Jacka, Robert McDermott. The Moline, Ill., members are: Fred Allen, Bill Jackson, Lee Smith, Deane Allen, Jack Sundee, Fred Luecker, Hobart Prince, Bob Erwin, Jack Barber, Harry Johnson, Bill Ruekert, Al Jones, Keith Wind, Peter Allen. Anybody may form a club by sending me the signatures of 15 petitioning readers. You'll receive, promptly, an autographed portrait for your club room and a letter on organization and activities.

what a dog!

Wallis Wenner, who helped organize the Mill Valley Kennel Club, has a very courageous Scottie pup named Mactavish. Mr. Mactavish licks cats in the face. (I've never licked a cat in a fair fight, let alone in the face!)

"In our last club meeting I read an American Boy story and the gang went wild about it. We're reading one every meeting now," writes Richard Donovan, Taft School, Watertown, Conn., secretary of a club called the L.A.C. Local Kennel Clubs might well copy that idea!

vocational stories coming up!

"I want more vocational and professional stories in the magazine," writes Deacon White, Montgomery, W. Va. "Since reading 'Ritchie of the News,' I have become news editor of my school paper. I intend to read the story again." John Olive, San Angelo, Texas, seconds this plea for vocational stories. We're planning more of them. "Keeper of the Refuge" started in the March issue and gives you a working knowledge of forestry and the important job of wild life conservation. And William Heyliger is now working on a new serial that will take you inside a manufacturing plant and introduce you to the problems of building and selling.

Kennel Clubber Roger Mills, Greenville, S. C., whose dog brings home live rabbits, now reports that this same dog leaped up into the air and caught a quail on the wing!

here's a dog hero

Pin a medal on the pointer dog belonging to Ray Govns, Glen Rock, N. J. She caught an owl that had been preying on smaller birds and saved the life of a bird then in the owl's clutches.

Edge C. Lewis, Downington, Penna., has been a subscriber to the Youth's Companion (and then the Youth's Companion—American Boy) for 62 successive years. He has just renewed his subscription for three years. Can anybody beat his record?

author and sports fan

B. J. Chute, who wrote "Pace-setter," the track story in this issue, is a dyed-in-the-wool sports fan. We asked him for his picture so that Morning Mail fans could see what he looks like, and he sent us the snowdrift snapshot shown on this page. Mr. Chute is in the snowdrift. His thumb-nail sketch:

"Born in Minneapolis and live now in the country, somewhere in the middle of about a hundred and fifty acres of woods. Right now I'm working in a real estate office and writing in my spare time. Got started writing because of a passion for trekking around the country after high-school and college basketball feuds which came hot and frequent around here. Addicted to football, hockey, basketball, track and nearly every sport that comes, as a fan. For personal use, my vote goes to hiking, swimming, skating and tennis. I also ski and create much merriment and happiness for my fellow man in the process. They say I look my best head-first in a snowdrift, but some thoughtful soul nearly always digs me out before the sprung thaws. Very sorry I haven't a snapshot to send you, unless this portrait of myself skiing would do. You will find me about three feet below the surface in the middle of the snow pile—my usual location for that sport."

Find the author!

get your copy—it's free

We have on hand a limited supply of the following articles: "Getting Ready for Track," "Track Meet Where Size Doesn't Count," "Tricks That Win Points," and "Our Parlor Track Meet." The latter is an indoor party stunt. Any one of them is yours for a three-cent postage stamp, first come first served. If you want them all, send us six cents in stamps. Just write the Sports Editor, *The American Boy*, 7430 Second Blvd., Detroit, Mich.

signals—K-9

Wendell J. Hays, Aberdeen, S. Dak., has a police dog, Fritz von Hindenburg, who is athletically inclined. He plays a great game of football, though he has some bad characteristics, such as going out of bounds, getting offside, never waiting for signals, refusing to give up the ball, and getting mad when she's tackled. He's punctured two balls with his teeth.

"I live in a town so small that the census takers haven't found it yet," Donald Barnard, Beaverton, Mont., says. "Why not start a Forum and Agin 'Em department?" That's one purpose of this page, Barnard, so if you want to air your opinion on anything, just shoot me a letter!

new hobbies—try 'em

George Tanigo, Winters, Cal., keeps his eyes skyward, takes down registration numbers of airplanes, and identifies them. Samuel Davy, New Castle, Pa., collects insects and studies them under the microscope. Jean Trout, Cleveland, Ohio, keeps Guiana (not guinea) pigs. (Jean also has a pet snail named Ignatz.) Rexford Newcomb, Jr., of Urbana, Illinois (who sends his magazine to the local tuberculosis sanitarium), has 6,000 stamps, 300 coins, 450 verifications of reception from radio stations, 600 match packets and a couple of hundred menus. Jack Fahey, Spokane, Wash., collects pictures of football plays, studies them, and uses what he learns on the gridiron. Bill McDonald, Glenwood Springs, Colo., studies people, and when he gets home puts down on paper all their characteristics he can remember. Of all those hobbies we'd rank studying people first; the ability to judge character is one quality a leader *must* have.

John Sheldon, Stockton, Calif., who takes care of rabbits, guinea pigs, pigeons and a dog; works in a store after school; takes magazine subscriptions; acts as leader of a group of Friendly Indians, and teaches a Sunday School class, wants to know whether Pluto gets most of his letters from east of the Mississippi or west. The east, Sheldon, because we naturally have a greater circulation in the heavily populated sections.

you model aviators!

"I built an R. O. G. (Rise-off-ground model plane) four years ago," Dale Sullivan, Mason City, Ill., says. "Neatest little model I ever saw. I got more than my money's worth in fun, then sold it for 35 cents. It was sold twice after that and probably has a transatlantic flight to its credit by now." Joe Blackman, Llanerck, Pa., and Carl Muller, Bogota, N. J., and all other model aviation fans—there are plans in last month's *American Boy* for a sturdy little R. O. G. In this issue there's an easy-to-build fuselage model. And in later issues there'll be new treats for you. If you haven't built and flown your own ships, try it! You'll not only have a lot of fun, but you may earn some money, as Sullivan did.

Howard Pickell, Greenville, Mich., wants back copies of The American Boy for the years 1921, 1922, 1923, and is willing to pay for them. Write him if you want to make a deal.

the Amboy in movieland

"Motion picture boys aren't immune to the fascination of *The American Boy*," writes E. Sawyer of the Columbia Pictures Corporation, Hollywood. "We had about thirty boys working on a picture entitled 'No Greater Glory,' and we turned them loose on some magazines. With one accord they went for *The American Boy*. So we took this picture of Jackie Searl reading the magazine and sent it to you." The picture is published on this page.

Movie stars, all of them! When the director told them to rest, they ganged The American Boy.

Clark Collins, Birmingham, Mich., has been entering American Boy contests for five years and never won a prize, not even an honorable mention! That kind of perseverance deserves recognition. From now on, Collins, you're a Kennel Clubber.

speaking of pets!

"I have a pet crow that talks, laughs, says 'Hello,' cackles like a hen, pulls the cat's tail, plays with the dog and hides shiny objects," Arnold Whitney, Franklin, Vermont, states, and insists that he has proof. That's nothing, Whitney. The Pup's boss can do all those things. He talks, laughs, says "Hello," and hides a shiny object every time he puts on his hat.

a bouquet for the ed

"Your stories (not yours, Pluto) are in favor with me," Wes Gardner, Pittsburgh, Pa., states, "because they're not only interesting and packed with adventure, mystery, and life, but are accurate as well." Thanks, Gardner! Once in a while we break down and allow ourselves a pat on the back. But not too many, because overconfidence is bad in any profession.

Chatter Member George Hileman, Lakewood, Ohio, wrote a theme based on The American Boy interview with Art Young who kills big game with bow and arrow, and got an "A" from his English teacher.

football shark!

Walter R. Couch, Sebastopol, Calif., is rapidly making himself an expert on football. He keeps a play-by-play chart of all leading college games, and has charts dating back to 1919. During football season he takes newspapers from all parts of the country, and saves the sporting sections. He has hundreds of game programs from nearly all leading colleges and his room is covered with football pictures and stories. His favorite *American Boy* stories, aside from football, are Connie Morgan and Renfrew.

"Both my folks were in the Klondike gold rush of 1897," he writes, "and they remained in the North until 1908. They both always read and enjoyed the Renfrew and Connie Morgan stories and often remarked that both authors described the North and its people exceedingly well."

"Fleas in war, fleas in peace, fleas on the backs of the country dogs!" shouts David Shepardson, Seattle, Wash. A good motto, David, but we already have one: "Let Fleadom Ring!"

canary fancier

"If you've never had a canary you don't know what you're missing," Harry Hendrick, Cliffside, N. C., writes. "It's fun to watch them build their nests, and what a thrill when the eggs hatch after three weeks of waiting!"

write us, please

The page this month is so jamful that the "Personal Service for the Puzzled" department got crowded out. It'll be back. Write us about anything. We read and acknowledge every letter. Everybody who gets a contribution printed on this page becomes a chatter member of The American Boy Kennel Club and receives an autographed portrait of Pluto, the Office Pup. Send your letters to the Pup, *The American Boy*, 7430 Second Blvd., Detroit, Mich.

GLIDERS INC.

The First Step in Flying—
THE DETROIT GULL

Here is a new sport that every air-minded boy can enjoy! Gliding affords the best air training preliminary to motored flight. It is unsurpassed for good, clean, healthful recreation. And the Detroit Gull offers a safe, practical low-cost motorless airplane that is within the reach of all.

Gliders, Inc., a division of Detroit Aircraft and builders of the Detroit Gull, are the pioneer manufacturers of motorless aircraft in the United States. The Detroit Gull is the result of 18 months of intensive engineering research and flight tests—and incorporates only proved principles of design.

The Detroit Gull is used by gliding clubs throughout the country. Their records have established that it costs practically nothing for upkeep. As high as 800 flights have been made with only minor expenses for repairs. Inexpensive, gliding is also thoroughly safe.

Sturdy in construction, the Primary Type Detroit Gull is built to stand hard usage. In every detail it is as carefully engineered as any motored airplane. The wing span measures 34 ft. and the length overall 17 ft., 7 in.

The Detroit Gull is popularly priced at $435, complete with launching rope and safety belt. Why not form a glider club in your vicinity and enjoy this thrilling sport? Write today for our illustrated folder and complete information.

RYAN AIRCRAFT CORPORATION
LOCKWOOD AIRCRAFT CORPORATION
PARKS AIR COLLEGE, INCORPORATED
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EASTMAN AIRCRAFT CORPORATION
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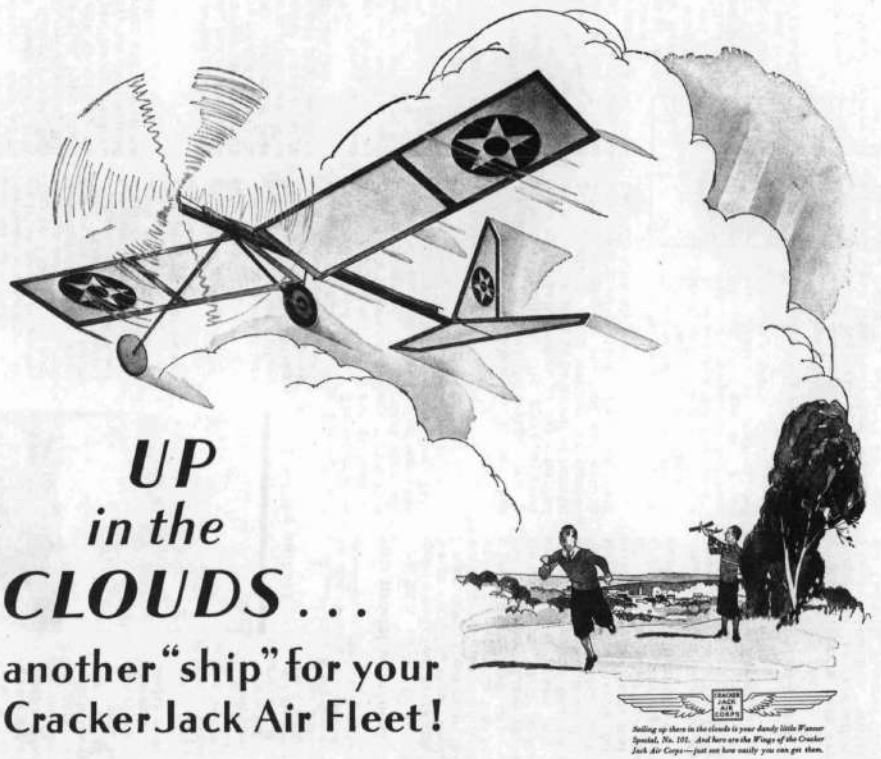
DETROIT AIRCRAFT EXPORT CORPORATION

June 1930



Selling up there in the clouds is your dandy little Wanner Special, No. 101. And here are the Wings of the Cracker Jack Air Corps—just see how easily you can get them.

UP in the CLOUDS . . .
another "ship" for your Cracker Jack Air Fleet!

HEIGH HO, gang—here's a new plane for your Cracker Jack Air Fleet that's a peach. It's a genuine Wanner Special R. O. G. Monoplane No. 101, made by the official manufacturers for the Airplane Model League of America, and what's more you can have all the fun of building it yourself, because it comes to you in knocked down form—in a kit.

Every part of this Cracker Jack Airplane fits perfectly. All you have to do is sit down and assemble it—wind-up the propeller and watch 'er fly.

Easy to get, too

You can get this little flyer just about as easily as you got your first two planes too. All you have to do is save the Sailor Boy faces from 5 packages of Cracker Jack and send them to us with twenty cents to partially cover mailing costs. We'll send your "Wanner Special" immediately.

And you'll have all kinds of fun. There are 50,000 members of the Cracker Jack Air Corps already and it's growing by leaps and bounds. Step on it, fellows, and get in on this great sport.

If you haven't joined the Cracker Jack Air Corps send in the coupon below with two Sailor Boy faces and we'll send your Wings of Membership right away. Then—start winning the whole Cracker Jack Fleet. Better do it today because we're going to have lots of fun this summer and this offer closes June 30, 1930.

THE CRACKER JACK AIR CORPS
The Cracker Jack Co., Chicago, Illinois

"THE MORE YOU EAT—
THE MORE YOU WANT"

If you can't get Cracker Jack, you can send the narrow side panel from packages of Cracker Jack for both Wings and plans—and the side that says "Prize Checkers."

Try it with a nickel

The keen taste and pure wholesomeness of Cracker Jack have made it famous the world over. Every regular fellow knows that it helps develop husky muscles in arms and legs and puts a healthy glow in young cheeks. You'll find it's the greatest nickel's worth in the world—and a surprise in every package.

THE CRACKER JACK AIR CORPS,
The Cracker Jack Co., 550 South Peoria Street
Chicago, Illinois

Dear Sirs: I want to be a member of the Cracker Jack Air Corps and start winning those dandy planes. Attached are two Sailor Boy faces. Will you please send me my Wings?

Name .....

Address .....

City ..... State .....

Youth will be served by
DURHAM-DUPLEX

"The Safety Razor with"
The Blades Men Swear By... Not At

¶ At the sign of those first ten hairs, when you make the momentous decision to shave, don't just settle it by using dad's razor. Shaving's a life job and you might as well solve the problem for yourself. Buy your first razor intelligently—just as you would a radio—or an automobile. Find out about it.

¶ Here's what you'll discover. A barber's shave is the best. He uses a long, keen edged, straight razor, shaves you with a diagonal stroke, giving you a good close shave without pulling.

¶ You can get all these advantages in one Safety-Razor—the Durham-Duplex. You'll find that you can use the same graceful, easy swing that the barber does—the stroke is a cinch to learn because it's the only *natural* one.

¶ We know you'll investigate and find this for yourself and that's why we say:

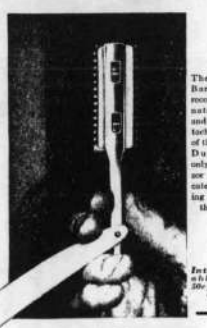
"Youth Will Be Served by Durham-Duplex"

(See the Coupon)

DURHAM-DUPLEX RAZOR CO.
Jersey City, New Jersey

Factories: Sheffield, Eng., Paris, France; Toronto, Canada

Sales Representatives in all Countries



The Terminal Barber Shops recommend the natural stroke and long detachable blades of this Durham-Duplex, the only safety razor that duplicates the shaving principle of the barber's razor.

Interchangeable Blades 5¢ for a package of 5

25¢

You can get a genuine Durham-Duplex Razor with one Blade for only a quarter. At your dealer or mail this coupon to

DURHAM-DUPLEX RAZOR CO.
JERSEY CITY, N. J.
(Address for Canada, 50 Pearl St., Toronto)

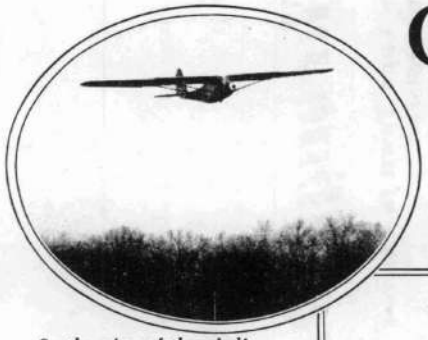
Name .....

Address .....

On the Wings of the Wind

Gliding Is a School for Fliers and a Sport for Kings

By Mitchell V. Charnley



On the wings of the wind!

Hawley Bowlus made the American record, better than nine hours, in this long-winged sailplane.

"GET into your glider!" says the instructor.

You take a look at the queer craft, and grin at the idea of getting "into" it. It's a primary glider—the kind used for beginners and not intended for soaring—and there's no "into" about it. There's just the long wing, the tail surfaces and a sturdy but decidedly airy framework that acts as fuselage. At the bottom of the fuselage is a skid—no such things as wheels! At the front is a tiny seat, with a safety belt; in front of it is a joy stick and a foot rudder bar. Not much to fly on!

"No need to get excited," you tell yourself. "I'm not going to fly for quite a while yet."

You plant yourself in the little seat, clasp the belt, take hold of the stick and set your feet on the rudder bar. The glider is resting on the side of a hill, one end of the wing on the ground. A breeze is blowing, and it's your job to get that wing into the air and keep it there.

It's the wing at your left that's on the ground. You want to lower the left aileron, and raise the right one—that will depress the right wing because of the wind force against the aileron, and raise the left wing.

"Slow and easy," says the instructor. "If there's anything a glider pilot has to remember, it's velvety treatment of the controls. A glider responds so quickly to them that they need be moved only the slightest bit."

You're likely to be teeter-tottering back and forth like the rocker arm on an old-fashioned river steamer for the first ten minutes. You'll be knocking first one wing, then the other, on the ground, and you'll be mighty glad that a primary glider—that's what you're in—is strongly built!

But after a while you'll get the feel of it. It may take you an hour, or two hours, before the instructor is satisfied. And that won't be until you can hold the glider wing perfectly level for a minute or more in tricky breezes.

"Now you know how to maintain your lateral stability," says the instructor. "You won't slip off on either wing, as long as you remember what you've just learned.

"Next you're going to get a short hop. Gliding, you know, is little more than sliding down hill on air currents. You have to get into the air by being thrown there—you're catapulted by means of the long rubber rope known as the 'shock cord.' Once you're there, the idea is to ride down on the wind. Ready for your first hop?"

You'll say gaily that you're all set—but you'll have a few qualms, nevertheless. Still, you know that your first hops will be short ones; that you'll never be more than a few feet off the ground; that your glider is intended for just the bumps you may give it. You know, too, that a primary glider is so heavily built that it doesn't climb very high or go very far! And the glider is now low on the hillside—only six or eight feet above the level.

"Let's go!"

You settle yourself in the seat. You go all over the instructions you've had on handling the controls, which you put carefully into neutral. The instructor hooks the metal ring at the center of the shock cord into the up-side-down hook in the nose of the glider, and the two long halves of the cord angle away before you in a perfect V, with three men at the end of each half.

"Always be sure that the shock cord angles out so that each half makes the same angle with the fuselage of the glider," warns your instructor. "Otherwise you'll be sent off to one side or the other."

He looks you over, gives you final tips.

"Ready? All right. Walk!"

The men on the end of the shock cord move out at a steady pace. Six or eight steps. Then:

"Run!" commands the instructor.

They start running, the cord tightens up, the glider moves slowly forward. Suddenly it accelerates, and in a quick instant—you're in the air!

Almost before you know it, then, there's a bit of a bump and you're down again. But you've had an experience you won't forget. You've flown!

And in that short flight—perhaps only thirty feet, with little chance to manipulate controls—you've learned a lot. You've got the "feel" of gliding. You've seen how easy it is. And you're all warmed up for more flights!

There are more of these same short hops. Gradually you'll move the glider to the higher slopes of a hillside for longer hops, and you'll learn to maneuver in the air.

"Now," says the instructor, "some catapult hops."

This means that the glider will be held stationary—either by one or more men holding onto the tail skid, or by the special release device which can be regulated for various degrees of pull—until the shock cord is well stretched. You'll shoot forward into the air like a slug from a slingshot, then, instead of easing slowly along to a take-off. And you'll find it more exhilarating every hop.

But don't let it get too exhilarating. There is an axiom among gliding men that the pilot who gets a severe bump on his first hop is going to be the best pilot—he'll take pains to learn slowly. And there's another that the fifth or sixth hop is the most dangerous, for it's about then that a novice decides he's pretty hot, and starts doing things! Don't learn too fast.

By the time you've had 20 or 25 flights you'll be capable and confident. You'll soon be taking off from a hilltop. And it won't be long before you'll be making 30-second flights—provided the terrain where you glide is favorable—and essaying easy right and left turns.

The 30-second flight is the so-called "A test" for glider pilots. The next step—the "B test"—isn't much more difficult; practice and suitable terrain are all you need to accomplish it. It requires a 60-second flight and an S-turn.

All this time you've been learning gliding with the shock-cord method. Perhaps your next door neighbor has been going to one of the glider schools, however, that uses the auto-towing method. Through the infancy of gliding in America this method has been frowned on, because it can be so easily misused; but it has been perfected by at least two schools of gliding—the Bowlus school in California and the Franklin school in Michigan—and by a number of clubs.

This is the way the next-door boy will go at it. He'll get the same instruction you've had in learning the control system of his glider. Then he'll be hooked behind an automobile—the instructor will be in the auto—and the car will start off at a speed that will take the glider's tail into the air, but won't permit the whole machine to rise. He'll be towed across the field at low speed, time after time, until he's learned to handle the rudder—to keep the glider following the car without swerving.

Next he'll go through the procedure again, this time concentrating on the stabilizers which send the ship up and down. Eventually he'll know how to work rudder and stabilizers— (*Continued on page 52*)

It's Fun to Glide!

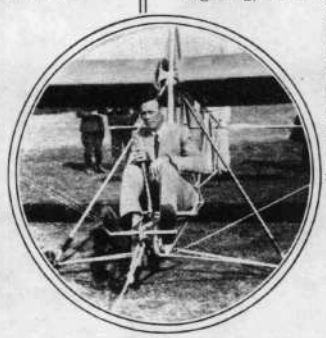
WHEN Wilbur and Orville Wright, fathers of flight, wanted to learn why and how airplanes might fly, they built themselves gliders and flew them. They started their work as a sport, and became the world's first real fliers.

When Germans interested in flying found themselves, by the terms of the Versailles treaty, prohibited from working with powered planes, they turned to first principles. They started to glide. And they developed thousands of potential power-pilots at the same time that they were doing astounding things with motorless planes and having all the thrills that come to an eagle soaring on the wings of the wind. They found that gliding is one of the world's most fascinating sports.

And they learned that, *properly supervised*, it is one of the safest.

Thousands of America's boys and young men (girls, too!) who are interested in aviation are turning their eyes to gliding. The members of the Airplane Model League of America who have learned the fundamentals of aerodynamics through their models; the college aeronautical students who have their own gliding clubs; even the Charles A. Lindberghs and the Amelia Earharts: they have taken to gliding, for the fun and the knowledge they can get from it.

This article tells readers of THE AMERICAN BOY something about gliding—how it is done, and how it may best be approached and regulated. It won't teach gliding—only gliding can do that!—but it will give you the information you need to get into the sport.



A glider pilot named Lindbergh!

Auto towing is safe, properly supervised.

for Economical Transportation

CHEVROLET

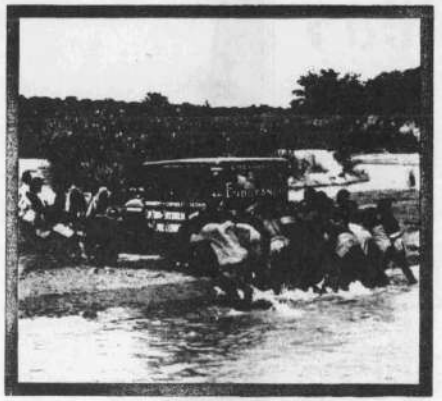
Through Darkest Africa!

From Cape Town to Cairo—in Chevrolets

Two Chevrolets plough their way doggedly onward—northward. Day after day, mile after mile—nothing but jungle, swamp, steaming river, burning desert. Occasionally, a so-called road. Sometimes, an elephant trail or boggy wagon track. More often, no trail at all—only thicket, flood, or an endless waste of shifting sand. . . .

For this is Africa . . . land of the lion . . . the hippo . . . the pygmy . . . the cannibal. Where a maddening sun beats down by day . . . where the jungle re-echoes at night with the cry of the beast, with the sob and moan of the tom-tom. Darkest Africa! Where nature is friend of the quadruped, arch-enemy of anything on wheels.

Yet through these wilds, blazing a new trail at every turn, a Chevrolet stock sedan and a Chevrolet truck push valiantly forward, under the command of the famous African adventurer, Captain C. V. H. Lacey. They have started at the southernmost city of Africa, Cape Town. Their goal is Cairo, at the northern



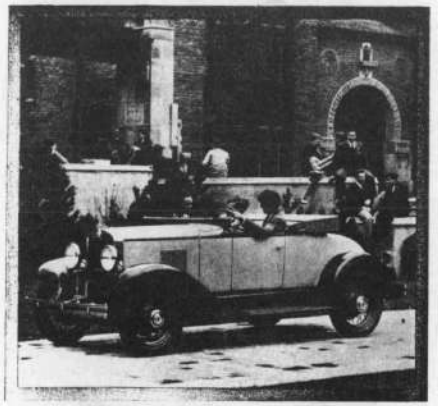
Hauling the Chevrolet across one of the many bridgeless rivers in darkest Africa

edge of the continent. No other stock sedan has ever accomplished this feat. And little wonder!

The days are one weary succession of ploughing, sinking, pushing, digging. The cars slither through quagmires up to the axles. Plug their way through dense tropical growth, towering sword-grass, giant ant-hills. Clamber through jagged rocky chasms. Are marooned for two days in a crocodile-infested stream, without food or supplies. They brave the insufferable heat of the desert. And they charge through the blinding fury of three Hooboossor sandstorms.

Most impressive of all—on arriving in Cairo, after 6000 persecuting miles, the Chevrolets are in such superb condition that the expedition *keeps on going 4000 miles more*—swinging around through Asia Minor, across Europe—to Stockholm!

This epoch-making journey was made almost two years ago—but it still stands as one of the miracles of modern transportation. It is a striking demonstration of what Chevrolet can do in the face of extreme odds—what Chevrolet power, vigor, stamina and dependability mean when the going is toughest.



The Chevrolet Sport Roadster, $555, f. o. b. factory, Flint, Mich.

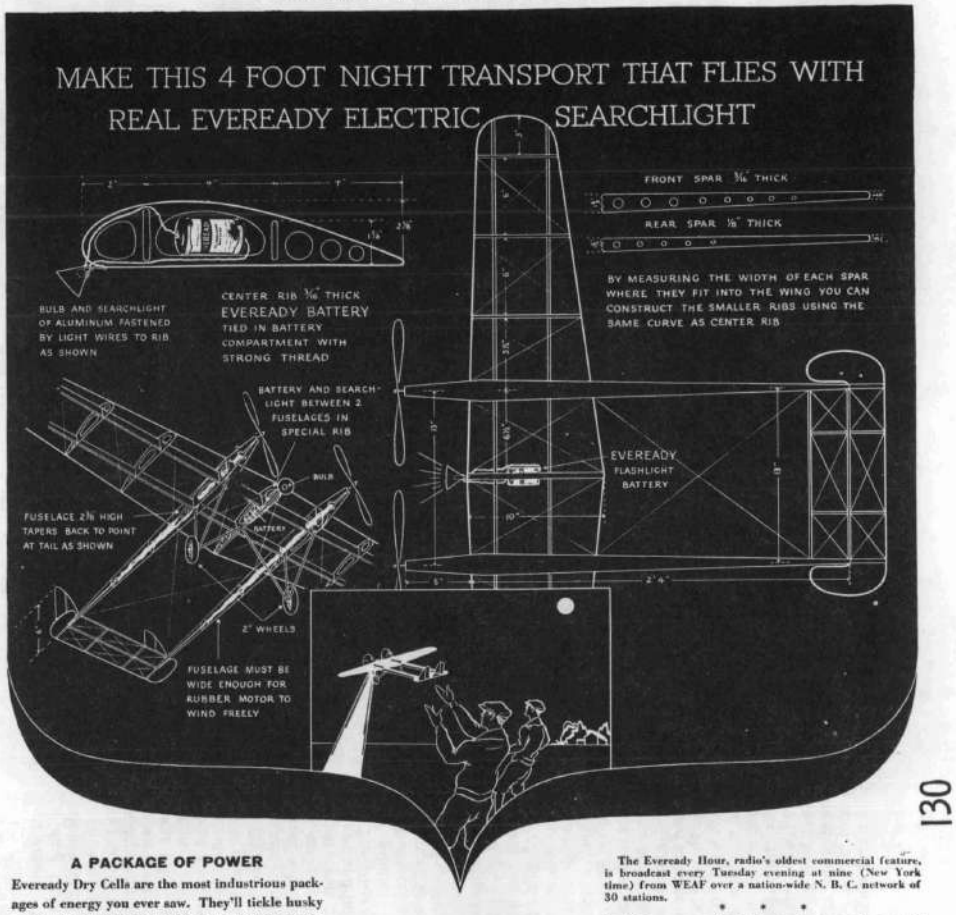
CHEVROLET MOTOR COMPANY, DETROIT, MICHIGAN
DIVISION OF GENERAL MOTORS CORPORATION

CHEVROLET SIX $495 to $725

IT'S WISE TO CHOOSE A SIX

All prices f. o. b. factory, Flint, Michigan. Special Equipment Extra

MAKE THIS 4 FOOT NIGHT TRANSPORT THAT FLIES WITH REAL EVEREADY ELECTRIC SEARCHLIGHT



130

A PACKAGE OF POWER

Eveready Dry Cells are the most industrious packages of energy you ever saw. They'll tickle husky motors into starting at the first turn of the crank. Doorbells, buzzers love 'em. And how they last!

CANNED LIGHTNING

These little cells send out a beam of light like a streak of lightning. Long-lasting light. Bright light. Light that makes old flashlights perk up again and give months more of extra service.

89 UNNECESSARY HAZARDS

60 soldered connections—29 thin wires—impair the security of ordinary "B" batteries using round, space-wasting cells. Eveready Layerbilt "B" Batteries use *flat* cells that fit together. Contacts are direct, eliminating 89 unnecessary wires . . . giving you *more* energy for your money.

The Eveready Hour, radio's oldest commercial feature, is broadcast every Tuesday evening at nine (New York time) from WEAF over a nation-wide N. B. C. network of 30 stations.

* * *

Send for our *new free* book on how to make a model airplane laboratory. Fully illustrated.

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(Fill in the above information carefully and the booklet will be sent to you, FREE, at once)

On the Wings of the Wind

(*Continued from page 10*)

controlled by moving the joy stick backward and forward—at the same time. Then a third time, now making very low hops off the ground, while he learns aileron control.

And finally he learns to take the ship up at the end of a tow-rope to an altitude of about 25 feet, to be cast free, to glide to good landings—tail high, wings level—just as you've done in your shock cord training. He'll learn the right and left turns and pass the A and B tests. And you're both at about the same point.

You've found out how to gauge your air-speed by the wind in your hair. You know instinctively when the ship is level and you operate the controls without thinking about them. You know all the things that an airplane pilot knows about handling a plane in the air. And you're not likely to make the mistake that Tommy Neff, an airplane pilot of 14 years' experience, recently did on his first glider flight.

"Simple stuff," he chuckled as he strapped himself in the seat of the red primary glider. "Easy as pie!"

The shock cord jerked him into the air, and he mounted steeply. He went into a stall, and jammed the stick forward. He dove, and jerked the stick sharply backward. He swooped upward, stalled again, shot down. He hit the ground with a thump, and climbed ruefully out.

"Easy was what I said, wasn't it? I take it back. In a real airplane you have time to feel around for the right place for the controls, because you have power to carry your ship along. Here you haven't any time at all. You have to know how!"

That's what your own training has taught you. You know how. You handle the controls delicately; you get them set as you start. You have the "feel" of the glider, and you fly by it.

And now you're ready for the real sport of gliding. You're ready to climb into a glider with a longer wing, just as sturdily constructed but not so stable, and start to soar. You'll be making longer and longer flights. You'll find out that you can go from one upward wind current to another; that you can soar across hills and valleys and lakes—if you're expert!—almost at will. And you'll eventually get into a sailplane—the big soaring glider with a very high aspect ratio (ratio of wing span to chord) that has sailed in America and Germany for hours and hours—and pass your "C test." This test, as you've long ago learned, requires a five minute glide and a 360-degree turn.

Then you'll be a pilot!

That means not only real aeronautical accomplishment, but a whale of a lot of fun. It means that you'll perhaps be taking your place, some day, alongside Hawley Bowlus, Frank Hawks, Dick Atwater, Lieutenant Barnaby, Colonel Lindbergh—you know about them.

Hawley Bowlus is the American champion at gliding. He holds the American record for soaring, with a mark of nine hours, five minutes and twenty-seven seconds, made in one of his big white "Albatross" sailplanes over Point Loma, California. He built the glider in which Colonel Lindbergh first glided. He was the teacher of Jack Barstow, who beat his teacher's and the world's record for soaring in an unofficial flight.

"Every high school boy can be a glider pilot," says Bowlus. "It's a boys' sport. If he takes ordinary precautions about his training, he's in for a great time!"

Frank Hawks is the airplane speed pilot who flew a glider across the country last spring at the end of a rope attached to an airplane. "It was a stunt," declares Captain Hawks. "The government prohibits airplane-towing except by special permission. But we did it because we want *everybody* to know about gliding—about the usefulness of it and the fun of it."

Dick Atwater is the skillful young pilot who, every year, helps to train hundreds of glider pilots down on Cape Cod. And Lieutenant Barnaby is the man who recently dropped in a glider from the big navy dirigible *Los Angeles*. He was the first man in the United States to become an official soaring pilot, and he wants to make gliding not only a sport but also a useful occupation. Some day, as a result of his feat, you may be dropping in a glider from a dirigible yourself, to pilot passengers or mail safely to a passenger field below!

Dozens of power-pilots have taken up gliding. Colonel Lindbergh points out the low landing speed and flying speed of the glider as elements in its essential safety, and its virtues as a training school for handling ships with great 400-horse-power motors to pull them.

You'll be in their company if you become a real glider pilot. You'll be in for pleasure flights, and you'll be prepared to enter glider contests—contests for distance, landing accuracy, duration in the air. You'll be helping to maintain America's high place in aviation, too.

BUT all of that, you're likely to say, is putting the gliding ahead of the glider. You haven't a glider, and you don't know anybody who'll lend you one!

There are lots of answers to that. About the best is the formation of your own glider club, and there's an agency already formed that is standing ready to help you in a dozen ways. It's the National Glider Association, Union Trust Building, Detroit, and its aim is to aid you in every way it can to get into gliding. It was organized in 1928 through the interest of Edward S. Evans, chairman of the aircraft bureau of the Detroit Board of Commerce, which helps to put on the A. M. L. A. contests every year.

Your first step is to write to the N. G. A. and ask for its booklet "Wings for Young America." This booklet will tell you all about the N. G. A. and about its subsidiary chapters, which are being organized throughout the country. It will tell you how to organize your own club, how to affiliate with the national organization, how to hold glider contests.

Then you will go about getting adult support for your club in your own community. First and most important will be the instructor. It isn't enough to get an airplane pilot, or somebody "interested" in gliding. You need a man who knows gliding. You'll make it your fundamental principle that you'll never try to glide without this man present, at least until the time you are a real glider yourself. If you take any chances, you're pretty sure to end up with matchwood instead of a glider, and maybe some slightly damaged arms or legs!

There have been deaths in glider accidents, but they've invariably been caused by failure to observe the ordinary rules of construction, operation or handling of a glider.

Next, the members of your club. They should be older boys and young men, chiefly. Your classmates in school may make up the bulk of them. Finally, adult backing. Your manual training teacher will likely be interested. Members of your local National Aeronautical Association chapter, officials of your local airport, "air-minded" men in your community—all are possible helpers.

You need a glider! There are a number of good gliders built in this country, varying in price from $385 to $600 for primaries to about $600 for the new "utility glider"—the type that combines the sturdiness and stability of the primary with the soaring qualities of the old secondary, now going out of date—and $900 or more for the sailplane.

If your club can swing it, you'll be wise to get one or more of these standard gliders, for—by new Department of Commerce regulations—all manufacturers must have the "approved type certificate" for their gliders after October 1, 1930. Don't buy a glider that hasn't the ATC rating—you can't fly it legally if you do!

If you want to get a glider at less cost, your club members will have to build it themselves. Here, again, the ATC rating enters. It can be granted only after Department of Commerce engineers have examined the plans and gone over them for stress analysis and the other factors that determine a glider's fitness. Information about such plans and where they are available may be obtained from the N. G. A.

It may be that your club will have in it aeronautical engineers of sufficient skill to design satisfactory gliders themselves. Still that ATC! For such gliders must be approved before they can be flown. So be very certain that your plans have the ATC.

The cost of a "homemade" glider can be kept relatively low. It is safe to plan on an expenditure of $150 to $200. Steel-frame gliders, which require welding, are proving more popular than wooden gliders. In any case, don't try to build a glider unless adequate shop facilities are at hand—facilities such as those in a technical high school shop, a university engineering department or a machine and wood-working shop.

If you build your glider from properly approved plans, there's still a formality necessary. You must call in a Department of Commerce inspector to pass official approval on it, else it will be liable to "grounding." A "grounded" pilot or plane is one not permitted to fly.

Then there's the matter of licenses, or official permits. There are three of these, and you must get the first, the glider student permit, before receiving instruction. It entitles you to learn to glide and to solo licensed gliders under the jurisdiction of licensed pilots.

To get the license, write to the Department of Commerce's aeronautical branch, Washington, D. C., for the necessary forms. Fill them out and return them, and you'll get the license—there is no examination required.

The non-commercial glider license will be issued to student glider pilots who can pass a simple flight test, consisting of at least three flights with moderate banks in either direction. If you've passed the "B test" you can easily obtain this second license.

The third, or commercial, license, will be issued to non-commercial glider pilots, and to all grades of airplane pilots, who can successfully pass more involved tests—take-offs and landings, banks, 360-degree turns and precision landings are included. Any glider instructor who is paid for his work must have this license.

From the Department of Commerce you can obtain Aeronautics Bulletin No. 22, which has a lot of useful information.

THERE are most of the things you need to know to get into the air in a glider. They're not difficult to learn, and the most important steps are the first steps, for the others follow naturally and easily.

You'll have something when you've learned to glide. You'll go at flying from an angle different from the Lindbergh approach, but you'll have a better primary training for handling a motored plane than he had. What's more—if you never learn to handle a plane with a motor—you'll have fitted yourself for participation in a sport that stands by itself. It's the sport of birds—the sport of soaring over hillsides, going in a glider to call on your friend in the next town; it's a sport that is the essence of outdoor life. You'll be controlling the power of the air—you'll be doing what man has wanted to do, says legend, since the days of Icarus and Daedalus.

You'll be soaring on the wings of the wind!

Father and Son Build a Television Receiver

By Armstrong Perry

MURRY J. MERCIER and his son Murry, Junior, built a homemade television receiver in the fall of 1928. They have been receiving television pictures from KDKA and other stations for the past year.

They found that it was easy to bring in the signals and change them into light, but hard to keep the receiver in step with the transmitter so that the dark and light spots would appear as a picture. Unless the disks at the sender and the receiver are running at exactly the same speed, the screen of the receiver shows only a lot of dots chasing each other across the lighted screen.

The building of a television receiver, they say, is simple. A short-wave radio receiver, built in a few hours at a cost of less than $25, brings in the signals. Instead of attaching a pair of phones or a loud speaker, they attach the television apparatus.

The television receiver consists of a neon lamp that turns the electricity into light; a scanning disk that places each light or dark spot separately on the screen; a motor that turns the scanning disk; a ground glass screen for the picture; and a lens that magnifies the picture.

The Merciers have improved their outfit from time to time. They believe that they can build one that will keep in step with the sending station automatically. That will be a very valuable invention.

The Merciers are willing to answer questions about building and operating amateur television receivers. Their address is 733 South Park Avenue, Columbus, Ohio.

An even greater opportunity for boys throughout the United States and Canada

AWARDS *valued at* $75,000

***Four University Scholarships** as International Awards, 116 Trips to Detroit and 1120 Gold Awards*

ENROLL TODAY IN THE

FISHER BODY CRAFTSMAN'S GUILD

Dealers in General Motors Cars Will Welcome You to Enrollment

The Fisher Body Craftsman's Guild has been organized under the sponsorship of the Fisher Body Corporation, to stimulate and develop craftsmanship among boys between the ages of twelve and nineteen years inclusive.

The Guild welcomes you to membership entirely without cost and invites you to take part in the second friendly competition where skillful handiwork is the one and only thing that counts.

This opportunity is open to every boy within the age limits mentioned, in the United States and Canada.

The test of ability this time will be the same as in the recent big competition which enabled boys to win 984 valuable awards. Every boy who enters will construct a miniature model Napoleonic coach, from detailed plans and instructions furnished by the Guild. The judges, both State and National, will be men of the highest standing in the knowledge of fine craftsmanship. At their head, as Honorary President of the Guild, is Daniel Carter Beard, America's beloved National Boy Scout Commissioner.

Perhaps you know some of the 104 State winners who attended the recent convention at Detroit. They'll tell you what honors and friendships the Guild brought to them. And as for the four scholarship winners, pictured at the right—! Well, just remember that there are four more of those $5,000 university scholarships waiting for *you*. So join the Fisher Body Craftsman's Guild right away and get an early start toward success.

Enroll NOW with any General Motors Car Dealer

Just go to any dealer in General Motors cars and say you want to join the Fisher Body Craftsman's Guild.

Dealers in Cadillac-La Salle, Buick, Oldsmobile, Oakland-Pontiac and Chevrolet are all General Motors car dealers. There is one in your community.

As soon as your enrollment is registered, you will receive from Guild headquarters your membership card and official Guild button, and a complete manual containing scale drawings of the model coach, instructions for building it, pictures of the coach in full color, and all other information pertaining to the Guild.

If you entered the first Guild competition, try again! (Memberships must be renewed.) If you missed the first chance, by all means get in this time. Enroll *now*.

FISHER BODY CRAFTSMAN'S GUILD
Sponsored by FISHER BODY CORPORATION
DETROIT, MICHIGAN, *Division of General Motors*

EACH OF THESE BOYS EARNED A $5000 SCHOLARSHIP

RAYMOND S. DOERR (S)
267 Oneida Street
Battle Creek, Michigan

ALBERT FISCHER (S)
341 Bluff Street
Waukegan, Illinois

This is the model Napoleonic coach which thousands of boys built in the first competition of the Fisher Body Craftsman's Guild. The same model will be the basis of the new competition announced herewith.

DONALD C. BURNHAM (J)
253 Chauncey Street
West Lafayette, Indiana

HOWARD JENNINGS (J)
3320 South Ross Street
Denver, Colorado

INTERNATIONAL AWARDS

Four University Scholarships of four years each

Two of these Scholarships go to Juniors (12 to 15 years inclusive) and two go to Seniors (16 to 19 years inclusive).

Ten Awards for Seniors and Ten Awards for Juniors in Every State and Canadian Guild District, as follows:

1st State or District Award	Trip to Detroit and $100 in gold
2nd State or District Award	$100 in gold
1st State or District Woodcraft	$ 25 in gold
2nd State or District Woodcraft	$ 15 in gold
1st State or District Metalcraft	$ 25 in gold
2nd State or District Metalcraft	$ 15 in gold
1st State or District Trimcraft	$ 25 in gold
2nd State or District Trimcraft	$ 15 in gold
1st State or District Paintcraft	$ 25 in gold
2nd State or District Paintcraft	$ 15 in gold

Every Guild member who submits a completed coach on or before midnight July 1, 1932, will receive the Guild Certificate of Craftsmanship.

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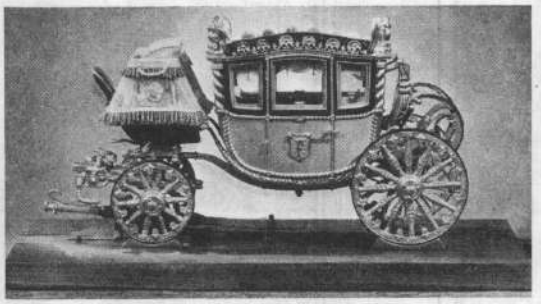
They Carved Out a College Career!

By F. R. Mering

IN Chicago, this summer, 112 boys sat at dinner. Seven of them had won for themselves university educations. All of them had distinguished themselves as master craftsmen who could fashion, by hand, objects as beautiful as the work of the famous craftsmen of Brussels and Florence.

On the table stood the evidence of their skill. Coaches, one and one-half feet long and a foot high. Magnificent affairs of gold, blue, red, and white, adapted from the coaches used by Napoleon at his coronation in 1804 and his wedding to Princess Marie Louise of Austria in 1809. One hundred twelve coaches on that table, all so nearly alike that only the caliper and template could reveal the minutest of differences.



It took 2,000 hours to build!

Many of these coaches are on exhibition throughout the continent today, and a careful inspection will show you that they are more than the product of a boy's spare time. Rather, they're jewels of incredible perfection. Heft one, and you will find it heavy with brass, copper, and steel. Run your hand over the eagle surmounting the rope column and note the detailed carving of the wing feathers. Turn the handle and open the door. See how smoothly it swings on its hinges. Put your finger inside and feel of the silk upholstery and velvet hangings.

You'll not be surprised, then, to learn that these coaches represent from 1500 to 2500 hours of work apiece—or from 5 to 8 hours a day for ten straight months. That out of a possible score of 475 points they come to within ten points of perfection.

Two coaches, in fact, were so nearly identical that the judges were compelled to award an extra scholarship. Where they had planned to give only four American and two Canadian scholarships, an extra scholarship went to Canada. But before we tell you how a Saskatchewan farm boy and a London, Ontario, city boy produced under vastly different conditions coaches of equal beauty and exactness, let's learn something of the background of the movement.

This dinner in Chicago, at which famous deans and engineers paid tribute to the work of boys in their teens, was the climax of a movement that has caused a rebirth of craftsmanship on this continent. More than 750,000 boys have been enrolled in the Fisher Body Craftsman's Guild in the last three years.

It really goes back to the middle of the last century, in Peru, Ohio, where a certain blacksmith repaired carriages so carefully and well that he earned the title of "Honest Andrew" Fisher. His sons developed the blacksmith shop into a carriage factory, and his grandsons, under the leadership of the oldest, Fred Fisher, began building automobile bodies in Detroit at the beginning of this century.

Honest work, fine craftsmanship, and intolerance of slipshod methods—these were heritage from Andrew Fisher that his sons and grandsons preciously guarded, and the Fisher Body Craftsman's Guild, organized to preserve the spirit of good workmanship among boys, was a natural result. It was the concrete expression of an ideal.

How well the movement succeeded can only be understood if you go into the workshop of one of the winners. Let's take a quick trip to London, Ontario, to meet David Tennent, 17 years old, tall and pleasant, in his home on Fullarton Street. He takes you immediately down into his basement workshop.

Having seen the coach in all its perfection of velvet, silk, and gold, you're a bit taken aback at the workshop. For, frankly, when Tennent finished his coach on the night of June 30 and rushed it to the post-office before the fatal hour of midnight when the contest would end, he didn't want to see his workshop again—at least for a while. In the last month he had spent 400 hours there—about 14 hours a day, Saturdays and Sundays included, meanwhile finishing up his last two weeks of school. He had accumulated some 400 tools. He had worked with six different kinds of wood and seven metals, with glue, paint, cloth and padding, with motor-driven lathe and polisher, with patterns and flame and tiny foundry equipment. The debris of a great project was lying around, some of it tossed into empty cigar boxes, some of it put mechanically on shelves, much of it scattered about the benches. It was like a field of battle, the issue won, waiting for the moppers-up.

How did he ever have the nerve to start? You ask the question and Tennent replies with a smile that he started, fortunately, on something easy—the body blocks that were simple to shape. Once started he couldn't give up. He worked on one thing at a time, never thinking how much work remained to be done.

Tennent worked 14 hours a day in his basement shop.

Furthermore, this was his second coach. The previous year he had built a coach in 1400 hours and won first junior prize for his district. He felt certain that as a senior, this year, he had a good chance to win a university scholarship. It was worth working for.

"I *intended* to finish the coach with a month to spare," he tells you with a rueful glance.

He would have, too, if he had been content with a fairly good job. But he discovered, as do all fine craftsmen, that there was no job that couldn't be done better. And doing it better ate up the time.

For instance the tiny leaf ornaments on the wheel. They're only a fraction of an inch long, but they are castings! He had to carve a wood pattern, make a mold, pour metal, take out the casting, burnish it. Naturally he had to keep on pouring and casting until he obtained the near-perfect specimens he desired. And those veins on the leaves. If he wished he could work indefinitely on them with his fine engraving tools (he bought the engraving blades but carved his own handles for them, out of wood). Always as he worked, he was spurred by the realization that the job could be done better.

And there is another wheel ornament that looks like four petals, with a background of dots between the petals. There are 24 of those for each wheel, and instead of making each ornament to the drawing he decided to make a die and stamp them out.

He shows you the die, a small block of metal.

"It would have taken a professional die maker about 50 hours to turn that out," he said. "It took me 100 hours."

You pick up a carved eagle so small that you can close your fingers over it and conceal it in your hand.

"It took ten hours to carve that," he tells you.

Tennent calculates a moment. "I made about 4,000 separate parts," he says finally.

Four hundred of the parts were French knots, made separately for the upholstery!

And so Tennent worked, starting on September 1, 1932, and putting in 100 hours the first month. Making parts over and over. Gradually increasing his hours. Wondering, in midwinter, if he could finish in time. Putting in longer and longer hours. Finally working on through the night—"I worked best at night," he explains—until eight in the morning, taking a few hours' sleep, and getting back to his bench before noon. Rushing along toward the deadline—June 30, midnight. Completing the job, carefully packing it, and sending it to the contest director with a prayer and a great feeling of weariness and contentment.

Meanwhile, in far-away Saskatchewan, another boy was working on identical ornaments, upholstery, spokes and springs and eagles. But this boy, Joseph Olafson, 19 years old, lived on a farm 12 miles from the nearest school. He had to go a long distance for materials. He also built the coach in a home workshop.

Yet when the judges went over these coaches they couldn't find enough difference to place one before the other. The honorary judges took a hand. From eight-thirty in the morning until late afternoon, with template and calipers, on their knees, crouching over, bending sideways, they worked over these two coaches. And finally they gave up in despair. The craftsmanship of the Saskatchewan farm boy and the Ontario city boy was a tie. There was just one thing to do and the Fisher Body Craftsman's Guild did it—award an additional $5,000.00 university scholarship.

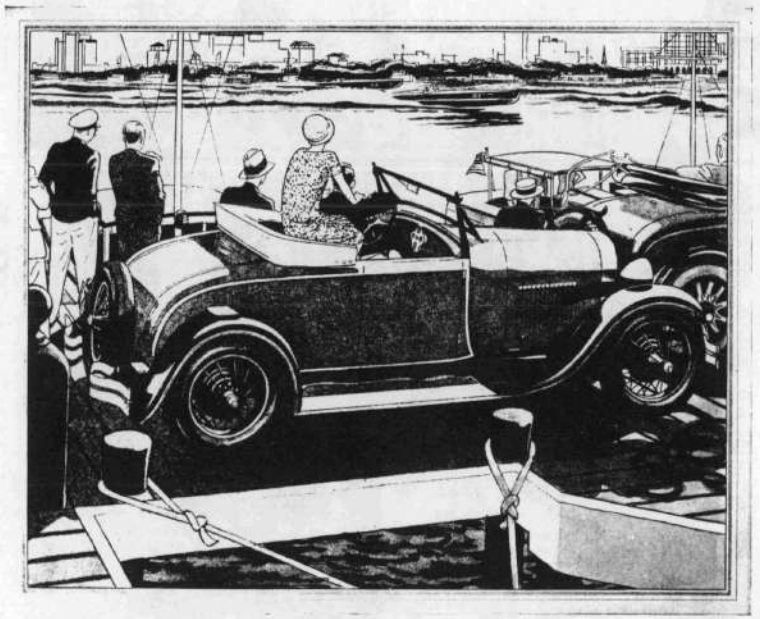
Tennent and Olafson, with Richard H. Guthrie, 16, also of London, Ontario, were the three Canadian winners. The four American winners were Myron Webb, 16, Arkansas City, Arkansas; Charles Gadd, 18, Parkwater, Spokane; Jack Wicks, 18, St. Paul, Minn., and E. Stanley Knochel, Jr., Baltimore, Md.

These seven, and 105 other boys, spent a week in Chicago, seeing the Fair, as guests of the Fisher Body Corporation. It was a week of rest and triumph after ten months of labor—of creating unbelievable beauty and perfection in the parlors, bedrooms, basements and attics of the United States and Canada.

You ask Tennent how he feels about 1932-33, now that the project is done.

"It was the happiest year of my life," he says. "I wouldn't have missed the experience for the world."

Famous engineers! Deans of foremost technical schools! They labored hours to pick the winners!



Get behind the wheel and know the joy of driving this great new car

THE joy of driving the new Ford comes not alone from its speed—its safety—its comfort—its reliability—the pride you take in its beauty of line and color—but also from the pleasure it puts into motoring.

Shown here is the new Ford Sport Coupe. Rumble seat is standard equipment on this car.

Instantly you start away for your first ride you have a feeling that here is an unusually alert and capable car. That here is a car fully equal to every need and emergency. That here is a car with a new eagerness to go. A new aliveness. A new responsiveness in traffic, on hills, and on the open road.

As the days go by, you find yourself developing real friendliness for the new Ford—a growing pride that is deeper and more personal than just an acknowledgment of faithful service.

You long to be behind the wheel—to drive for the sheer joy of driving—to know again the sense of power, security and complete control that is yours when you ride in this great new car.

Watching the performance of the new Ford—studying its reliability—you begin to see that it is not just a new automobile—not just a new model—but the advanced expression of a wholly new idea in modern, economical transportation.

For now, at a low price, you can get everything you want or need in a modern automobile . . . steel body . . . beautiful low lines . . . choice of colors . . . speed of 55 to 65 miles an hour . . . a four-cylinder engine which develops 40 horsepower at only 2200 revolutions a minute . . . quick acceleration . . . exceptional hill-climbing qualities . . . 20 to 30 miles per gallon of gasoline . . . protected safety gasoline tank in cowl, with the advantage of direct gravity flow . . . mechanical, self-centering, internal expanding-shoe four-wheel brakes . . . Houdaille hydraulic shock absorbers . . . typical Ford reliability, and low up-keep cost . . . Triplex shatter-proof glass windshield.

Ford

FORD MOTOR COMPANY
Detroit, Mich.

The Ford Motor Company is able to build such a really fine car at a low price only because of new manufacturing methods and production economies as unusual as the car itself. Every purchaser shares the benefits of the established Ford policy of selling at a small margin of profit—of owning the source of raw materials—of constantly giving greater va'

Price: $652.00

*This is the fourth of a series of stories describing Billy's experiences with the new Silver Anniversary Buick. Next month Billy learns about the Buick torque tube drive.

Billy Jones *learns why Buick's engine is* "Vibrationless beyond belief"

Billy (entering Buick sales room): Johnny Green has been trying to tell me that Buick had more main bearings than any other car.

Buick Dealer: Well, Johnny's "all wet" then, Billy. Take a look at this Buick crankshaft over here, and you'll find only four.

Billy: Well, how is it that Buick's so smooth, then? Why, you can't even tell when the engine's running, except by the instrument on the dash!

Buick Dealer: "Vibrationless beyond belief, at any engine speed." That's Buick, Billy. And seven bearings, or seventeen, couldn't make her run any smoother. For the number of bearings, in itself, has nothing at all to do with smoothness.

Billy: It hasn't? Then what is the answer?

Buick Dealer: Buick removes any tendency to "whip" or vibrate *when it manufactures the crankshaft.* A crazy man doesn't need a strait-jacket after he's cured. And Buick's crankshaft doesn't need seven bearings to tie it down, because it's perfectly balanced before it ever leaves the Buick crankshaft plant. Extra heavy to begin with, it has little tendency to "whip." And its smoothness is further insured by counterweights, and by the Buick torsional balancer.

Billy: That's the balancer there, isn't it? What does it do?

Buick Dealer: The balancer absorbs the excess energy delivered to the shaft on the instant of the explosion, and delivers this energy back to the shaft after the piston forces are spent. Buick's crankshaft, in conjunction with its counterweights and its balancer, forms a perfectly balanced unit, which must run smoothly.

Billy: Well, I think I can understand that. What I don't see is why I ever thought seven main bearings were better than four!

Buick Dealer: I suspect, Billy, you were assuming that because seven is *more* than four, seven is *better* than four.

Billy: I see it now. It wouldn't be true of wheels, or legs on a table, or—

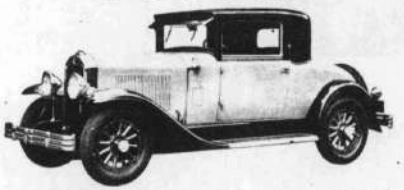
Buick Dealer: —Or a quartette. And it's no more true of bearings in an engine—provided your crankshaft is balanced properly to begin with. And if it's not, no number of bearings will give you satisfactory results.

Billy: Well, the four-bearing crankshaft is one place where Buick produces something better and saves money at the same time, isn't it?

Buick Dealer: Not by a long shot! The cost of balancing a Buick crankshaft more than offsets the expense of providing three additional bearings. No, my boy; this is another superiority which Buick volume alone makes possible at Buick's price! Like the Buick torque tube, and any number of other Buick engineering features.

Billy: Oh yes! I wanted the "low down" on the torque tube, too! And I'll be back for it one of these days.

THE SILVER ANNIVERSARY
BUICK



WHEN BETTER AUTOMOBILES ARE BUILT . . . BUICK WILL BUILD THEM

Price: 1,275.00

134

How Do You Stand?

By Captain Godfrey Rodriguez

EVERY fellow wants to be healthy. That's why he goes out for swimming, for baseball and football, for setting up exercises and tennis and track. But many chaps get so involved in these games that they forget the simplest and one of the most important elements of health—

Posture.

Games are good, if they're not overdone, because they're fun, and it's good to have fun.

Exercises are good, because they make a fellow breathe deeply, increase his appetite, make him sleep soundly at night.

But unless a fellow makes his games and exercises develop for him the correct posture he's losing the biggest advantage they can give him.

Posture isn't a matter of muscles. It isn't a matter of holding the head stiffly back or the shoulders absurdly rigid. It's the natural, correct way of standing and sitting that permits a man's body to act the way a good body should act.

To understand how important it is, you've got to take a look into your body. Your legs and arms are lined with an intricate system of muscles. But leg and arm muscles aren't the most important factor in health. You can cut off a leg and live.

The important works of the body are in the chest and abdominal cavity. The intricate mechanisms of the heart, the lungs, liver, kidney and intestines—these are the things that must be kept in working order if a fellow wants to enjoy health. It's not surprising, then, that if the case enclosing this mechanism is bent or out of shape, the mechanism can't properly do its work.

Like any machine, if one part is out of order or out of place, the others are affected. Let's see:

In the abdominal cavity there are ridges, or shelves, upon which the organs rest when the body is straight. When the back is bowed over and the shoulders rounded, these organs are pushed out of place. Let's trace it. First, the muscles fastened to the breastbone are loosened and the breastbone and ribs sink. That cramps the chest and limits the amount of air you can take into your lungs. The body doesn't get the oxygen it requires and the blood isn't as well purified as it should be.

You don't notice much difference at first. Perhaps you get sleepy a bit more easily. You're a bit more sluggish, less peppy. But as time goes on, it may be that you're making yourself more susceptible to respiratory disease—to tuberculosis, for instance.

The same sinking of the breastbone and ribs may cramp the heart. It will continue to work for you; it may do it pretty well and for a long time. But then again, it may do its job with a growl.

Depressing the lungs and heart tends to push the abdomen out of place; it'll work in its new place, but with a sincere grumble of complaint. Bowing over the body is apt to crease the folds in the digestive tube and slow up the traffic. In that case, you're multiplying the chances of harmful bacteria and poisons to be carried into the blood.

He has taught thousands of people how to walk.

Bad posture—a fellow may get away with it for a long time, but somewhere along the line he's going to pay for it.

What's he going to do about it? Man is the one animal that's got to do something definitely *about it*. A dog, standing on four legs, would have a dickens of a hard time developing bad posture. Its chest is bound to be full because it hangs that way. It's almost impossible for a dog to get its organs misplaced. Ditto the horse, or any other four-legged animal.

But man, so it happens, stands upon his hind legs only. He's got to hold five or six feet in an up-and-down position. But most of his work, his studies, his unnatural way of working at desks, tend to bend him over like a candle in a sweltering room.

So there's just one thing to do: use the intelligence that bows him over to straighten him up again. He's got to go after good posture consciously and with effort. And if he does it long enough, his heart and liver and lungs can hold an informal meeting and say: "I'm glad we're living inside this guy. We'll be here a long time."

The best part of it is that good posture is one of the simplest things in the world to achieve. Games help, exercises help—if you don't consume more vitality than your body can produce.

But it's easier than that. Try taking a walk this afternoon. Not an ordinary walk, but a health walk such as I've introduced to thousands from San Francisco to New York.

During this walk, pull in your abdomen—the spot right underneath your ribs. Pull it in and hold it in. Notice how that automatically arches your chest and gives you room to breathe? Notice that it makes it almost impossible for you to breathe through your mouth—that you *have* to breathe through your nose?

Notice how it throws your shoulders back into a normally square set? Notice how it corrects the carriage of your head? Notice how it somehow makes you feel gladder to be alive, more alert, more confident?

All that, simply through holding in your upper abdomen. After you've walked a block, though, you'll feel yourself getting tired. Your torso muscles are among the biggest in your body, and if they're flabby, it's not surprising that merely holding yourself in correct posture should make you tired. So, after you've walked around the block, rest until the next day.

Then take a longer walk. Keep this up, until, standing or sitting, you are holding yourself correctly. Stay with it until it's second nature.

Some fellows may have tougher battles than others in achieving good posture. Perhaps their eyes are bad and—because they have to push their head forward, or lean over and peer at things—they are constantly tending to crowd the mechanism and cramp the mainspring. In that case, the answer is eyeglasses.

Maybe they're not eating the right things. In that case, they're having to battle constant fatigue. The answer is correct diet—any doctor can tell you about that.

Poor shoes or flat feet tend to make good posture hard. Both conditions can be corrected.

The most important muscles in the body are those that help you to hold your body as it should be—erect. These are in your chest, your abdomen, and to a lesser degree your back. These, then, are the ones to develop in exercise.

Don't try too hard for big biceps, a wrestler's shoulder muscles, or knobby calves. Don't struggle to achieve over-development of *any* muscles. Two of the world's most fabled strong men—Sandow and Frank Gotch—learned that strong muscles did not mean long lives. Men who have never indulged in strenuous exercises have lived lives of mental vigor and usefulness far beyond their normal days.

Want to test your posture? Hang a string from the chandelier. Stand on one side of it, so that the string hangs opposite the ear. Then it should pass the middle of the tip of the shoulder, the middle of the hip bones, down along the shinbone, to the prominent part of the outer side of the foot.

You're erect. Your shoulders are square without effect. Your chest is arched so that your lungs aren't hampered in their job of taking in air (and most men are air-starved). Your stomach is flat. Your weight is poised on your feet. You feel capable, fit, ready for anything.

Through correct posture you've started on the road to enduring health. You need other aids: good diet, air, fun, and work that keeps you interested and happy. With those companions—and posture—you'll face the next job unafraid.

Let Captain Rodriguez Tell You

FOR twenty years, Captain Godfrey Rodriguez has practiced and taught posture in most of the large cities of this country. In Nashville, Washington, D. C., San Francisco, and Kansas City, like the Pied Piper of Hamelin, he has led thousands of people on health walks. Not just walks—but walks with posture.

Captain Rodriguez is tall and erect. He tells you he's forty-six, but it seems unbelievable. His one hundred and ninety pounds are distributed over his six-foot frame so evenly that he looks slender. He has no "stomach." And he walks with the springiness and litheness of an animal.

Yet, when he was a student in Holland, he broke down from over-study and was faced with the prospect of ill health. That was when he stuck out his chest at the world and sought health in correct posture.

Of the common sense he has evolved, Dr. Arnold H. Kegel, Commissioner of Health in Chicago, says:

"Everyone who'll try Captain Rodriguez' simple method for a few days will realize at once that breathing is deeper and seemingly more satisfactory. And after he's done it a long time, he'll realize that posture is necessary to his own health and physical and mental development."

Read this article—Then Develop Posture.

November, 1930

The *New* Thrill in Motoring

[Four Speeds Forward
Standard Gear Shift]

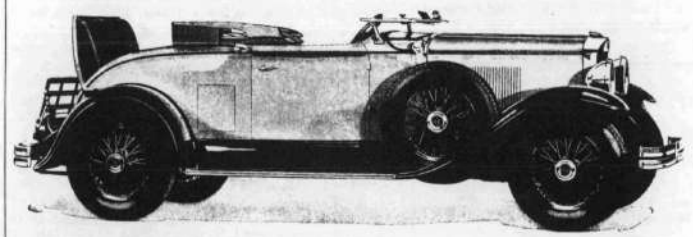
THERE is a new motoring thrill in the performance of the Graham-Paige four speed transmission, with its *two* high speeds and *standard* gear shift. The smoothness and swiftness of *fourth*, and the rapid acceleration of *third*, can only be appreciated by personal experience. There is nothing new to learn —you start in second; first is instantly available, but seldom used. We invite you to enjoy a demonstration of this new thrill in motoring.

Joseph B. Graham
Robert C. Graham
Ray A. Graham

Boys—*Write to Graham-Paige Motors Corporation, Detroit, for our interesting booklet which tells all about Graham-Paige Four Speeds Forward.*

* * *

Five chassis—sixes and eights—prices ranging from $885 to $2495. Car illustrated is Model 615, six cylinder Roadster with rumble seat. $1195 (special equipment extra). All prices at factory.



GRAHAM-PAIGE

YOU PAY LESS—YOU GET MORE—IN A CHRYSLER

American youth, quick to appreciate the manifest superiorities in the first Chrysler, has played a great part in initiating a demand for that zestful Chrysler appearance, performance and long life in other price classes.

Serving this public demand, there are today four distinct New Chrysler models —"52," "62," "72" and Imperial "80" —ranging in price all the way from $725 to $6795.

These Chryslers give new standards of value in the four principal price fields. They are superior, because they are the products of that famous Chrysler Standardized Quality of engineering and manufacturing which, from the beginning, has pioneered and developed countless betterments in motor cars and has applied them to every Chrysler.

Carefully inspect the features of these four New Chrysler models. Comparison with anything the market offers will convince you that they cannot be duplicated by other cars, except at hundreds of dollars more.

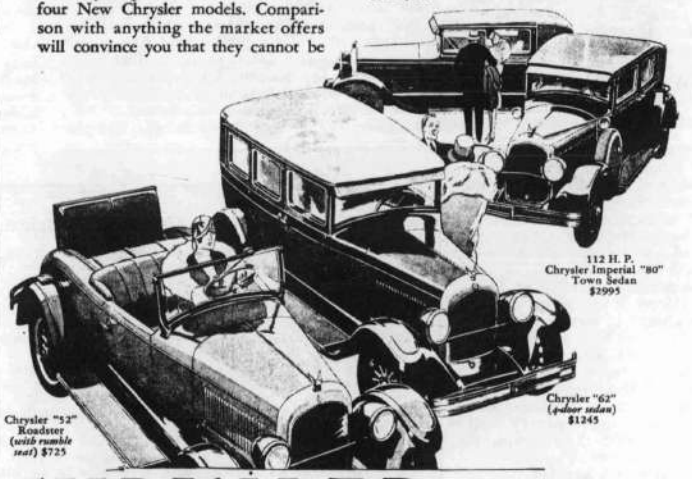
Persuade your folks to learn by actual inspection and demonstration how much more Chrysler offers, regardless of what they intend to invest in a motor car. In every case, they pay less, but get more —in a Chrysler.

New Chrysler "Red-Head" Engine—*designed to take full advantage of high-compression gas, is standard equipment on the roadsters of the "52," "62," "72" and all models of the new 112 h. p. Imperial "80." It is also available, at slight extra cost, for all other body types. For a reasonable charge it can be applied to earlier Chrysler cars now in use.*

All prices f. o. b. Detroit, subject to current Federal excise tax. Chrysler dealers are in a position to extend the convenience of time payments. Ask about Chrysler's attractive plan.

All Chrysler models will be exhibited at the National Automobile Shows; and at special displays in the Commodore Hotel during the New York Show, Jan. 7th to 14th, and in the Balloon Room and entire lobby space of the Congress Hotel during the Chicago Show, Jan. 28th to Feb. 4th.

Chrysler "72" Town Sedan $1695



112 H. P. Chrysler Imperial "80" Town Sedan $2995

Chrysler "62" (4-door sedan) $1245

Chrysler "52" Roadster (*with rumble seat*) $725

CHRYSLER '52-62-72-*Imperial* 80'

Start the day whistling!

BEGIN at breakfast with a bowl of toasted Kellogg's Corn Flakes. You get flavor and refreshing crispness that put a real edge on your appetite.

But more than that. Kellogg's are rich in energy . . . easily, *quickly digested*. The kind of food that leaves you fit!

Enjoy Kellogg's for lunch, with cool milk or cream and berries or fruit.

And here's another tip. When you're hungry at bedtime, get yourself a bowl of Kellogg's. Scientific tests show that a late snack of these delicious, easy-to-digest flakes will help you sleep more soundly.

Kellogg's are ready to serve. No cooking or trouble to prepare. Always oven-fresh, thanks to the *heat-sealed* WAXTITE inner bag — a patented Kellogg feature. Made by Kellogg in Battle Creek.

Kellogg's NRA

FOR COOLNESS

Ask at grocers for the new 48-page Kellogg Swimming Book. FREE with the purchase of 1 package of Kellogg's PEP!

136

THE *Last* WORD in candy— HOME-MADE

There's nothing else like home-made candy. Ask anybody. Except, of course, OH HENRY! And the very reason OH HENRY! *is* so good, is that it's made this home-made way:

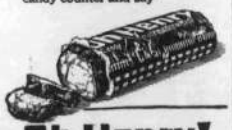
FUDGE CENTER: 1½ cups pure cane sugar; ½ teaspoon creamery butter; 1 cup rich, full cream milk; ½ cup corn syrup; white of one egg.

CARAMEL LAYER: 2 teaspoons creamery butter; 1¼ cups corn syrup; 2 cups rich, full cream milk; ¼ teaspoon salt.

PEANUT LAYER: 3 cups prime No. 1 Spanish whole nuts, roasted in oil (hulls removed).

CHOCOLATE COATING: Melt one pound pure milk chocolate.

We tell the world how to make OH HENRY! because we're proud of the fact that it's made of the very things that come out of your own pantry—made just as you'd make it yourself. You *can* make it yourself! But *why* —when you can walk up to any candy counter and say



Oh Henry!

CANDY MADE THE HOME-MADE WAY

"GEE, You can't beat that New Plymouth!"

4-DOOR SEDAN, $635

LOOK *at that smart new radiator. You'd expect it in the Plymouth.*

OF COURSE, you've seen the New 1932 Plymouth.

You couldn't possibly miss it with so many on the streets these days.

Everybody's talking about the Plymouth, too. How big it is! How long and roomy! How low and smart!

Maybe when the New Plymouth was announced, you didn't have a chance to look over the car as you'd have liked to because of the crowds.

Well, it's got everything you'd expect to find in a modern automobile these days even if it does sell for as little as $495:

Patented Floating Power that wipes out all vibration and makes Plymouth performance as smooth as silk;

Free Wheeling, too, with Easy-Shift Transmission and Automatic Clutch to make handling easy and take all the grief out of driving in traffic.

Also, safety features like the Safety-Steel Body, Rigid-X Double-Drop Frame and Hydraulic Brakes with Centrifuse Drums.

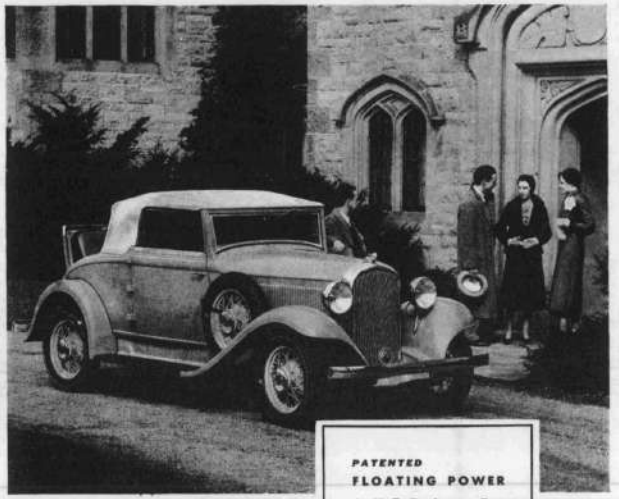
Maybe you'd like to have the full story about the New Plymouth with Floating Power. It's told in the handsome Plymouth Silvergravure Book which is packed full of interesting pictures. Fill out and mail the coupon below and we'll send you a copy *free.*

PLYMOUTH MOTOR CORP., DEPT. A., DETROIT, MICH.
I'd like a free copy of the Plymouth Silvergravure Book.

*Name*_____

*Street*_____

*City*_____



THE NEW PLYMOUTH *Convertible Coupe sure looks speedy. And it is! Good for 70 miles an hour. And they're the smoothest miles you ever traveled.*

10 NEW PLYMOUTH MODELS—$495 and up, f. o. b. factory. THRIFT MODELS—2-door Sedan $495, 4-door Sedan $575.

OF COURSE, you're listening to Chrysler Motors Radio Program "Ziegfeld Radio Show" personally conducted by Flo Ziegfeld—Columbia Coast-to-Coast Network—every Sunday evening.

PATENTED
FLOATING POWER

65-H. P. Engine . . . Free Wheeling . . . Silent-Second, Easy-Shift Transmission . . . Safety-Steel Bodies . . . Rigid-X Double-Drop Frame . . . Hydraulic Brakes with Centrifuse Brake Drums . . . Smart Body Styles . . . 112-inch Wheelbase. *Optional Equipment at Slight Extra Cost: Automatic Clutch $8; Duplate Safety Plate Glass, Coupe $9.50, 4-door Sedan $17.50.*

PLYMOUTH AS LOW AS **$495** F.O.B. FACTORY

SOLD BY DESOTO, DODGE AND CHRYSLER DEALERS

Mention of THE AMERICAN BOY will bring prompt attention from advertisers

PHOTOCRAFT for BOYS

Published for Boy Photographers by the Eastman Kodak Company

THE SIMPLEST FOLDING CAMERA EVER DEVISED

"I'VE sure been having fun with my new Jiffy Kodak. It works like greased lightning—just press a button and 'Pop'—it opens . . . press another and 'Click'—I've got the picture. It folds, so I carry it on all our hikes—and you can bet all the fellows want to use it. One thing I like about this Jiffy is the easy focusing . . . at normal, it takes all pictures from ten feet to infinity . . . and at a turn of the lens I can make close-ups, too."

Denny

JIFFY KODAK

Six-20—for 2¼ x 3¼ pictures—$8

Six-16—for 2½ x 4¼ pictures—$9

FOR BIGGER THRILLS . . . DO YOUR OWN ENLARGING

The new Kodak Home Enlarger makes it so easy to do. Takes all negative sizes up to 2½ x 4¼ . . . makes enlargements up to 11 x 14. Ground-glass focusing. Complete with lens—$16.50.

ALL THE PRINTS YOU WANT— WHEN YOU DEVELOP YOUR OWN

Have your own darkroom and get the complete thrill out of picture taking. Make all the prints you want, have the fun of developing your films. Kodak Darkroom Outfit No. 1, shown above, contains everything you'll need for home developing—yet it costs but $8.75.

Now ready . . . THE NEW BROWNIE JUNIORS

Newest members of the famous Brownie family—the two Juniors are today's biggest camera values. A meniscus lens . . . Eastman Rotary shutter with *instantaneous* and *time* actions . . . adjustable diaphragm . . . two extra-large finders. The Six-20, for 2¼ x 3¼ inch pictures, costs $2.25—the Six-16, for 2½ x 4¼ inch pictures, costs $2.75.

FREE—*Kodak Catalog*

Eastman Kodak Company, Rochester, N. Y.
Gentlemen: Please send me a *free* copy of your catalog. I am particularly interested in more information about:

Kodak Home Enlarger ☐ New Brownie Junior ☐
Kodak Darkroom Equipment ☐ Jiffy Kodak ☐

Name_____

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City_____ State_____

IF IT ISN'T AN EASTMAN, IT ISN'T A KODAK

Mention of THE AMERICAN BOY will bring prompt attention from advertisers

Quality

IT'S satisfying to keep company with leaders. It's fun to play tennis with a man who knows his drives and cut shots; go to a football game with a keen, alert observer; work alongside the energetic man who makes every minute count. Contact with leaders sharpens your own mind, speeds up your tempo, and gives you greater joy in living and doing.

As it is with men, so it is with magazines. Your subscription to *The American Boy* gives you the companionship of the quality magazine for boys. *The American Boy* has earned its leadership by striding ahead; by setting the pace in stories, interviews, illustrations and articles.

The American Boy encourages its writers to go all over the world to search out adventure for you. One of them spends a month in the superstitious black island of Haiti, flying over green jungles, talking to weather-beaten Marine sergeants and witch doctors, to bring you stories of flying in far places. Another sits down with the officers of the Royal Canadian Mounted in Ottawa. Others explore iron mines, live with Maine fishermen, ride the Rockies, and circle the globe, to tell you the true-to-fact, adventurous story of this world of ours.

One Year $2.00
In Canada add 85c a year Abroad add 50c a year

CHAMPIONS in every sport rise, glitter brightly for a moment, and pass, leaving their own contributions to football, basketball, baseball, and track. Before they go, they pass on their own playing tips to the coming crop of champions through *The American Boy*. A staff writer sits on the bench in the Rose Bowl at Pasadena; chats with a famous mid-western coach in the locker room; talks strategy with two Eastern quarterbacks in a New York hotel, to help *you* play the game.

Three Years $3.50
In Canada add 85c a year Abroad add 50c a year

Staff writers bring you true adventure from famous explorers—from Roy Chapman Andrews of Gobi Desert fame, Carl von Hoffman, blood brother of the Zulus, Air Commodore Fellowes, conqueror of Mount Everest. Others explore the steel insides of a great ocean liner and the laboratories of giant electrical companies to bring you stories of science.

The artists who illustrate for *The American Boy* are important contributors to leading adult magazines. The best is none too good for you. An expert art director is constantly experimenting with type and arrangement, to give you attractive, interest-compelling pages.

American Boy editors believe that young America deserves its own magazine, and that this magazine must breathe quality. That is the reason for *American Boy* leadership.

The YOUTH'S COMPANION *combined with* American Boy *Founded 1827*

180 N. Michigan Blvd. Chicago, Ill.

7430 Second Blvd. Detroit, Mich.

VACATION DAYS

Make Them Truly Enjoyable Days

Vacation days are here! Glorious days—carefree days—sunshine—baseball—but best of all, camping and hiking.

Now to make the most of these summer days—not a minute to waste for they're all too short—not a pleasure must be overlooked. On this page are pictured AMERICAN BOY premiums that will help you get the utmost out of those summer days. And any one of these premiums might easily be yours; just a few minutes of your spare time, that's all it takes.

Simply introduce the AMERICAN BOY Magazine to your friends who are not now taking it—let them read a story or two from your own copy—then obtain their subscription orders—send these with proper remittance to THE AMERICAN BOY—and back will come the premium to which your subscriptions entitle you.

No red tape—no waiting. Anyone can win AMERICAN BOY premiums. You'll find it easy to get subscriptions.

RULES

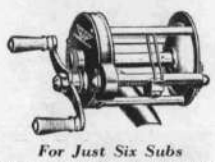
(1)—Neither your own subscription nor that for anyone in your own family can be used by you in getting premiums. Subscriptions must be from persons outside your own home. (2)—No premiums are C. O. D. and no premiums sent outside the United States. (3)—Collect and send to THE AMERICAN BOY $2.00 for a one-year subscription, $3.00 for a two-year subscription or $3.50 for a three-year subscription. Be sure to point out to your prospects the advantage in their subscribing for two or three years—they save money by doing this. (4)—No premium sold for cash only—at least one AMERICAN BOY subscription must accompany every premium order.

Send Orders to

THE AMERICAN BOY
550 W. Lafayette Blvd. DETROIT, MICHIGAN

For Just Two Subs

Pack up your Knapsack and off you go—no trouble at all to carry your supplies on long jaunts. It's neat—compact—easy to handle—holds a whale of a lot. This Knapsack sent to you, postpaid, for just two AMERICAN BOY subscriptions or one subscription and 50c extra in cash. Ask for No. 246—Knapsack. Read Rules.



For Just One Sub

Sixteen luscious Curtiss bars—the delicious candy that fades away in your mouth like a beautiful dream. Man Howdy! If you want to bring sunshine to a rainy day, or chase away the tired feeling that follows a session of sports or hikes—if you want to wash out all the troubles of camp life and give everything a rose-colored hue, take along a box of these assorted Curtiss candy bars—Baby Ruth, Peter Pan, Cocoanut Grove and Carlton. A whole carton—16 bars—of these delicacies, fresh from the spick and span Curtiss kitchens, will be sent you, postpaid, for JUST ONE AMERICAN BOY subscription. Ask for No. 326—Candy Bars. Read Rules.

For Just Three Subs

Be prepared to give the "gang" a real treat when the summer sun starts sizzling—have close at hand an ice-cream freezer that can be rolled out and put to work. This premium freezer will make two quarts of ice-cream—enough for a dozen adults—or eight boys. Sent to you, postpaid, for just three AMERICAN BOY subscriptions, or for two subscriptions and 50c extra in cash, or for one subscription and $1.00 extra in cash. Ask for No. 278—Freezer. Read Rules.

For Just Six Subs

Fish get a real pleasure out of being pulled in by this reel. It's a light weight, level winding reel with a line capacity of from 60 to 100 yards, depending on the size of line used. This reel sent to you, postpaid, for just six AMERICAN BOY subscriptions. If fewer than six subscriptions are obtained, add to your remittance 50c in cash extra for each subscription required to bring your total up to six. Ask for No. 325—Reel. Read Rules.

For Just Two Subs

There are very few services this knife won't perform. It is the official Boy Scout knife with a large cutting blade, can opener, leather punch, bottle opener and screw driver. Just what you need for camping trips. This knife sent to you, postpaid, for just two AMERICAN BOY subscriptions or for one subscription and 50c extra in cash. Ask for No. 253—Scout Knife. Read Rules.

You Can Easily Win a Premium

For Just Five Subs

Moonlight night with the fellows lolling 'round the fire—supper dishes washed and out of sight—peace after a busy, tiring day. Only one thing lacking—music. Then you bring out your banjo-ukelele and with a yell of joy, the gang bursts into song. Music—that's the key to popularity. You can easily learn to play this beautiful banjo ukelele and you'll be mighty glad to have it with you on camping trips. Sent to you, postpaid, for just five AMERICAN BOY subscriptions. If you cannot obtain all five subscriptions, add to your remittance 50c extra for each subscription you fail to get. Ask for No. 327—Banjo Ukelele. Read Rules.

FUNNYBONE TICKLERS

Not So Simple

It's easy enough to look pleasant
When spring comes along with a rush,
But the fellow worth while
Is the one who can smile
When he slips and falls down in the slush.

Parking Jam

Father: "I hear you are always at the bottom of the class. Can't you get another place?"
Son: "No, all the others are taken."

Big Brother

Jim: "What is college bred, pop?"
Pop (with son in college): "They make college bred, my boy, from the flour of youth and the dough of old age."

Useful

Editor: "This line is devoted to Philip."
Reader: "To Philip who?"
Editor: "To Philip Space."

A Handful

Soph: "There are several things I can always count on."
Frosh: "What are they?"
Soph: "My fingers."

Big Game

First Dumb Hunter: "And how can you detect an elephant?"
Second Hunter: "You smell a faint odor of peanuts on its breath."

Soapily Said

"May I hold your PALMOLIVE?"
"Not on your LIFEBUOY, IVORY formed."

Pure Swiss

Short-sighted lady (in grocery): "Is that the head cheese over there?"
Salesman: "No, ma'am, that's one of his assistants."

Not Golden

Fresh: "What's the odor in the library?"
Soph: "That's the dead silence they keep there."

His Own Language

Teacher: "Repeat in your own words, 'I see the cow. The cow can run. The cow is pretty.'"
Tough Mike: "Lamp de cow. Ain't she a beaut? An' say, baby, she sure can step."

Read That One

"Yes," said the bumptious young man, "I'm a thought-reader. I can tell exactly what a person is thinking."
"In that case," said the elderly man, "I beg your pardon."

Hey! Hey!

Senior: "What is it that lives in a stall, eats oats and can see equally well at both ends?"
End Man: "By me."
Senior: "A blind horse."

"Look, Gladys! That must be Sing Sing Prison."

Fatal

First Stude (in English): "What part of the body is the fray?"
Second Stude: "Fray? What are you talking about?"
First Stude: "This book says that Ivanhoe was wounded in the fray."

Has Right of Way

"We have the safest railway in the world where I came from. A collision on our line is impossible."
"Impossible! How do you make that out?"
"Why, we've only got one train."

The Hitch

A dear old lady had attended a health lecture, and stayed behind to ask the lecturer a question.
"Did I understand you to say," she asked, "that deep breathing kills microbes?"
"I certainly did say that many microbes are killed by deep breathing," replied the lecturer.
"Then can you tell me, please," she asked, "how one can teach the microbes to breathe deeply?"

Painful Ancestry

"Yes, I'm a cosmopolitan. My father was Irish, my mother Italian, I was born in a Swedish ship off Barcelona, and a man named McTavish is my dentist!"
"What's McTavish to do with it?"
"Why, that makes me of Scottish extraction!"

Might Burn It at Both Ends

Mother: "Tommy, wouldn't you like to have a pretty cake with five candles on it for your party?"
Tommy: "I think I'd rather have five cakes and one candle, Mama."

The Return

On a rainy day a much-bejewelled woman in a sable coat got on a street car.
"I don't suppose I've ridden on a street car for two years," she said to the conductor, a gloomy fellow, as she gave him her fare. "I ride in my own car," she explained.
The conductor punched the ticket.
"You don't know how we missed you," he said quietly.

Where They Often Bloom

Teacher: "Jimmy, give a sentence using the word deceit."
Jimmy: "I wear pants with patches on de seat."

Cheers from the Bleachers

Chem. Prof.: "First I'll take some sulphuric acid, and then I'll take some chloroform."
Senior: "That's a good idea."

To Raise a Mustache

Before retiring at night, rub the upper lip well with salt. You must then get a pail of water and place it at the head of your bed. The hairs being thirsty will come forth for a drink. The aspirant should then quickly tie a knot in the hair and it will stay out.

Teacher: "Please follow the work on the board."
Bright Scholar: "Where is it going?"

Contents for April

Cover Painting by *Manning deV. Lee*

SEAMLESS BRASS TUBE.

See page 6—No. E-72 to E-76.

QUALITY STEEL ROD.

S-30—Steel rod 1-16" diameter. Postpaid, per ft. 6c
S-31—Steel rod 3-32" diameter. Postpaid, per ft.....6c
S-32—Steel rod 1/8" diameter. Postpaid, per ft.....7c
S-33—Steel rod 5-32" diameter. Postpaid, per ft. 8c
S-34—Steel rod 3-16" diameter. Postpaid, per ft. 9c
S-35—Steel rod 1/4" diameter. Postpaid, per ft.....13c
S-36—Steel rod 5/8" diameter. Postpaid, per ft.....21c

"DURAL" (Hard Light Aluminum Alloy) ROD

(Not to be confused with soft aluminum rods sold by others).

S-40—Dural rod 1-16" diameter. Postpaid, per ft. 7c
S-41—Dural rod 3-32" diameter. Postpaid, per ft. 7c
S-42—Dural rod 1/8" diameter. Postpaid, per ft.....8c
S-43—Dural rod 5-32" diameter. Postpaid, per ft. 9c
S-44—Dural rod 3-16" diameter. Postpaid, per ft. 11c
S-45—Dural rod 1/4" diameter. Postpaid, per ft.....15c
S-46—Dural rod 5/8" diameter. Postpaid, per ft.....23c

SEAMLESS ALUMINUM TUBING.

These selected light aluminum tubes fill a long felt want among model builders.

S-50—1-16" O. D., 1-32" I. D. Postpaid, per ft.....9c
S-51—3-32" O. D., 1-16" I. D. Postpaid per ft.....10c
S-52—1/8" O. D. 3-32" I. D. Postpaid, per ft.....11c
S-53—5-32" O. D., 1/8" I. D. Postpaid, per ft.....13c
S-54—3-16" O. D., 5-32" I. D. Postpaid, per ft.....14c
S-55—7-32" O. D., 3-16" I. D. Postpaid, per ft.....18c
S-56—1/4" O. D., 7-32" I. D. Postpaid, per ft.....19c

NOTE—All rods and tubing is shipped in 1 ft. lengths unless 5c extra packing and postage charges is included with orders for more than 1 ft. No order accepted for less than 1 foot.

SHEET ALUMINUM.

S-60—Flat sheet .006". Postpaid, per square foot 25c
S-61—Flat sheet .008". Postpaid per sq. foot.....25c
S-62—Flat sheet .010. Postpaid, per sq. foot.....25c

BOOKS ON MODELS AND AVIATION IN GENERAL.

This list contains a number of popular and interesting books on model airplanes and aviation in general which every model builder should study. This list includes practically all of the better books on the subject.

L-0—MODEL AIRPLANES, by Pond. The most complete and up-to-date model airplane book and instruction guide on the market today. Pond is a Reserve Air Officer and an expert model flier who has held numerous world model records. Scientific model designing, construction of many world record models, a list of records, compressed air models, the true origin and development of modern model designs, aviation and model history, how to start and run a club, and a thousand other valuable model topics are discussed and illustrated in detail. Truly it is just what you have been looking for, postpaid, each $3.00

L-1—Building and Flying Model Aircraft by Garber. Contains much interesting material, well illustrated with photographs, gives early history of models and their development. Cloth bound. Price each $2.25; plus 20c packing and shipping, making a total delivery price of....$2.45

L-2—The Boys Book of Model Airplanes by Collins. Contails some valuable ideas in model building especially some of the original models of the early days, making it possible to trace the development of the design of model airplanes. Cloth bound. Price each $2.00; pus 20c for packing and shipping, making a total delivery price of $2.20

L-3—Model Airplanes by Allen. A practical book showing the construction of various types of fine pine and spruce models including simple racing and scale models. Cloth bound. Price each $3.50; pus 20c for packing and shipping, making a total delivery price of.....$3.70

L-4—BEGINNING TO FLY, by Hamburg. Contains some interesting pictures of large airplane engines and the construction of several of the more recent types of balsa models, including the Rassner hydro model and others. This book probably illustrates as well as any of the books available the methods of construction developed by the Illinois Model Aero Club. Cloth bound. Price each, $2.50; plus 20c for packing and shipping, making a total delivery price of.....$2.70

L-5—ABC of Aviation by Major Page. This book explains in simple terms many of the interesting features of airplanes of today. It is a well illustrated and planned book considering the exceptionally low price. Heavy paper bound. Price each $1.00; plus 15c for packing and shipping making a total delivery price of $1.15

L-6—Everybody's Aviation Guide, by Major Page. A more advanced and complete book on airplanes. Contains 600 questions and answers on design, construction and operation of all types of aircraft, fully illustrated. Cloth bound. Price each $2.00; plus 20c for packing and shipping, making a total delivery price of $2.20

L-7—Modern Aircraft, by Major Page. A complete text book of aviation, used for text books and read by everyone interested in aviation, completely illustrated. This is a large book and you are getting more than your money's worth in every way. Cloth bound. Price $5.00; plus 25c for packing and shipping making a total of $5.25

NOTE—Our quality model parts and reasonable materials are ideal for the better model airplanes described in the above model airplane books. ORDER TODAY!

1981 NOTE: The PERU MODEL AIRPLANE SHOP was started in 1927 by Bert Pond. Bert saw a model plane fly in 1911.while he was in 5th grade. Thus inspired after the family moved to Chicago,he built a small "peanut" size biplane which flew so well that to his surprise, he was inducted into the Illinois Model Aero Club. Later back in Peru with his own family and a degree in engineering and a position with Honeywell, a group of lads coaxed Bert to instruct them in modeling of planes. Having to buy in larger quantities than needed, a little advertisement in Popular Aviation appeared about as Lindberghflew to Paris & the model business was born. Many specialty items & supplies were in demand by the better modelers of the era. The business flourished & such people as Corben & Hoffman helped in the business. The business wound down as a result of Bert being called to active duty in the Air Force. He still has a few item of interest to modelers!

Manual and Bargain Price List

Of the Best Advanced Model Airplane Materials Obtainable

"The Model Airplane Experts of Today are the Aviation Experts of Tomorrow."

MAKE 1930 YOUR PRIZE WINNING SEASON.

The Advanced Peru Model Airplane Shop quality materials in 1929 won trips to Europe for two Model Fliers. Many others won numerous prizes using our materials.

DONALD BURNHAM, National Champion HARLEY RICH, Air Model Champion

Send for Your Quality Model Parts Where the Prize Winners Obtain Theirs!

We have the latest type of compressed air model kits. (See Page 5).

WE PAY THE POSTAGE IN THE UNITED STATES, making it easier for you to order our superior materials. Simply look for what you want in the index below, turn to the proper page and order today.

HANDY INDEX.

Advanced

PERU MODEL AIRPLANE SHOP

Peru, Indiana

"The Home of World Record Models."

February 20, 1930—THIS LIST CANCELS ALL PREVIOUS LISTS.

Watch for Our Next Big List and Manual.

PROPERTY OF_____

(Write Your Name Here)

PERSONAL

To the Thousands of Our Model Building Friends:

Ever since Penaud, the Frenchman, introduced twisted rubber as a motive power for model airplanes back in 1871 the development of aviation has been rapid and much of this development has hinged directly on models.

We all know that the World War hastened the development of aviation and helped to bring about the numerous recent long distance and record-breaking flights.

The growth and development of modern model airplanes has been more steady. However, the recent flights have increased the number of model builders and the interest in building models greatly. Ever since 1911, the Illinois Model Aero Club of Chicago has been developing and improving model airplanes using purely scientific methods. Practically all of the best kinks, ideas and design data used by model fliers all over the country today were the original developments of this pioneering model airplane club. The Advanced Peru Model Airplane Shop is proud to state that Mr. Pond, one of the early members of the Illinois Model Aero Club, is our model airplane expert and our customers technical advisor. Mr. Pond is an authority and an author on model airplane subjects.

The aviation industry is yet young and many new and valuable ideas and principals will be developed in the next few years. The Wright Brothers, Langley, Wm. B. Stout, Sikorsky, Laird, Warner and many other prominent aviation experts of today were model fliers in their earlier days. Col. Lindbergh, Commander Byrd, Clarence Chamberlain and practically every aviator and airplane manufacturer in the country recommend model building highly to young men as the greatest aid in learning this relatively new science. Perhaps from your own experience you will discover some new idea or principle which will be a great improvement upon large aircraft. Who knows!

The following is a list of the world's model records at the time this manual was printed. Preserve this manual and in the space opposite the present records you should insert the new records which are broken officially from time to time as you will surely read about in the model sections of such magazines as Aeronautics, American Boy, Aero Digest, Popular Science, etc.

NOTE—Many of the following records have been exceeded unofficially in 1929.

Official World Records for Model Airplanes,

Hand Launched.

(New Records.)

1. Twin Pusher — Duration
R. Jaros I.M.A.C. 10 Min. 14.1 Sec.

2. Twin Pusher — Distance
R. Jaros I.M.A.C. 7920 feet

3. Tractor — Duration
Shifler-Smith I.M.A.C. 9 Min. 42.2 Sec.

4. Tractor — Distance
Shifler-Smith I.M.A.C. 6024 feet

5. Indoor 15" Tractor — Duration
Joseph Culver CAL. 8 Min. 32.5 Sec.

6. Indoor 15" Pusher — Duration
Johnson I.M.A.C. 7 min. 30 Sec.

Rise Off Ground.

(New Records.)

7. Twin Pusher — Duration
Carleson I.M.A.C. 4 Min. 24 Sec.

8. Twin Pusher — Duration
Schweitzer I.M.A.C. 4029 feet

9. Tractor — Duration
Breckenridge I.M.A.C. 3 Min. 47.4 Sec.

10. Tractor — Distance
Breckenridge I.M.A.C. 2865 feet

Rise Off Water.

(New Records.)

11. Twin Pusher — Duration
Tudor Morris IND. 12 Min. 30 Sec.

12 Tractor — Duration
Hittl$_{\rho}$ I.M.A.C. 1 Min. 56 Sec.

Miscellaneous.

13. Fuselage, Indoor R. O. G. Duration
Fransioli, Tenn 2 Min. 58.2 Sec.

14. H. L. Fuselage, Outdoor Duration
Leja, Chicago 16 Min. 33.6 Sec.

15. H. L. Speed Outdoor 300 ft. Speed
Lockwood I.M.A.C. 52 M.P.H.

16. Flying True Scale Model Duration
Miller I.M.A.C. 47 Sec.

17. Indoor Glid$_{\rho}$r — Duration
Lockwood I.M.A.C. 14.6 Sec.

18. Comp. Air Outdoor Tractor Duration
Rich, Tenn 35 Sec.

You will note from the above list of world records that the Illinois Model Aero Club, where most of the best model designs originated, still holds practically all of the records, so with our model airplane expert and technical advisor from the I. M. A. C. we are better prepared to furnish materials and designs for record models of the best type than any other model supply house in the country.

WINS TRIP TO EUROPE.

Donald Burnham of West Lafayette, Indiana, consulted with our technical advisor and purchased all the materials for his wonderful little model from the Peru Model Airplane Shop. The result was that by consistent flying he first won a trip to Detroit in the elimination contest at Lafayette and again repeated at Detroit 1929 National Model Airplane Contest by taking first place at the Outdoor Duration Contest, thereby winning a trip to Europe as well as $200.00 cash prize, Mulvihill Trophy for one year, a large loving cup, gold medal, $150.00 outfitting prize for the European trip and much fame for himself, and he was only a Junior division contestant!

ANOTHER EUROPEAN TRIP

Was won by Joseph Culver of California, who broke the World Indoor Record with the astonishing time of 8 minutes, 32.5 seconds, using tough rubber which was purchased from the Peru Model Airplane Shop.

These performances and many others of only slightly less importance have been made throughout the country with models made from materials purchased from the Home of World Record Models at Peru.

MODEL AIRPLANE CLUBS AND CLASSES.

Should order in the small quantity lots at special prices given in small type throughout the catalog, such as 50 sheets of paper, full skeins or spools of rubber, cement, dopes, etc., by the dozen. Such supplies can be sold to members at exact cost in smaller quantities or sold to them at our single lot catalog prices, thereby earning money for the club treasury.

LARGE WHOLESALE USERS WRITE US FOR TERMS AND DISCOUNTS.

We specialize in supplying users of large quantities of high grade model airplane materials, especially to dealers, summer camps, Y. M. C. A.'s, Playground Supply Departments, Schools, etc. Our continued repeat orders and numerous complimentary letters have proven to us that we have a good reputation among these customers. WRITE AT ONCE FOR OUR SPECIAL DISCOUNTS. DISCOUNTS ARE BASED ON UNIT PRICES, NOT ON DOZ. LOT AND SMALL QUANTITY PRICES.

SPECIAL ORDERS.

Our equipment enables us to build a great variety of special model airplanes from our many special model parts or units not listed in this price list.

Submit your detailed requirements for our reasonable estimates. Special orders, of course, require more time for delivery than stock items. Allow ten days to two weeks extra in ordering for estimating delivery.

GUARANTEE.

The parts and materials listed are the best grade obtainable and the same selected varieties used on all of the recent world record and prize winning models. Defective material is replaced. Damaged material is not and should be insured against.

ORDERING INSTRUCTIONS.

Read carefully and avoid mistakes and unnecessary delays in ordering.

1. **NO C. O. D. ORDERS ACCEPTED.**
2. **NO STAMPS ACCEPTED** for payment of materials amounting to 50c or more.
3. **FOR SAFE REMITTANCE** send only drafts, express or postal money orders. If currency is sent it is at customer's risk or else it should be registered. Personal checks from U. S. possessions and foreign countries are subject to 30c collection fee, Canada and Mexico excepted.
4. **ADD 5c TO ALL ORDERS FOR LESS THAN ONE DOZEN STICKS 40" LONG** to cover extra packing cost. **No extra charge over one dozen sticks.**
5. **IMPORTANT—In all miscellaneous part orders under 75c you must add 10c to cover handling and packing.** Of course, the best way is to order a few additional things to bring your order over 75c and avoid this extra expense.
6. **QUESTION DEPARTMENT**—For obtaining answers to your questions about model airplanes, simply send a 2c stamp and state your question very clearly. We want to help model builders make the best models possible so we are making our years of experience available free to customers in this QUESTION AND ANSWER DEPARTMENT.
7. **QUICK SERVICE**—If your dealer or club does not handle our kits and supplies you will receive prompt service by ordering direct. Our factory is centrally located so that you can get quick delivery service to any point in the United States and Canada in a very short time. We supply model materials all over the world—to every continent, Hawaii, etc.
8. **FOREIGN ORDERS**—Outside of the United States and its possessions on account of extra customs tags, special packing regulations, etc. an extra charge is made for Canadian deliveries of 10c an order. To all other foreign countries and U. S. possessions, 30c extra must be added to each order and an additional 5% of the value of the order to cover extra transportation costs. The English language is preferable. (Typewritten French is permissible). United States possessions and foreign customers remit by money order or draft. Checks outside of Continental U. S., Canada and Mexico are subject to a 30c collection fee.
9. **SPECIAL DELIVERY**—15c REQUIRED on all parcel post packages up to 2 lbs.; 25c up to 10 lbs. and 35c over 10 lbs. in the U. S. Light parcels of 4 to 6 ounces will be sent Special Delivery First Class Mail for only 10c extra.
10. **INSURANCE**—We are not responsible for materials lost or damaged in shipment. Include insurance cost with orders you wish insured. (The present postal insurance rates are 5c up to $5.00 value; 8c up to $25.00 value; 10c up to $50.00 value.) The customer must make all claims for lost or damaged insured goods.
11. **AIR MAIL IS QUITE EXPENSIVE** but it can be used for sending rush orders for small amounts of small, light model materials. Be sure to include sufficient air mail postage at the present rate of 5c for the first ounce and 10c for each additional ounce or fraction thereof.
12. **WRITE OR PRINT YOUR ORDER CLEARLY AND CAREFULLY!** Check with the price list before mailing. Correct orders are filled promptly. If possible use our order blanks.
13. **RETURNING GOODS**—Like radio and other fragile special merchandise, model airplane kits and materials are not returnable except by written permission from us, and are subject to our inspection before acceptance.
14. **ORDERS WITH INSUFFICIENT REMITTANCE** will be held for full amount or be sent in part up to the amount enclosed, according to conditions.
15. **PRICES SUBJECT TO CHANGE WITHOUT NOTICE.**
16. **McFADDEN AMERICAN SKY CADETS** may deduct 10 per cent on orders amounting to $1.00 or over, but only at the time order is sent.

KITS.

Our kits are being improved constantly. New ones of the latest and best types are added after being thoroughly tried and tested. Most any one can construct models from our kits quite easily as they are arranged so that only the simplest tools are needed. Our blueprints show many of the troublesome details in actual size. We have many letters in our files from customers who have won prizes, and contests, trips to Europe and "What Have You" with models made from our selected kits.

Our models are not burdened with bulky metal fittings, nails, heavy hard wood construction, heavy wheels and other weighty materials. If a heavy model flies at all it has to fly fairly fast and when it lands—CRASH!

Models made from our kits fly much slower yet considerably farther and longer and they land much easier. Everything is selected and designed to make the lightest, strongest and simplest models possible.

Our world record models speak for themselves as they are true reproductions even to the minutest details of the original record machines. The original models were used as patterns in most every case.

WARNING—Our genuine record model kits and designs have been copied by others but we guarantee every genuine world record kit which we sell to be an authentic duplicate of the original.

SPECIAL NOTE—You can order one dozen miscellaneous kits at the dozen prices providing you order three or more of each kind which goes to make up the dozen. Dozen prices on kits only are F. O. B. Peru, Indiana.

PROPELLERS—For ordering hand carved propellers separately for any of our kits see the hand carved propeller list.

Key to Meaning of Catalogue Letters used for Kits

K—Kit.
F—Metal fittings included.
P—Carved propeller included.
R—Ribs included.
W—Wheels included.
b—blueprints only.
c—Special blueprint only.

NOTE—In addition to the model kits listed we we supply Culver Eagle; Lefker; Jaros; R. O. G.; Flying Wing and Burnham Kits. Prices on request.

INDOOR GLIDERS AND TRACTORS

KF-0 RECORD TYPE PUSHER GLIDER—Like a baby which must crawl before it can walk, you should experiment with gliders before attempting to build a more complicated model. You can learn quickly how to set the wings to make it glide straight or in circles. Interesting indoor contests can be run with the contestants launching their gliders from the same height (usually 6 ft.) The best duration or best distance traveled from the starting point determining the winner. The world's record is almost 15 seconds for indoor gliders launched from a height of 6 feet.

Complete glider kit, 21" wings, all balsa parts accurately and smoothly cut to size, correctly formed wing clips ready to use, made from toughest rustproof plated music wire, with blueprint, postpaid, each $ .40
In dozen lots or more, each .35

K-0b—Extra copies of blueprints for the pusher glider model, postpaid, each $ .15

K-1—IMPROVED "SCOUT" MODEL 19" wing span tractor for indoor duration. Very easy to build. No bamboo to bend. Only simple cement joints. Ideal for beginners and beginning classes in model work. Learn how to carve your propellers, wind the rubber motors, cover the wings and adjust a machine for flying balance, with this simple tractor. Thousands of these have been used all over the country. Beginners often make over 60 seconds on their first flight. The record for this beginner's model is 155 seconds. Complete with all balsa parts cut to size with blueprint, postpaid, each $ .60
In dozen lots or more, each .50

KP-1 With hand carved balsa propellers postpaid each **$1.05**
In dozen lots or more, each ..... .95

KF-1 Same Kit as K-1 except the rustproof music wire parts are included formed ready to use. Thousands of these kits have been used throughout the country. Postpaid, each ..... **$ .75**
In dozen lots or more, each ..... .65

KFP-1 With hand carved balsa propellers, postpaid, each **$1.20**
In dozen lots or more, each 1.10

K-1b. Extra copies of "Improved Scout Duration Model" blueprints, postpaid, each ..... **$ .20**

KF-2—"POND INDOOR TRACTOR DURATION MODEL—170 seconds, 21 wing span. This machine held the world's record 6 years. Almost every indoor model has been copied from this machine. Just a trifle more advanced to build and fly than the A-1 series of Scout models. All parts to make this model, wire parts correctly formed ready to use from toughest plated rustproof music wire with blueprint, postpaid, each ..... **$ .75**

K2b—Extra copies of Pond Indoor Tractor Duration model blueprints, postpaid, each ..... **$ .20**

KF-3—RECORD TYPE INDOOR DURATION MODEL 15" MOTOR BASE. A real flier. Cambered wing, special designed elevator, all balsa model. This record type indoor model is very easy to build. Flights of between 5 and 6 minutes are easily made with this machine. Complete with all balsa parts cut to size. Rustproof music wire parts are included ready to use. With large blueprint showing everything in actual size. Postpaid, each ..... **$ .80**
In dozen lots or more, each ..... .75

KFP-3—Same as KF-3, except with hand carved featherweight balsa indoor propeller. Postpaid, each **$1.50**
In dozen lots or more, each 1.35

K-3b—Extra copies of Record Type Indoor Duration Model blueprint, postpaid, each ..... **$ .20**

TWIN PUSHERS.

KF4—"C" model. An excellent beginners model—just the thing to learn with. One beginner built a record style model while another built a "C" model. The beginner with the record style model could not get his model to fly so very well while the boy with the "C" model had no difficulty at all in beating him in his flights The "C" model is very convenient to carry. It is smaller and more sturdy than the record style models. The wing span is only 24" and the motor base is only 30" long. Hundreds of "C" models have been sold especially to schools and classes beginning the construction of outdoor models. All balsa parts are accurately and smoothly cut to size, correctly formed wire parts ready to use made from toughest plated rustproof music wire and blueprints complete kit, postpaid, each **$2.45**
In dozen lots or more, each 1.90

KFP-4—Same as KF-4 except with a pair of 8½" hand carved balsa propellers, postpaid, each **$3.35**
In dozen lots or more, each 2.65

K-4b—Extra copies of "C" model blueprints, postpaid, each ..... **$ .25**

K-5—"WABASH VALLEY FLYER" duration model, 30¾" wing span, 40" long. A fine outdoor twin pusher duration model. This type of model has won many contests. Its wing tip construction can be identified in many of the pictures of 1928 and 1929 contest winners with their machines. Flights of 5 and 6 minutes duration have consistently been made with this model because of its high climbing ability, tapered wings and great power in comparison to the weight of the whole machine. A potential record flier. Very easy to build. Complete kit, all balsa parts accurately and smoothly cut to size with blueprint. Postpaid, each **$2.60**
In dozen lots or more, each 2.10

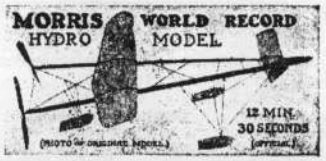
KP-5—Same as K-5 except with hand carved propellers, postpaid, each **$3.55**
In dozen lots or more ,each 2.90

KF-5—Same as K-5 except wire parts are included, correctly formed ready to use, made from toughest rustproof plated music wire. Postpaid, each **$2.90**
In dozen lots or more, each 2.35

KFP-5—Same as KF-5 except with a pair of 10½" hand carved balsa propellers. Postpaid each **$3.85**
In dozen lots or more, each 3.15

K2b—Extra copies of "Wabash Valley Flyer" model blueprints. Postpaid, each ..... **$ .25**

BUILD A GENUINE



KF-6—After much careful work, it is with the greatest of pleasure that we are enabled to offer to our customers and model building friends an identical plan and kit of the world's record hydro model to the date of the printing of this list. Though this model flew 12 minutes and 30 seconds officially after rising from the water on the floats which it carried through the air on its record breaking flight, it can be flown equally well and even better with landing gears or as a hand launched model. 29¼" wing, 40" motor base, weighs less than 3 oz. You can only get the genuine Morris hydro kits, models and parts through the Advanced Peru Model Airplane Shop, or our dealers.
This model may be built by beginners as it is simple to build and fly. The cost is extremely low considering the fact that this is a world record machine. Complete kit with all balsa parts accurately and smoothly cut to size, wire parts correctly formed ready to use, made of toughest plated rustproof music wire and two large sheets of blueprints showing many parts actual size. Postpaid, each **$3.00**
In dozen lots or more, each 2.55

KFP-6—Same kit as KF-6 except with a pair of 12 inch hand carved balsa propellers waterproofed for hydro models, postpaid, each **4.40**
In dozen lots or more, each $3.60

K-6b—Extra copies of Tudor Morris World Record Hydro Model blueprints, copyrighted. Two large sheets showing many parts in actual size, including the floats, ribs, elevator tips, metal fittings, etc. Postpaid, set ..... **$ .75**

KF-8—S. E. 5 SCOUT—Every boy will want to build this featherweight 27-inch wing spread flying scale model. This model is an accurate reproduction of the War scout planes, famous in fact and fiction. One of the best flying scale models known. Flights over 50 seconds have been made. 20 seconds (300 feet or better on straight away flight) are quite easy with this machine. Thousands of these kits have been sold. This machine has a removable motor stick for ready winding, dummy motor and exhaust pipes, making this a beautiful realistic scale model easy to fly. Complete kit, correctly formed wire parts ready to use, made from toughest plated rustproof music wire, all balsa parts accurately and smoothly cut to size, with blueprint showing body formers, ribs, wing tips, etc., in actual size. Postpaid, each, only **$2.95**
In dozen lots or more, each 2.40

KFPRW-8—Same as KF-8 except with hand carved scale model propeller, ready cut ribs and completed featherweight balsa wheels. Postpaid, each **$5.50**
In dozen lots or more, each 4.50

K-8b—Extra blueprints for the S-E-5 Scout model, Postpaid, each ..... **.50**

KF-9—HELICOPTER—The latest in experimental air models is the helicopter. This kit includes sufficient parts and materials to make either the original style of helicopter model which the Wright Brothers used in 1878 or the very latest type of duration helicopter. The record for indoor helicopters is 37 SECONDS to date. The price of this interesting outfit with all balsa parts accurately and smoothly cut to size, correctly formed wire parts ready to use made from toughest rustproof plated music wire with blueprints showing the construction of the two types Postpaid, each **$1.50**
In dozen lots or more, each 1.20

K-9b—Extra copies of blueprints for helicopter model, postpaid, each ..... **$ .40**

K-10c—SPECIAL—Fairchild cabin monoplane blueprint. A very accurate drawing of the large machine. Very fine, showing how wings fold. Same used by Morris for making his winning Fairchild model at Detroit 1928 contest. Span on drawings measures 27"—2 large sheets, 3 views. Postpaid, set ..... **$ .75**

KF-11—"THE SPIRIT OF ST. LOUIS"—This fine flying 33" wing spread model of the "Spirit of St. Louis" is very easy to construct. You will never regret building a model of the world's best known airplane. A new idea in light, strong, and simple model plane construction, all balsa parts accurately and smoothly cut to size, correctly formed wire parts ready to use made from the toughest plated rustproof music wire with blueprint. Postpaid, each only **$2.95**
In dozen lots or more, each 2.40

KFPRW-11—Same as KF-11 except with hand carved scale model balsa propeller, ready cut ribs and completed featherweight balsa wheels, complete. Postpaid, each **$5.50**
In dozen lots or more, each 4.50

K-11b—Extra blueprints for the "Spirit of St. Louis" model, postpaid, each ..... **.50**

KF-12—SHIFLER-SMITH WORLD RECORD OUTDOOR TRACTOR MODEL—36-inch wing span. This machine holds the world's outdoor tractor record for both hand launched distance (6024 feet) and hand launched duration (9 minutes 42 2-10 seconds). The feature of this world record machine is a simply constructed hollow spar 45 inches long. An excellent model for the experienced model flier. Simple to build. All balsa parts accurately and smoothly cut to size, correctly formed wire parts ready to use, made from toughest plated rustproof music wire with blueprint. Postpaid, each **$2.50**
In dozen lots or more, each 2.25

KFP-12—Same as KF-12 except with hand carved balsa propeller, postpaid, each **$3.35**
In dozen lots or more, each 3.10

K-12b—Extra copies of blueprints for Shifler-Smith world record model. Postpaid, each ..... **.40**

K-15—Kit for compressed air 5-foot monoplane—(tank and motor NOT included) See picture on front cover. All materials necessary with blueprint—Postpaid, each **$4.90**
In dozen lots or more, each $4.10

K-15b—Blueprints for compressed air model, postpaid, each ..... **.50**

COMPRESSED AIR MODEL EQUIPMENT.

Now you can make real engine driven Airplane and Boat Models. Just what you have been looking for.

See K-15 kit for compressed air balsa contest model. Flights of one-half mile have been made.

IMMEDIATE SHIPMENT.

Hoosier Air Motors and Tanks Won All Air Prizes Louisville National Contest October, 1929

These compressed air motors and parts are very light and strong.

E-1—Hoosier Whirlwind—powerful compressed air motor, assembled 3 cylinder, ⅜" bore, ⅜" stroke, ready to use, weight only ⅞ ounce Counter balanced, strong steel shaft, gnat-weight construction, ideal for 3½ to 5 foot light biplane and 4½ t 7 foot light weight monoplane. Make a real engine driven model. Postpaid, each, only **$4.90**
In ½-dozen lots or more, each 4.40

E-3—Hoosier Whirlwind—Powerful compressed air motor, partly assembled 3 cylinders, ⅝" bore, ⅝" stroke, same as above. Complete parts with blueprints showing simple assembling methods. Postpaid, each, only **$2.90**
In ½ dozen lots or more, each 2.70

E-5—Hoosier Whirlwind assembly blueprints only. Postpaid, each ..... **$ .45**

We carry replacement parts for Hoosier Whirlwind motors at reasonable prices.

E-20—Seamless compressed air tank. Weight about 9 ounces. A very safe tank on account of its seamless construction; 3" diameter, 30" long. Bursting pressure about 175 to 200 pounds. Throttle and filler valves installed. Reinforced. Postpaid, each **$7.00**
In dozen lots or more, each **$6.30**

E-21—Seamless compressed air tank. Weight about 8 ounces. A very safe tank on account of its seamless construction; 3" diameter, 24" long. Bursting pressure about 175 to 200 pounds. Throttle and filler valves installed. Reinforced. Postpaid, each **$6.50**
In dozen lots or more each **$5.95**

E-19—Motor mounting strips and tube for attaching motor to tank, set, postpaid **35c**

BUILT-UP-TANKS.

Other sizes of seamless tanks can be supplied. Prices on request.

TANK AND MOTOR COMBINATIONS.

If you want your motor already mounted to the tank and connected up all ready to run, add $2.50 extra to the price of the tank and motor.

E-33—Hoosier Whirlwind gnatweight compressed air motor No. E-1 ready mounted on seamless compressed air tank No. E-20 3" in diameter and 30" long. This combination is all ready to mount in your compressed air model airplane. Postpaid, each **$14.40**
In dozen lots or more, each **$12.50**

E-34—Hoosier Whirlwind gnatweight compressed air motor No. E-1 ready mounted on seamless compressed air tank No. E-21 3" in diameter and 24" long. This combination is all ready to mount in your compressed air model airplane. Postpaid each **$13.90**
In dozen lots or more each **$12.00**

We recommend the built-up tanks only. The knocked down tanks should be built only by experts.

E-25—Hoosier Whirlwind gnat-weight construction streamlined compressed air tank knockdown kit. Complete weight about 5 to 6 oz. When properly assembled will stand 175 to 200 lbs. pressure. However in operation for safety factor only 90 to 115 lbs. pressure should be used. Knockdown kit, size 3" tapered to 2½"x19" long consisting of the following materials:

1 strip E-60 .005 brass, 12" wide x 17" long	$ .60
1 tank cap, E-70 3" diameter	.55
1 tank cap, E-71, 2½" diameter	.53
Gnat-weight throttle valve, E-50	.75
Gnat-weight filler valve, E-55	.50
Rustproof plated music wire for re-inforcing the tank, coil, E-80	.40
1 coil E-85 our special hard solder wire	.15
1 assembly and instruction blueprint	.25
1 Dram Hoosier Special Soldering Flux	.08
Total value	$3.81
Postpaid, complete, only	**$3.25**
In ½ dozen lots or more, each	$3.00

E-26—Hoosier Whirlwind gnat-weight construction streamlined compressed air tank knockdown kit. Complete weight 7 to 8 oz. Pressure capacity same as E-25. Knockdown kit, size 3 tapered to 2½"x24" long, consisting of the following materials:

1 strip E-60 .005 brass, 12" wide x22" long	$ .75
1 tank cap, E-70 3" diameter	.55
1 tank cap, E-71 2½" diameter	.53
Gnat-weight throttle valve, E-50	.75
Gnat-weight filler valve E-55	.50
Rustproof plated music wire for re-inforcing the tank, coil E-81	.50
1 coil E-86 Special hard solder wire	.20
1 assembly and instruction blueprint	.25
1 Dram Hoosier Special Soldering Flux	.08
Total value	$4.11
Postpaid, complete, only	**$3.50**
In ½ dozen lots or more, each	$3.15

E-27—Hoosier Whirlwind gnat-weight construction streamlined compressed air tank knockdown kit. Complete weight about 9 to 10 oz. Pressure capacity same as E-25. Knockdown kit, size 3" tapered to 2½"x30" long consisting of the following materials:
1 strip E-60 .005 brass, 12" wide x27" long $ .90
1 tank cap, E-70, 3", diameter ..... .55
1 tank cap, E-71, 2½" diameter ..... .53
Gnat-weight throttle valve, E-50 ..... .75
Gnat-weight filler valve, E-55 ..... .50
Rustproof plated music wire for re-inforcing the tank, coil E-82 ..... .60
1 coil E-87 Special hard solder wire ..... .25
1 assembly and instruction blueprint ..... .25
2 Drams Hoosier Special Soldering Flux ..... .12

Total value $4.45
Postpaid, complete, only 3.65
In ½ dozen lots or more, each $3.30

E-35—Blueprint showing construction and methods of making your compressed air tanks in the easiest manner possible. Postpaid, each ..... $ .25

SPECIAL LUBRICANTS AND MISCELLANEOUS.

E-36—Hoosier Lubricant, specially prepared for improving the performance of all compressed air motors. Oil the motor, especially the cylinder walls after each flight. 1 ounce bottle lasts a long time. Postpaid, each ..... $ .25

E-40—Small No. 2-56 nuts and round headed bolts for holding compressed air model units together—¼ long. Postpaid, per dozen ..... $ .10

E-41—Small No. 2-56 nuts and round headed bolts for holding compressed air model units together 5/8 long. Postpaid, per dozen ..... $ .10

E-42—Small No. 2-56 nuts and round headed bolts for holding compressed air model units together ½ long. Postpaid, per dozen ..... $ .10

E-50—Throttle valves for compressed air tanks, quick operating gnatweight valves, postpaid, each ..... $. 75
In ½ dozen lots or more, each ..... .65

E-51—Double throttle valve for operating 2 motors from one tank postpaid each $1.10
In ½ dozen lots or more, each ..... .95

E-55—Gnatweight filler valves for compressed air tanks, the lightest obtainable with a special light valve core, postpaid, each ..... $ .50
In ½ dozen lots or more, each ..... .45

E-56—Gnatweight valve cores, postpaid, each ..... $ .06
Box of 5, per box ..... .25

E-60—.005" brass 12" wide, the ideal material for making compressed air tanks up to 3½ in diameter. (Note, aluminum cannot be used as it cannot be soldered securely). Can be supplied any length. Postpaid, per foot ..... $ .40
10 feet or more, per foot ..... .32

E-69—3½" diameter tank end caps, very light
Postpaid, each ..... $ .60
Postpaid, per pair $1.10
In ½ dozen lots or more, each ..... .52

E-70—3" diameter tank caps, very light, only 56-100 oz. each, postpaid, each ..... $ .55
Postpaid, per pair 1.05
In ½ dozen lots or more, each ..... .50

E-71—2½" diameter tank caps, very light, postpaid, each ..... $ .53
Postpaid, per pair 1.00
In ½ dozen lots or more, each ..... .48

SEAMLESS BRASS TUBING.

All our tubing is very light, having practically a 1-64" wall. Each size just barely slips into the next larger size. Ideal for air motors, etc.

	Outside Diameter	Inside Diameter	Price per foot Postpaid
E-72	¼"	1-32"	14c
E-73	5/16"	⅛"	11c
E-74	⅜"	3/16"	15c
E-75	7/16"	¼"	18c
E-76	½"	5/16"	20c

NOTE—All tubing is shipped in one foot lengths unless 5c extra packing and postage charges in included with all orders for more than one foot.

NO ORDERS ACCEPTED FOR LESS THAN ONE FOOT.

E-80—Toughest rustproof plated music wire for winding around tanks to reinforce them. No. 4, .013" diameter, 68 ft. coils (for 19" tanks) Postpaid, each 40c

E-81—Same as E-80 except 88 ft. coils (for 24" tanks) Postpaid, each 50c

E-82—Same as E-80 except 115 ft. coils (for 30" tanks) Postpaid, each 60c

E-85—Small coil special hard solder wire. Postpaid, each 15c

E-86—Medium coil special hard solder wire. Postpaid, each 20c

E-87—Large coil special hard solder wire. Postpaid, each 25c

E-90—1 pound special hard solder wire. Postpaid, per pound $1.50

E-95—Hoosier Special non-corrosive soldering flux, 1 dram, postpaid, each 8c

E-96—Hoosier Special non-corrosive soldering flux. 2 drams, postpaid, each 12c

You should write us for any compressed air items that you may need which are not listed above. We maintain a reasonably priced repair service for compressed air motors and tanks which are not too badly crashed.

BALSA WOOD.

This is the most wonderful wood yet discovered for model airplanes. We were among the very first to use this wood in model airplanes along with Mr. Lawrence, Mr. Delancy, Mr. Jaros and Mr. Pond back in 1917.

It is hard to believe but true that the selected stock such as we carry is much lighter than cork! Our large stock of wood is all selected from Government specification balsa at considerable extra expense to us. It is strong and tough yet light weight and easily worked. Our spars, sticks and planks are smoothly and accurately cut to size. Note the great selection of sizes and the very low postpaid prices.

We supply many large users of balsa with quantity lots from our selected stock which we ship in U. S. express charges collect unless otherwise specified. Transportation charges must be included on all Canadian and other foreign orders for Ab1 and Ab2 bulk balsa boards.

Ab1—Bulk balsa less than 10 board feet, per board foot ..... $ .45

Ab2—Bulk balsa, 10 to 50 board feet, per ft. ..... .35
On larger quantities write for prices.

$2.00 WORTH OF BALSA WOOD FOR 20c.

This hardly seems possible, but in our efforts to make all of our regular sizes of listed propeller blanks and sticks we find that there are some sticks that are not quite long enough or are not right to the exact sizes. Some pieces having a small worm hole in the end which throws them out of our regular high grade stick supply and there are thin veneers, undersized propeller blanks, and a lot of other odds of the best grade balsa thrown together in one large box.

This material is then bundled up into large packages about 4"x5"x14" long. **One to a Customer** We reserve the right to substitute items of equal or greater value if A-0 material is exhausted. State second preferrence in case substitution is necessary

A-0—Balsa Scrap Kit—Guaranteed value from $1.50 to $2.00. Separately or with orders for other materials less than 75c. Postpaid ..... $ .30
If ordered with other materials amounting to 75c or more—Postpaid ..... $ .20

EXTRA SELECT BALSA PIECES LARGE SIZES

Make your own special sizes of propellers, blanks and sticks.

*Most popular sizes.

SIZES Thickness and Width	LENGTHS 20" Cat. No.	20" Each P. P.	20" Dz. Lots Each	40" Cat. No.	40" Each P. P.	40" Dz. Lots Each
1"x1"	A-1	$ .15	$ .13	A-2	$ .28	$ .26
1"x1½"	A-3	.18	.16	A-4	.34	.32
*1"x2"	A-5	.22	.20	A-6	.40	.37
*1"x4"	A-7	.35	.32	A-8	.65	.61
1"x5"	A-9	.45	.42	A-10	.85	.80
1½"x2"	A-11	.30	.28	A-12	.55	.51
2"x2"	A-13	.35	.32	A-14	.65	.61
2"x5"	A-15	.70	.65	A-16	1.25	1.15

EXTRA SELECT BALSA VENEER—VERY SMOOTH.

Our smooth high grade balsa veneers, postpaid, are the best bargains on the market today.

Our 1-20", 1-16", 3-32" and 1-8" veneer is double sanded.

Our 1-32" veneer is used by better model fliers for constructing hollow spars. Don Burnham won a trip to Europe with a model having a spar made from our 1-32" veneer.

*MOST POPULAR SIZES.

†Used also for radio loud speakers.

SIZES Thickness and Width	LENGTHS 20" Cat. No.	20" Each P. P.	20" Dz. Lots Each	40" Cat. No.	40" Each P. P.	40" Dz. Lots Each
*1-32"x1"	A-17	$ .06	$ .05	A-18	$ .11	$ .09
1-32"x2"	A-19	.12	.10	A-20	.24	.21
*1-20"x1"	A-21	.05	.04½	A-22	.09	.08
1-20"x2"	A-23	.11	.09	A-24	.20	.18
1-20"x3"	A-25	.14	.12	A-26	.27	.24
1-20"x6"	A-27	.28	.25	A-28	.55	.45
*1-16"x1"	A-29	.04	.03½	A-30	.08	.07
*1-16"x2"	A-31	.09	.08	A-32	.18	.16
1-16"x3"	A-33	.13	.12	A-34	.26	.24
*1-16"x6"	A-35	.28	.25	A-36	.55	.45
*3-32"x1"	A-37	.06	.05	A-38	.10	.09
3-32"x2"	A-39	.11	.09	A-40	.20	.18
3-32"x3"	A-41	$ .18	$ .16	A-42	$ .30	$ .27
*3-32"x6"	A-43	.28	.25	A-44	.55	.45
⅛"x1"	A-45	.06	.05	A-46	.10	.09
⅛"x2"	A-47	.11	.09	A-48	.20	.18
⅛"x3"	A-49	.18	.16	A-50	.30	.27
*†⅛"x6"	A-51	.25	.23	A-52	.48	.45

SMOOTHLY AND ACCURATELY CUT BALSA SPARS AND STICKS.

In addition to being smoothly cut, the wood that these sticks are cut from is tough light weight balsa especially selected for being straight grain and for freedom from worm holes and knots.

NOTE IMPORTANT:—Add 5c to all orders for less than one dozen sticks 40" long to cover extra packing cost. No charge one dozen sticks or over.

*MOST POPULAR SIZES.

SIZES Thickness and Width	LENGTHS 20" Cat. No.	20" Each P. P.	20" Dz. Lots Each	40" Cat. No.	40" Each P. P.	40" Dz. Lots Each
1-16"x⅛"	A-53	$ .03	.02½	A-54	$ .04	.03½
*1-16"x3-16"	A-55	.03	.02½	A-56	.04	.03½
*1-16"x¼"	A-57	.03	.02½	A-58	.04	.03½
*1-16"x5-16"	A-59	.03	.02½	A-60	.04	.03½
*3-32"x5-32"	A-61	.03	.02½	A-62	.04	.03½
⅛"x⅛"	A-63	.03	.02½	A-64	.04	.03½
⅛"x3-16"	A-91	.04	.03½	A-92	.06	.05½
*⅛"x¼"	A-65	.04	.03½	A-66	.06	.05½
⅛"x5-16"	A-67	.05	.04½	A-68	.07	.06½
*5-32"x5-32"	A-69	.05	.04½	A-70	.07	.06½
*5-32"x⅜"	A-71	.07	.06	A-72	.09	.08
3-16"x3-16"	A-73	.05	.04½	A-74	.07	.06½
*3-16"x⅜"	A-75	.07	.06	A-76	.09	.08
*3-16"x½"	A-77	.07	.06	A-78	.09	.08
*7-32"x7-16"	A-79	.07	.06	A-80	.09	.08
¼"x¼"	A-81	.06	.05½	A-82	.08	.07
¼"x⅜"	A-83	.07	.06	A-84	.09	.08
5-16"x5-16"	A-93	.07	.06	A-94	.09	.08
⅜"x⅜"	A-85	.07	.06	A-86	.09	.08
⅜"x7-16"	A-87	.08	.07	A-88	.11	.10
½"x½"	A-89	.09	.08	A-90	.12	.11

BALSA ANGLE BEAMS.

Used mostly on Record Type, Fuselage Models for body longerons.

Flanges 1-16" thick.

SIZES Thickness and Width	LENGTHS 20" Cat. No.	20" Each P. P.	20" Dz. Lots Each	40" Cat. No.	40" Each P. P.	40" Dz. Lots Each
¼"x¼"	A-150	.10	.09	A-151	.15	.13
5-16"x5-16"	A-152	.12	.11	A-153	.18	.15

BALSA "I" BEAMS

Used on the famous Lefker and Lucas Prize Winning Models. Scientifically and Structurally Correct Design and Proportions. 3-32" web, 1-16" flanges.

SIZES and Width Thickness	LENGTHS 20" Cat. No.	20" Each P. P.	20" Dz. Lots Each	40" Cat. No.	40" Each P. P.	40" Dz. Lots Each
5-16"x5-16"	A-160	.10	.09	A-161	.18	.13
⅜"x⅜"	A-162	.14	.13	A-163	.24	.22

CHANNELS AND CAPS FOR MAKING HOLLOW SPARS FOR RECORD MODELS.

A-170—3-16 x⅜ x40 —1-20 sides and 1-16" bottom—channel and 3-16"x1-16 x40 cap. Set of 1 each postpaid ..... $ .40
Two sets for twin pushers. Postpaid ..... .75
In dozen sets or more, each ..... .35

A-175—5-16"x½"x45"—1-20" sides and 1-16" bottom—channel and 5-16"x1-16"x45" cap (as used on Shiffer-Smith world record tractor). Set of 1 each. Postpaid ..... .55
In dozen sets or more, each ..... .40

PROPELLER BLANKS.

Suitable for making most all standard sizes of propellers.

A-101—⅜"x½"x5", postpaid, each ..... .02
In dozen lots or more, each ..... .02½

A-102—7-16"x⅝"x6", postpaid, each ..... .04
In dozen lots or more, each ..... .03½

A-103—⅜"x1⅛"x7", postpaid, each ..... .05
In dozen lots or more, each ..... .04

A-104—⅝"x1⅛"x8½", postpaid, each ..... .05
In dozen lots or more, each ..... .04

A-105—11-16"x1¼"x10", postpaid, each ..... .06
In dozen lots or more, each ..... .05

A-106—⅞"x1¾"x10½", postpaid, each ..... .06
In dozen lots or more, each ..... .05

A-107—1"x1¼"x11" (can be made toothpick style) postpaid, each ..... .08
In dozen lots or more, each ..... .07

A-108—½"x1.2"x12" special grade balsa, postpaid, each ..... .09
In dozen lots or more, each ..... .07½

A-109—⅝"x1¼"x12", postpaid, each ..... .09
In dozen lots or more, each ..... .07½

A-110—¾"x1⅛"x16", postpaid, each ..... .14
In dozen lots or more, each ..... .12

A-111—1"x1½"x12", postpaid, each ..... .10
In dozen lots or more, each ..... .08

A-112—¾"x1½"x12½", postpaid, each ..... .10
In dozen lots or more, each ..... .08

A-116—¾"x1¾"x9" for S. E. 5 scout model, postpaid, each ..... .09
In dozen lots or more, each ..... .07½

A-117 7/8"x1⅝"x8½" for Spirit of St. Louis, postpaid, each ..... .09
In dozen lots or more, each ..... .07½

A-130—1"x1½"x10½" (can be made toothpick style, postpaid, each ..... .10
In dozen lots or more, each ..... .07

A-134—1"x1⅛"x14" (can be made toothpick style), postpaid, each ..... .15
In dozen lots or more, each ..... .13

A-138—1"x1⅝"x17" (can be made toothpick style), postpaid, each ..... .20
In dozen lots or more, each ..... .17

HAND CARVED BALSA PROPELLERS AT UNHEARD-OF PRICES!

Our propellers are true pitch for maximum efficiency and hand carved from selected balsa wood. They are cut to the proper weight and proportions.

Please note that our hand carved propellers are true pitch. Bent balsa veneer machine made propellers even if bent correctly soon strain out of shape and lose their true pitch and efficiency. Pay a few cents more and get a real honest-to-goodness propeller made like the big plane propellers!

The indoor propellers are the lightest record style duration type. Hydro propellers are doped

to protect them against water. Outdoor propellers are regular duration style true pitch propellers. Our scale model and compressed air propellers are somewhat sturdier and just the props for higher R.P.M. Shafts and washers are installed on all rubber model propellers. All single propellers are carved right hand unless otherwise specified.

We will be glad to quote on any propellers not listed in the price list as our propeller department is fully equipped to make any style of pattern of balsa wood propellers.

In addition to our line of propellers you will notice that we supply a special instruction board for schools and classes which shows each step in the carving of a propeller. The price of this instruction board is negligible considering its immense value in making the method of carving propellers simple to the inexperienced model builders in classes.

P-0—Propeller carving instruction board with complete directions and actual propellers in the various stages of completion in eight steps. You need one in your class or club, price each only $3.00

P-0b—Blueprint showing the various stages of propeller construction with directions. Large sheet with many different views, including duration and toothpick propeller. Much used by schools and classes and often used in conjunction without carving instruction board, postpaid ea. $ .50

P-101—Hand carved featherweight propeller carved from blank No. A-101 ⅝"x1⅛"x5"—11.8" pitch for small tractors. Postpaid, each 35c

P-102—Hand carved featherweight propeller carved from blank A-102 ⅛"x⅝"x6"—13.25" pitch for skeeter models and other similar machines. Postpaid, each 40c

P-103—Hand carved featherweight propeller carved from blank A-103 ¾"x1½"x7"—14.7" pitch, for indoor pusher models. Postpaid, each 45c

P-104—Hand carved featherweight propeller carved from blank A-104 ⅝"x1⅛"x8½"—14.85" pitch Postpaid, each 50c

P-104A—Pair of hand carved featherweight pusher propellers, one left and one right hand, carved from blank A-104 ⅝"x1¾"x8½"—14.85" pitch for "C" model. Per pair, postpaid, each $1.00

P-105—Hand carved featherweight propeller carved from blank A-105 ⅛"x1¼"x10"—17.3" pitch for indoor tractor models. Postpaid, each 55c

P-106—Hand carved featherweight propeller carved from blank A-106 ⅞"x1¼"x10½"—23.1" pitch for commercial transport model. Postpaid, each 65c

P-106A—Pair of hand carved featherweight pusher propellers carved from blank A-106 ⅞"x1¼"x-10½"—23.1" pitch for Wabash Valley Flyer. Postpaid, per pair $1.20

P-107—Pair of hand carved featherweight propellers carved from blank A-107 1"x1¼"x11"—27.7" pitch for twin pusher models. Postpaid, pr $1.30

P-108—Hand carved special featherweight propeller carved from blank A-108 ½"x1.2"x12"—15.7" pitch for the Pond Indoor Duration model and the record indoor duration model. Postpaid, each ..... .95c

P-109H—Pair of hand carved pusher feather weight propellers carved from blank A-109 ⅝"x1¼"x12"—18.9" pitch as used on the Morris world record 12½ minute model, waterproofed for hydro models. Per pair, postpaid $1.50

P-109—Same as P-109H except not waterproofed. Per pair, postpaid $1.45

P-110—Hand carved featherweight propeller carved from blank A-110 ¾"x1⅛"x16"—$1.7" pitch for Shifler-Smith world record tractor model. Postpaid, each 95c

P-111S—A dandy hand carved propeller. Scale model type, carved from special toothpick blank 12"x-½"x1¼" at ends, and 1"x1¼" half way out with 12.6" pitch (shaft and washers included). Postpaid, each $1.35

P-112—Pair hand carved pusher featherweight propeller carved from blank A-112 ¾"x1¼"x12½"—19.6" pitch as used on the Jaros world record twin pusher hand launched duration model, 10 minutes 14 2-10 seconds. Per pair postpaid $1.50

P-116—Hand carved featherweight propeller carved from blank A-116 ¾"x1¾"x9"—12.2" pitch for S. E. 5 scout model. Postpaid, each 95c

P-117—Hand carved featherweight propeller carved from blank A-117 ⅞"x1⅝"x8½"—14.4" pitch for Spirit of St. Louis Model. Postpaid, each 95c

P-130—A dandy hand carved propeller. A scale model propeller carved from toothpick blank 10½"x1¼"x1½" at ends, and 1"x1½" half way out with 11" pitch (shaft and washers included) Postpaid, each $1.20

P-134—A superior hand carved propeller for compressed air model (no shaft or washer supplied) carved from special toothpick blank 14"x-½"x1⅛" at ends and 1"x1⅛" half way out with 14" pitch. Postpaid, each $1.70

P-136—A superior hand carved propeller for compressed air model (no shaft or washers supplied) carved from special toothpick blank 15"x1½"x-1⅛" at ends and 1 x1⅛" half way out with 15" pitch. Postpaid, each $1.90

P-138—A superior hand carved propeller for compressed air model (no shaft or washers supplied) carved from special toothpick blank 17"x1½"x1⅝" at ends and 1"x1⅝" half way out with 17" pitch. Postpaid, each $2.40

LIGHT CELLULOID AND BALSA WHEELS.

These are made of lightest balsa with washers to be cemented in place for bearings. These are just the thing for any machine requiring wheels.

W-1—2" diameter CELLULOID WHEELS, just the thing for models up to 2½ or 3 ounces weight requiring a 2" wheel. Weight only 16-100 oz. per pair. White or assorted colors. Postpaid per pair 35c
1 Dozen pairs or more, per pair ..... .29c

PLAIN DISC WHEELS, UNPAINTED.

W-2—⅜" diameter, 1-20" thick. Postpaid per pr. 2c
Per dozen pair 20c

W-3—½" diameter, ⅛" thick. Postpaid, per pair 2c
Per dozen pair 20c

W-4—¾" diameter, ⅛" thick. Postpaid per pr. 2c
Per dozen pair 20c

BALSA RIBS.

R-1—3¾" long 1-20" thick, high lift section, postpaid, each 3c
In dozen lots or more, each ..... 2½"

R-2—5" long, 1-20" thick, high lift section, postpaid each 4c
In dozen lots or more, each 3½c

R-3—5" long, 1-20" thick, Clark "Y" section, postpaid, each 4c
In dozen lots or more, each 3½c

R-4—7¼" long, ⅛" thick, high lift section, postpaid each 6c
In dozen lots or more, each 5c

R-5—10½" long, ⅛" thick, high lift section for compressed air models, postpaid, each 10c
In dozen lots or more, each 8c

R-6—12" long, ⅛" thick, Clark "Y" section for compressed air models, postpaid, each 12c
In dozen lots or more, each 10c

R-7—15" long, ⅛" thick, Clark "Y" section for compressed air and engine driven models, postpaid, each 15c
In dozen lots or more, each 12c

NOTE.

These prices do not include holes for beams, entering edges, lightening holes, etc.

Model Airplane Balsa and Bamboo Bender

Bends Quickly and Without Burning

BB—Stop wasting bamboo and balsa wood. Balsa bends almost as well as bamboo on our bender if the balsa is moistened beforehand. You will wonder how you have been getting along without a bamboo and balsa bender. You can bend most any radius, shape or form you wish (see picture above) landing gears, wing tips, elevator floats, fins, etc. Bends camber in balsa wing and elevator ribs. It will bend circles and ovals, small and large. Bends cockpit outlines, etc., complete, assembled ready to use with spirit lamp and complete directions. Beware of cheaper imitations. This is the first and best bamboo and balsa bender on the market. Postpaid, each only $1.00
In dozen lots or more, each ..... .85

BC—All parts necessary to make your own bamboo and balsa bender, postpaid, each, only ..... $ .60
In dozen lots or more, each ..... .50

BAMBOO.

Our bamboo is selected from the highest quality so that it will split straight and easily. Our Tonkin bamboo is the toughest bamboo obtainable and yet it is more easily bent and scraped to any desired shape and cross section than our plain bamboo. The Tonkin pieces are about ⅝" wide.

B-1—Jointless Tonkin, between 8 and 10½ inches long, postpaid, each 4c
In dozen lots or more, each 3½c

B-2—Jointless Tonkin, between 10½ and 12½ inches long. Postpaid, each 6c
In dozen lots or more, each 5½c

B-3—Jointless Tonkin, between 12½ and 15 inches long. Postpaid, each 10c
In dozen lots or more, each 8c

B-4—Plain jointless bamboo pieces about ⅛"x¼"x-12". Postpaid, each 3c
Two for 4c
In dozen lots or more, each 1½c

B-5—Plain jointless bamboo pieces approximately ⅓"x⅛"x15". Postpaid, each 3c
Two for 5c
In dozen lots or more, each 2c

B-9—"Jumbo" joints. Full 15" joints bamboo 2½" to 3" diameter. Postpaid, each 35c

ROUND REED.

Many scale model builders prefer our selected round white reed for elevator edging, body formers, wing tips, landing gears, fins, etc. Easily bent by hand, water or steam into most any reasonable shape.

B-10—⅛" diameter round reed 10 feet, postpaid 5c
B-11—⅛" diameter round reed, 8 feet, postpaid 5c
B-12—⅛" diameter round reed 6 feet, postpaid 5c
B-13—⅛" diameter round reed 4½ feet, postpaid 5c
B-14—¼" diameter round reed 2½ feet, postpaid 5c

COVERING MATERIALS

For Wings, Elevators, Fuselages, Etc.

JAPANESE SILK TISSUE PAPER, a light, strong and smooth model covering very extensively used for years, 6 to 7 sheets weigh one ounce. Sheets 21"x31".

C-1—1 to 5 sheets, postpaid, each ..... $ .05
Package of 6 sheets, each package ..... .25
6 to 49 sheets, postpaid, each ..... .04½
Package of 50 sheets, each package $1.75

GENUINE EXTRA SUPERFINE JAPANESE SILK TISSUE PAPER.

Something new, extra fine and light. You will like its extreme light weight and its close grain and glossy surface. 17 to 20 sheets weigh one ounce. Sheets 18"x24". Beware of cheaper substitutes so called superfine. Burnham won a trip to Europe with a model covered with our genuine superfine tissue.

C-2—1 to 5 sheets, postpaid, each ..... $ .10
Package of 5 sheets, postpaid, each package .45
6 to 49 sheets, each ..... .08
Package of 50 sheets, each package $3.25

Any wrinkles caused by folding Japanese tissue for shipment may be ironed out by using a hot iron and ironing the Japanese paper between two layers of smooth paper on a hard surface. Then before using the paper, expose it to the air for one-half hour to one hour so that it may absorb moisture from the air and assume its normal size.

GOLDBEATERS' SKIN.

Goldbeaters' skin is tougher than silk, smoother than fine Japanese tissue paper, almost as light as our Japanese papers, easily attached to wings, fuselages and other surfaces. Stretches to a smooth tight surface using water alone or water followed with Light dope, or most any doping solution.

Goldbeaters' skin makes wonderful appearing models and is much used especially on larger models, scale models, compressed air models, etc. You will note that we furnish goldbeater skins either white or in a variety of colors. The average size of these skins is over 8" wide and 30" long. These are first grade skins. Second grade skins are not nearly so satisfactory for model airplane use but are often sold to unsuspecting model builders.

This material used in the working of gold and in gas bags of zeppelins is a great "discovery" for model builders.

C-5—White or transparent, postpaid, each 30c
In dozen lots or more, each 25c

C-6—Red, postpaid, each 35c
In dozen lots or more, each 30c

C-7—Blue, postpaid, each 35c
In dozen lots or more, each 30c

C-8—Black, postpaid, each 35c
In dozen lots or more, each 30c

C-9—Green, postpaid, each 35c
In dozen lots or more, each 30c

C-10—Orange, postpaid, each 35c
In dozen lots or more, each 30c

C-11—Purple, postpaid, each 35c
In dozen lots or more, each 30c

DOPES.

You will find these the best pure dopes obtainable for model airplane use. Prepared to formulas developed from twelve years of model airplane experience.

DOPE THINNER.

Contains no solid matter or foreign substances. For shrinking paper and thinning cements or dopes.

D-1—½ ounce, postpaid, each 10c
In dozen lots or more, each 9c

D-2— 1 ounce, postpaid, each 15c
In dozen lots or more, each 13c

D-3—2 ounces, postpaid, each 20c
In dozen lots or more, each 17c

D-4—½ pint, postpaid, each 45c
In dozen lots or more, each 40c

D-5—Pint, postpaid, each 65c
In dozen lots or more, each 58c

LIGHT DOPE OR WING DOPE.

Used on record style models, to shrink the paper slightly and to lay the fuzz smoothly.

D-7—1 ounce, postpaid, each 18c
In dozen lots or more, each 15c

D-8—2 ounces, postpaid, each 22c
In dozen lots or more, each 19c

D-9—½ pint, postpaid, each 45c
In dozen lots or more, each 40c

D-10—1 pint, postpaid, each 75c
In dozen lots or more, each 68c

BANANA OIL.

Highest grade pure material, colorless and light, used for various model purposes. Does not turn white, ideal for doping silk, excellent for thinning cements. Not to be confused with inferior "bronzing fluids."

D-12—1 dram vial, postpaid, each 5c
In dozen lots or more, each 4½c

D-13—2 dram vial, postpaid, each 7c
In dozen lots or more, each 5c

D-14—½ ounce, postpaid, each 12c
In dozen lots or more, each 10c

D-15—1 ounce, postpaid, each 18c
In dozen lots or more, each 15c

D-16—2 ounce, postpaid, each 22c
In dozen lots or more, each 19c

D-17—½ pint, postpaid, each 45c
In dozen lots or more, each 40c

D-18—1 pint, postpaid, each 75c
In dozen lots or more, each 68c

LIGHT MODEL CEMENT, SPECIAL HYDRO DOPE, IDEAL PAPER CEMENT, AND BAMBOO VARNISH, ALL IN ONE!

Best material obtainable for sticking Japanese tissue paper to models, and for making hollow spars, waterproofing models, etc. Sticks like Hoosier Glu or Ambroid. Dries light as banana oil.

D-19—½ ounce, postpaid, each 15c
In dozen lots or more, each 12c

D-20—1 ounce, postpaid, each 20c
In dozen lots or more, each 16c

D-21—2 ounce, postpaid, each 28c
In dozen lots or more, each 24c

D-22—½ pint, postpaid, each 75c
In dozen lots or more, each 65c

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BEAUTIFUL COLORED DOPES.

These colored dopes are the best obtainable. They are the consistency of our Light Dope and can be used on record style models directly to replace Light Dope. The coloring matter is soluable and adds practically no weight to the machine. These dopes will produce brilliant colors on balsa and other woods as well as on covering materials. Brightly colored models can be seen easier at greater distances than uncolored models.

Violet and Silver bronze, same price as colored dopes.

D-31—Red. 1 ounce, postpaid, each 20c
In dozen lots or more, each 16c

D-32—Red. 2 ounce, postpaid, each 35c
In dozen lots or more, each 30c

D-33—Red. ½ pint, postpaid, each 85c
In dozen lots or more, each 70c

D-37—Yellow. 1 ounce, postpaid, each 20c
In dozen lots or more, each 16c

D-38—Yellow. 2 ounce, postpaid, each 35c
In dozen lots or more, each 30c

D-39—Yellow. ½ pint, postpaid, each 85c
In dozen lots or more, each 70c

D-40—Green. 1 ounce, postpaid, each 20c
In dozen lots or more, each 16c

D-41—Green. 2 ounce, postpaid, each 35c
In dozen lots or more, each 30c

D-42—Green. ½ pint, postpaid, each 85c
In dozen lots or more, each 70c

D-43—Orange. 1 ounce, postpaid, each 20c
In dozen lots or more, each 16c

D-44—Orange. 2 ounce, postpaid, each 35c
In dozen lots or more, each 30c

D-45—Orange. ½ pint, postpaid, each 85c
In dozen lots or more, each 70c

CEMENTS.

NEW TRANSPARENT "HOOSIER GLU"

Most Everybody is Using It.

Spreads better, dries quicker, tougher and neater. **It is transparent, and yet in spite of its improved qualities, it is cheaper!**

Always keep the lid on your "Hoosier Glu" containers even when in use to preserve the strength and quality.

G-10—1 dram vial, postpaid, each 7c
In dozen lots or more, each 6c

G-11—2 dram vial, postpaid, each 10c
In dozen lots or more, each 9c

G-12—½ ounce (4 drams) postpaid, each 13c
In dozen lots or more, each 11c

G-13—1 ounce, postpaid, each 18c
In dozen lots or more, each 15c

G-14—2 ounce can, most popular size, special price postpaid, each 24c
In dozen lots or more, each 21c

G-15—4 ounce cans, postpaid, each 45c
In dozen lots or more, each 39c

G-17—½ pint cans (8 ounces) postpaid, each 75c
In dozen lots or more, each 65c

G-16—Full pint cans (for refilling smaller containers) postpaid, each $1.30
In dozen lots or more, each $1.05

AMBROID.

That wonderful model airplane cement. It holds most anything. Tough, flexible, waterproof, sets quickly, and makes obsolete the use of nailing, binding and eliminates the need of heavy metal fittings. Several coats of Ambroid will even hold bearings in place without wrapping with thread. In sealed airtight containers. Always keep the lid on your ambroid container even when using it so it will retain its best qualities. It is more economical to use a small container and refill when necessary from a pint can.

G-1—1 dram vial, postpaid, each 8c
In dozen lots or more, each 6c

G-2—2 dram vial, postpaid, each 12c
In dozen lots or more, each 10c

G-3—½ ounce (4 drams), postpaid, each 15c
In dozen lots or more, each 12c

G-4—1 ounce, postpaid, each 20c
In dozen lots or more, each 16c

G-5—2 ounce can, the most handy size, extra special price, postpaid, each 28c
In dozen lots or more, each 24c

G-6—4 ounce cans, postpaid, each 50c
In dozen lots or more, each 40c

G-8—½ pint cans (8 ounces) postpaid, each 85c
In dozen lots or more, each 75c

G-7—Pint cans (handy to refill the smaller containers) postpaid, each $1.50
In dozen lots or more, each $1.25

RUBBER.

Para rubber has always been one of the best motive powers for model airplanes ever since Penaud first introduced a twisted rubber driven model in 1871. Practically all world records for model airplanes have been made with rubber power. One fifth the weight of a spring of equal duration and power. Our rubber is always fresh. The sizes we carry are adopted to all types of models. You get every possible bit of power back out of our tested long life rubber strands. The best rubber is the only kind we carry. There is a difference!

Donald Burnham, a Junior outdoor contestant, and Joseph Culver, a Senior indoor contestant, at a National model contest won trips to Europe using our rubber! Why? Simply because our rubber was the toughest pure rubber available any place—and because our rubber is always fresh.

Culver's indoor flight of 8 min. 32.5 sec. smashed the world's record and he used our standard ⅛"x1-32" rubber!

M-0a—1-32" sq. full skein, postpaid, each 90c

M-1—1-20" square, for Skeeter models and other small machines, such as the baby R. O. G.'s. 7 feet (enough for 4 motors) postpaid 5c

M-1a—1-20" square full skeins. Postpaid, each $1.25

M-2—1-32"x⅛" flat. Most convenient size. 10 feet to 130 feet. Postpaid, per foot 1c

M-2a—1-32"x⅛" flat. Special 25 ft. packages only. Postpaid, each 20c

M-2b—1-32"x⅛" flat full skein between 205 and 212 feet. Bargain price, postpaid, each $1.30

M-2c—Spooled 1-32"x⅛" flat, fresh, tough rubber, easier to measure off—no tangled skeins. 10c credit for return of spool. postpaid, each $1.50

M-4—1-32"x3-32" flat. A new size, 7 ft., postpaid 5c

M-4a—1-32"x3-32" full skeins, postpaid, each $1.25

M-3—1-32 x¼" flat often used on large models, 10 feet or over. Postpaid, per foot 1¼c

M-3a—1-32"x¼" flat full skein, between 205 and 212 feet. Bargain price, postpaid, each $1.55

RUBBER LUBRICANT—THE BEST KNOWN

Most of the 1929 prize winners and record-breakers used Rubber Lubricant. Our lubricant is very popular among record model builders. Simply lubricate rubber thoroughly and wipe off excess for obtaining many more power winds and more duration! This lubricant is so good you need rubber cement to keep the knots from slipping!

ML—Peru Special Rubber Lubricant, absolutely harmless to rubber, 2 ounces, postpaid 35c
Dozen lots or more, each 28c

METAL PARTS AND FITTINGS.

LIGHT ACCURATELY DRILLED BEARINGS—TOUGH STEEL.

F-2—Small—for "small and medium" shafts. Postpaid, each 4c
In dozen lots or more, each 3c

F-3—Large—for "large" shafts. Postpaid, each 5c
In dozen lots or more, each 4c

DURABLE WASHERS.

Not less than 1 dozen sold.

F10—"Small" ⅛" outside diameter for small and medium shafts. One dozen, postpaid 10c
In 12 dozen lots or more, per dozen 8c

F-11—"Large" ¼" outside diameter for medium and large shafts. One dozen 10c
In 12 dozen lots or more, per dozen 8c

All wire and wire parts are correctly formed ready to use from the toughest plated rust-proof steel music wire obtainable. These new bright and shiny fittings will add considerably to the appearance of your model and yet you will note prices are exceptionally reasonable.

PROPELLER SHAFTS.

F-6—Small No. 6 music wire. Postpaid, each 4c
In dozen lots or more, each 3½c

F-8—Medium No. 8 music wire. Postpaid, each 4c
In dozen lots or more, each 3½c

F-9—Large No. 14 music wire. Postpaid, each 5c
In dozen lots or more, each 4½c

"S" HOOKS.

F-14—Small No. 6 music wire, postpaid, each 4c
In dozen lots or more, each 3½c

F-15—Medium No. 8 music wire, postpaid, each 4c
In dozen lots or more, each 3½c

F-16—Large No. 14 music wire, postpaid, each 5c
In dozen lots or more, each 4½c

TWIN PUSHER—YOKES OR FRONT HOOKS.

F-18—Large No. 14 music wire, postpaid, each 5c
In dozen lots or more, each 4½c

TRACTOR REAR HOOKS.

F-20—Small No. 6 music wire, postpaid, each 4c
In dozen lots or more, each 3½c

F-21—Medium No. 8 music wire, postpaid, each 4c
In dozen lots or more, each 3½c

F-22—Large No. 14 music wire, postpaid, each 5c
In dozen lots or more, each 4½c

TRACTOR CANS.

F-24—Small No. 5 music wire, postpaid, each 4c
In dozen lots or more, each 3½c

F-25—Medium No. 6 music wire, postpaid, each 4c
In dozen lots or more, each 3½c

F-26—Large No. 10 music wire, postpaid, each 5c
In dozen lots or more, each 4½c

TWIN PUSHER "CANS".

F-29—Medium No. 8 music wire, set of two, postpaid 8c
In dozen sets or more, per set 6½c

F-30—Large No. 11 music wire set of 6, postpaid 30c
In dozen sets or more, per set 25c

WING CLIPS.

These wing clips should be adjusted so that they fit the motor sticks snugly without damage.

F-40—Small for pusher gliders, skeeter models and small R. O. G. machines for motor sticks about 1/16"x⅛", set of two, postpaid 8c
In dozen sets or more 6½c

F-41—Medium for indoor pusher and tractor models having a motor stick approximately ⅛"x¼", set of two, postpaid 8c
In dozen sets or more, set 6½c

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For those who want to make their own special fittings, landing gears, axle shafts, etc., our shiny plated rustproof steel music wire is the most economical yet the toughest and most satisfactory material obtainable. Our plated rustproof wire costs no more than the plain music wire sold by others Each coil contains approximately the length indicated.

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F-61—No. 6, .016" diameter, 6½ feet 5c
F-62—No. 8, .020" diameter, 6 feet 5c
F-63—No. 10, .024" diameter, 5½ feet 5c
F-64—No. 11, .026" diameter, 5 feet 5c
F-65—No. 12, .029" diameter, 4½ feet 5c
F-66—No. 13, .031" diameter, 4 feet 5c
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One dozen coils of any size or miscellaneous sizes, each 4c

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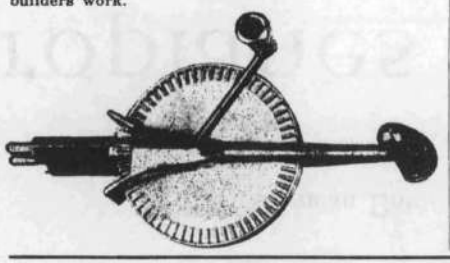
These tools are especially selected for model builders work.



T-1—WINDER FOR RUBBER MOTORS. Everybody needs an advanced quality winder. The very best grade of solid smooth operating heavy duty twin winder, 5 to 1 ratio for large and small, single and twin motor models. The thrust of winding heavy twin motors is taken up by a heavy bearing. Others charge as high as $2.50. Our bargain price is postpaid, each $1.25
If ordered with other materials amounting to $1.00 or more, the price of the winder is, postpaid, each $1.00
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SPECIAL TUBING—NON METALIC.

Special tubing for strut sockets, hydro float sockets, R. O. G. sockets, dummy exhaust manifolds, etc. Short pieces are stiff, while long pieces are flexible and easily formed to resemble any particular engine manifold for scale models. They may even be flattened to resemble streamlined manifolds and exhaust pipes. This tubing is very light in weight and especially selected for model airplane use. Much lighter and easier worked in fact than metal fittings and metal tubing.

S-1—3-32" outside diameter, 3-64" inside diameter. Postpaid, per foot 10c
(This is the size used on the Morris World Record Hydro Model).

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S-20—Brass rod 1-16" diameter. Postpaid per ft. 5c

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Making Model Aeroplanes

I.—Flying Paper Gliders

By WILLIAM B. STOUT

HERE is the first of a series of articles which will go a long way toward enabling you to really master the science of aviation. Before the Wrights startled the world with their first flight and aroused public interest in aviation the author had published articles telling how to make successful flying models which he himself had built and flown. Octave Chanute, the real father of aviation—for the Wrights started with machines which he furnished, and experimented under his direction—a decade ago selected Mr. Stout to lecture on aviation before the Engineers Society of Minneapolis, as the man best fitted to discuss the problems of aviation at that time. Later he went to Chicago where he was aviation expert for a local newspaper and a prominent figure in the Aero Club. He founded the Model Aero Club of Illinois and under his direction the boys of Chicago developed such marked ability that they now hold world's records for distance, duration, eighteen-inch models, and hydro-aeroplane records for distance. One of these boys, who learned the principles of aviation by practicing with gliders and models under Mr. Stout, has constructed a full-sized machine and is now flying in exhibition—though not twenty years old. We believe that Mr. Stout, of all the aviation experts in this country, is best able to tell you how to construct, fly and really understand model aeroplanes.—The Editors.

LONG BEFORE man ever flew himself, he had succeeded in making models which would accomplish flights of a hundred feet or so, and from that time to this the construction of model fliers—in no sense to be called toys—has been closely associated with the progress of real man-flight, while to-day the problems of the bigger craft can be learned almost completely from the construction and study of these flying models.

With increasing interest in the larger craft, there has grown up a large following of both men and boys who are spending their time in experimenting and studying aeronautics through the medium of the miniature fliers and their parts.

The following pages are designed to start such experimenters along the right lines, giving simply and with as little mathematics as possible the principles which underlie successful flight and outlining the bases of experiments which can be followed to a further conclusion by those who wish to pursue the object further than this series takes them.

Whether the work is meant as a scientific study or is the mere amusement of the high school boy, the same principles are involved in the making of the models; and outside of the boy's fun in his model aeroplane contests and aero meets, the actual aeroplane experimenter can save himself much money and experimenting if he will learn the principles of construction and flight from these small and inexpensive models rather than from the bigger, more expensive and cumbersome machines.

Model Aero Clubs are being formed in the high schools of the various cities, and contests between the different schools are being organized which are teaching the boys many things that will be of great use to them later on.

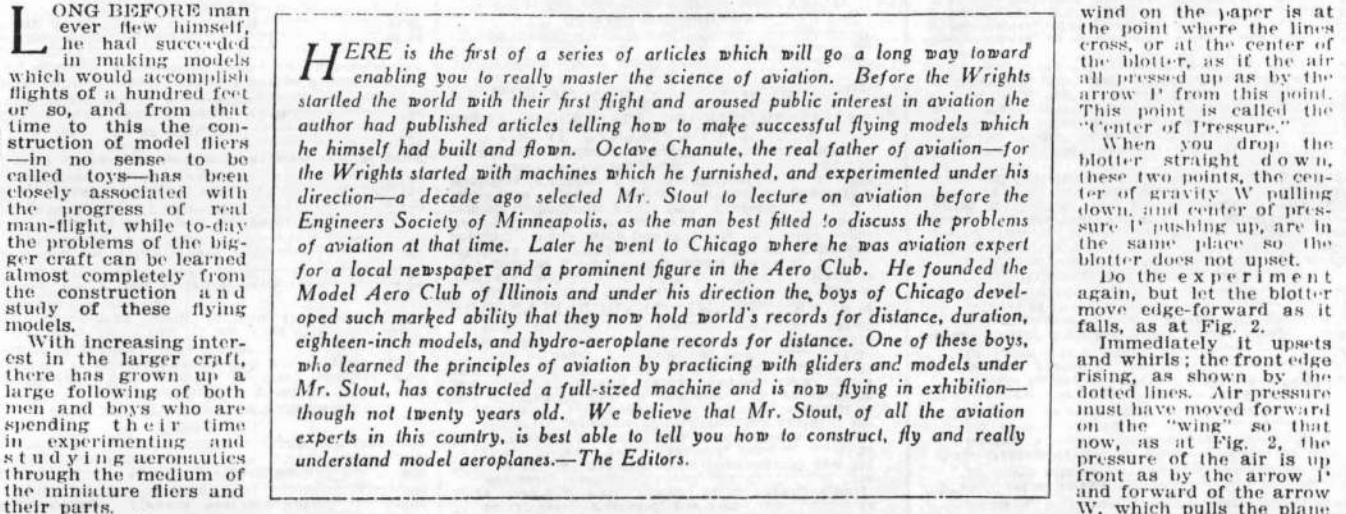
The war has developed the flying machine from a crude, impractical circus performing vehicle to a safe, reliable method of transportation, and many of the world's model records were developed from the writer's first instruction.

AN AEROPLANE may be well likened to a kite with a motor to push it instead of a string to hold it, the wind of its motion through the air supporting it instead of wind flying by it as with the kite.

A glider is an aeroplane which uses gravity for a motor, that is, it supports itself by sliding down hill over the air, the fact of its falling furnishing the power. Such gliders are made of all sizes and it was on a glider of their own making, after the type developed by Chanute, that the Wrights first learned to fly.

Model gliders, or I might say miniature gliders, can be cut out of stiff writing paper which will teach the principles we need first; so let's get some paper and scissors, with a ruler and pencil to do our measuring and marking with, and see what we can learn before we do any more difficult construction work.

By studying these toy gliders we can learn many of the terms we will use in our real fliers, and learn also how our later machines must be balanced to fly successfully.



BEND THE WINGS at a very slight "dihedral angle." This angle of the wings allows the air to slip off over the ends of the wings a bit in flight, which decreases its lift a little but it gives the machine a side balance which it otherwise would not have.

You can see that if a side gust struck one wing and lifted it, as its angle with the perpendicular increases its lift will lessen, while the lower wing being flatter to wind on the paper is at the point where the lines cross, or at the center of the blotter, as if the air all pressed up as by the arrow P from this point. This point is called the "Center of Pressure."

When you drop the blotter straight down, these two points, the center of gravity W pulling down, and center of pressure P pushing up, are in the same place so the blotter does not upset.

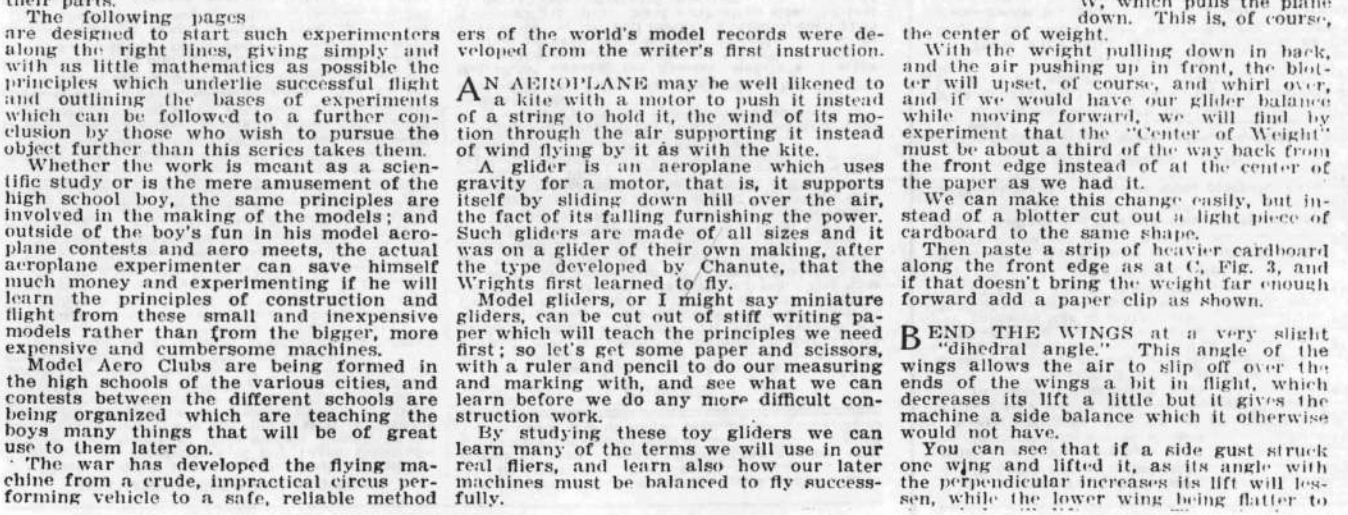
Do the experiment again, but let the blotter move edge-forward as it falls, as at Fig. 2.

Immediately it upsets and whirls; the front edge rising, as shown by the dotted lines. Air pressure must have moved forward on the "wing" so that now, as at Fig. 2, the pressure of the air is up front as by the arrow P and forward of the arrow W, which pulls the plane down. This is, of course, the center of weight.

With the weight pulling down in back, and the air pushing up in front, the blotter will upset, of course, and whirl over, and if we would have our glider balance while moving forward, we will find by experiment that the "Center of Weight" must be about a third of the way back from the front edge instead of at the center of the paper as we had it.

We can make this change easily, but instead of a blotter cut out a light piece of cardboard to the same shape.

Then paste a strip of heavier cardboard along the front edge as at C, Fig. 3, and if that doesn't bring the weight far enough forward add a paper clip as shown.



is to add a short stick, as at K in Fig. 4.

This stick K is fastened to the bend of the wings by small curtain tacks, letting it stick out front and cutting it off a little at a time until you get the weight right.

If you want, you can make it too short and add a big headed pin P at the front. You can vary the center of weight to meet the center of pressure by sliding the pin out and in.

In both of these last two gliders you will notice that you add weight at the front to bring the glider to balance.

A BETTER and more efficient way is to add a second surface at the back in the way of a "tail," or better still, a surface at the front for an "elevator."

The first monoplanes were of the tail behind type, as in Fig. 5, and here you see a toy cut entirely from one sheet of paper.

Fold the paper and cut both sides at once so each side will match the other. Give the tail a little down angle and at the front add a small weight of tin foil, or the like, held by a paper clip.

This kind of a glider will take some experimenting before you will get a good flight, and at that will not go as far as if you send the model tail first.

Types of tail first gliders are shown in the other sketches, Figs. 6 and 7.

The one shown in Fig. 6 has a small weight at the front, and a flat "fuselage," as the framework connecting the wings and tail is called.

Fig. 7 has the fuselage spread out a bit, and the elevator E given a little more dihedral than the wings, being bent up at a small angle from the wings also.

Model 8 is one of the early types of bird-like gliders, but rather inefficient.

After you have made and experimented with models of all these types, you will understand a great deal which cannot be explained in a book about their performances; and, indeed, to give dimensions for making a flier without having taught the rules of flight first, would only be waste of time.

So master the different reasons for the funny antics the models go through in the air.

If a tail first model starts to climb up at too steep an angle when you drop it, and then, losing its speed, falls down backwards, the elevator is too steep or too big.

If it dives to the ground nose first, tilt the elevator up a bit.

These are just suggestions. You will learn the rest much quicker than I can tell you, by making a paper glider series of your own, experimenting with this and that until you get one that flies right.

The Second Article in this Series, "More Gliders and Real Flying" will appear in the March issue of THE AMERICAN BOY.

of passenger transportation.

The aeroplane of to-day compares with the flying machine of a year ago as the curved dash runabout compares with the modern twelve cylinder car. The early type was in the experimental stage; the new is a developed, reliable machine.

Over five thousand aeroplanes or air-planes, as they are coming to be called, are flying daily in Europe in military work and thousands more are building and will be in use very shortly. This has been an air war and the importance of aeroplanes in military work was very much underestimated even by the most ardent enthusiasts before the war.

With the end of the war the commercial development of the aeroplane will begin.

It is certain that future travel will be by air. The world has never dropped a worthy invention but has adapted it to commercialism as soon as it became practicable. The aeroplane is now a practicable machine and will be put to use.

In the development of this new industry in America, millions of dollars will be made. Engineers of a new type will spring up and make names for themselves. Aeronautics and aviation are the greatest engineering opportunity for the younger generation to-day and he who wisely studies now the problems connected with flight is laying an early basis for future success.

This is not being written for small boys alone, but for men; for everyone who is interested in his development in engineering and as a means of stirring up interest in a vital new factor in travel.

Automobile engineers will do well to post themselves on this new subject; high school boys will find it the most absorbing of all studies. Let's get to work, then, and learn the new fun, the science of flight, the principles of aviation.

The quickest way to learn the first steps is by actually making flying models, not by watching others do it. This series, therefore, will deal with model aviation at first, describing how these may be built and how the present hold-

The principles are explained in Fig. 1.

If you take an ordinary blotter and draw lines across it from the corners as at A, the spot where the lines cross will be the center of weight, or the center of gravity of the paper, as you can prove by balancing the toy at this point on the end of a pencil. This is as if all the weight pulled down from this point, as by the arrow W.

Now, hold the blotter up in the air and drop it straight down, broadside on, as by the corner arrows. It will drop without upsetting or gliding, as when it goes down flat against the wind the pressure of the the wind will lift more. Thus the lower wing will rise and the upper one come down of its own accord until the toy is on an even keel again.

This is, in brief, the principle of the "dihedral angle" for side or "lateral" balance. That is, it keeps it from upsetting.

After balancing the plane on a pencil point to see if the center of weight is about a third of the distance from the front, and adjusting the paper clip weight until it is right, try the model.

To do this, hold it by the back end and drop it straight down.

If it is right, it will drop like a stone for some distance, then, as it gets speed, will straighten out and glide almost parallel with the floor for a long way, the length depending on how light it is and how well made.

If it turns one way or the other, instead of flying straight, bend the one wing tip or the other a very little. By experimenting for a morning at this, you will soon learn to make even this simple glider do what you wish.

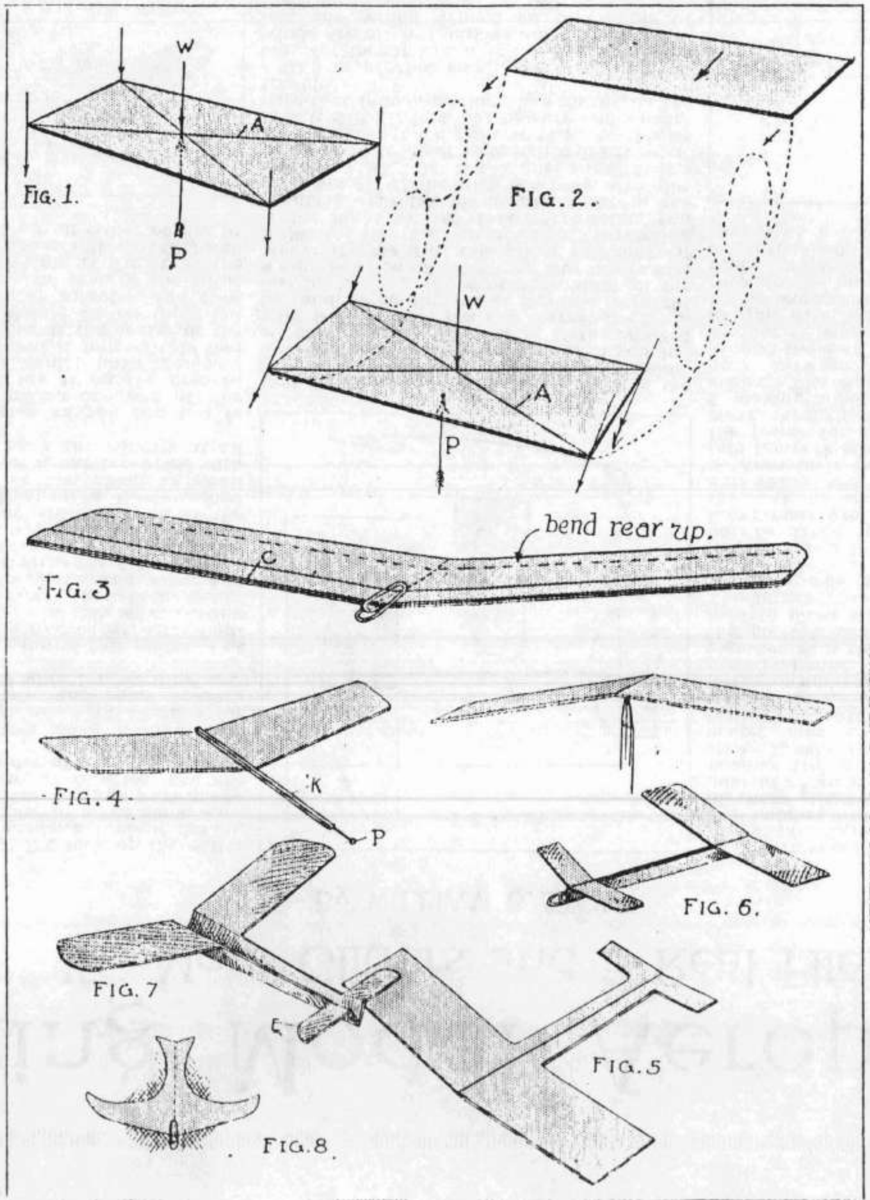
However, if you are going to do real experimental work, do not forget to write down in a note book what you learn from each day's work or each unusual glide.

It is only by a serious study of each step, without hurry to attack a full sized flier at first, that one can attain success with models. Without the underlying principles of flight firmly in your mind, you will never make a good flier, for no matter how much it may look like another which flies well, yet it will not do the same work.

The actual hand work of making a flying model is so simple that any boy of ten can accomplish it, but the designing of it is the biggest part of the work, and can only be done after study beforehand of what you are going to make.

The basic principle of balance in gliding we have already found out and that is that the "Center of Pressure" must be at the same place as the "Center of Weight."

Another way of making a glider instead of using the weight, as in Fig. 1,



Making Model Aeroplanes

II.—More Gliders and a Real Flier

By WILLIAM B. STOUT

OUR FIRST STUDY took up the easier principles of model aeroplane design, and showed how to make some simple paper gliders. If you have made these and flown them, as directed, you are ready to make a glider of a slightly larger type and try it.

This glider requires some medium stiff writing paper and a piece of bamboo for construction materials, and some scissors and a tube of liquid glue for working materials.

Figure 1 shows a plan of this glider. Cut the wings W from writing paper, after folding it in the middle. In this way, cutting from the fold, you will get both wings exactly the same in shape and area, and in their proper relation to the folded center line. The elevator E is cut in similar shape, but very much smaller, as shown in the dimensions. These two are connected by the sliver of bamboo B about a thirty-second of an inch square, or just about as small as you can split from a bamboo stick with a sharp knife, and have any rigidity at all to it.

Smear as little glue as you can use to make the paper stick on one end of this bamboo sliver, and lay it on the creased line of the wings W, which have been laid out flat, being sure that it follows this fold line exactly and comes at the center of the wings. The wood should be on top. Let this dry for five or ten minutes, and then glue on the elevator in exactly the same way. Be sure when this is dry, that the wings and elevator are exactly parallel and flat, i. e., not curled up on either corner or

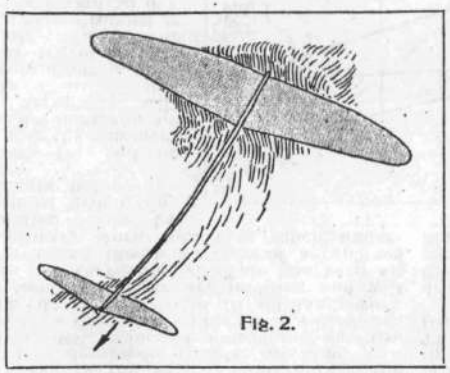


Fig. 2.

more flimsy on one side than on the other. By taking the paper between your fingers and twisting it, taking care not to make any creases in it, you may straighten the wings

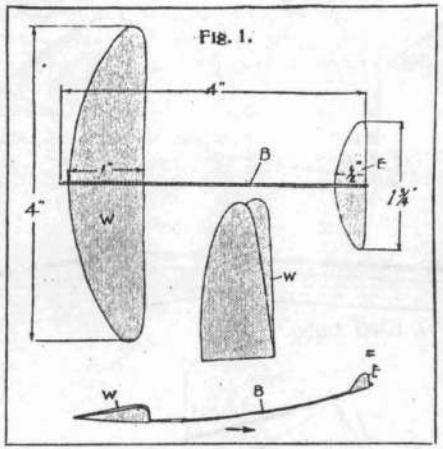


Fig. 1.

that the bamboo stick twists a little to the right and steers it around in this direction. Carefully examine your glider until you find which of these is the trouble. If the crooked stick is the cause, you can correct the trouble and make the model fly in a straight line by bending the wing to counteract the wrong position of the stick. But this would hinder the flight of this glider and make it inefficient so that instead of correcting wrong flight by any type of twisting, you should be careful to use the twist in the right place. If the stick is wrong, straighten the stick. If the right wing twists down, twist it about so that it will lift more. If it is the left wing, twist to make this so that it will lift less, but be sure and correct only that influence which has given you the trouble.

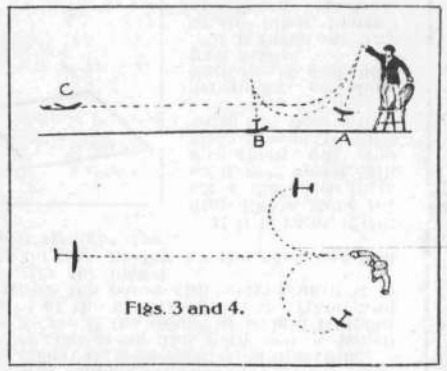
Gliders of this small size are practical only for indoor use, as outdoors, where the winds are often in circles and very disturbing, one cannot depend on the flights of these small models.

An Early Flying Model

BEFORE starting the construction of a real gliding aeroplane with power plant, it will be a good scheme to build up one of the earlier types of flying machines—possibly the earliest model which ever flew by actual power. This is shown in Fig. 5, and the main part of this is the power plant. The drawing shows the dimensions which you will need to follow, and there is very little to tell concerning its construction except follow the shapes of the drawing exactly.

in the drawings just at the top of the wings, the sticks themselves being shown at A. The notches which you see cut in the sides of these sticks A are spaced equally one-quarter of an inch apart. The two outside notches are to take the ends of the frame sticks L, which fit into them as shown. The center notch O is to receive the hairpin bent-wire shaft of your propeller as described later.

The second small sketch shows this cross-piece fastening. These cross pieces are tied together with the sticks L between them in the notches which you have cut, and are held in place with thread and liquid glue. The larger drawing shows how these look from the side when completed. The ends of the sticks L may be sharpened before they are fitted in these notches and need not be large to be strong enough. The lower ends are sharpened and thrust into the cork C, which you have already cut out. They are placed one-half inch apart between their inside surfaces and fastened into the cork with liquid glue. This makes the frame for the main part of the flyer. Next, through the cork C thrust a hairpin f, making a hole midway between the two sticks. The hairpin terminates in a flat hook between the sticks and is curled around the cork at the other end as shown, so that it cannot turn in the cork. Fit a hairpin wire hook at the other end of this frame work, but let the wire stick straight through the hole O. Over this wire string first a couple of glass beads and, after this, a quarter-inch square of tin. The bead is shown at b. This little tin piece should



Figs. 3 and 4.

not be over one-fourth inch square, with a small hole in its center, and can be cut with scissors from an old oyster can.

any flying model which you may build, wit the assurance that there is nothing bette

Flying the Model

HOLDING the cork C in the palm of you left hand, and restraining the sticks from twisting, turn the propeller F with th index finger of the other hand so that yo wind up the rubber bands R. Keep turn ing until the bands begin to double o themselves, and then turn until the whol length of the rubber band motor is thu kink-twisted. Your motor is then woun up and you are ready to start to fly.

Hold the top between the thumb and in dex finger so that the propeller cannot turr grasping the lower cork C in the left han between the thumb and index finger an holding the toy vertically with the propelle up. Release the propeller, and as soon a it is turning at full speed, up will g the model. You will be surprised how hig in the air this toy will mount and hov swiftly it will climb before it loses powe and drops easily to the ground again.

Having thus learned first the principle of flight with our gliders, and having nov learned how to make a power plant for a flyer, our next task is to learn how to fi such a power plant to an aeroplane whicl will fly horizontally, parallel to the ground This we reserve for the next story.

"How to Make a Tractor Monoplane," the third article in this series, will appear in the April AMERICAN BOY.

to any shape you wish. By pinching the bamboo sliver between your fingers, you can give it a slight concave appearance which will give the elevator an angle with the line to the wings, as in the lower sketch, Fig. 1. In other words, the elevator should strike the air at a slightly steeper grade than the wings, as shown in Fig. 2, where the dotted lines represent the continuation of the side line of the wings and elevator. You are now ready to try the model as shown in Figs. 3 and 4.

Flying the Glider

THE OPERATOR standing on a chair ready to drop the model down, elevator first is shown in Fig. 3. Hold the glider as steadily as you can, elevator down and suddenly release your finger. If correctly balanced, it will drop straight down until it gets to its flying speed, when the elevator will steer it out in a horizontal line, and it will fly clear across a good sized room at a high rate of speed, as shown at C in Fig. 3.

It is very probable that the first flight will not give you this result, but this should be no discouragement, as you will never get two flights the same on account of the different twist which will be given to the wings at each landing. By watching the flights, however, you soon know what to do to make the next flight better by judging from the performance of the last one.

If the model drops straight to the floor and lands on its nose, as at A, Fig. 3, then the elevator is not turned up at a steep enough angle. Before the next flight, therefore, you should bend the bamboo a little more and try again. If the model straightens out correctly to start its flight, then climbs in the air and falls backwards as at B, Fig. 3, then the elevator is at too steep an angle and the bamboo should be straightened out a little. The bending of the bamboo up and down in this fashion will cure all of the troubles which are found in a vertical plane as shown in Fig. 3.

Figure 4 is a top view of the operator and his machine, and illustrates the troubles which are met with in making the model fly straight. If, when you drop the model, it flys around to the right, it is proof that there is a drag on the right hand wing, or too much of an angle and lift on the left hand wing. Or it may be

The first part to make is the power plant shown in Fig. 5. First take a cork about one inch in diameter and cut it in two, down the middle. Then slice off the largest end from it, making this about one-quarter of an inch thick. One piece is shown at C in Fig. 5. Next cut out of straight grain spruce or pine wood, two sticks six inches long and about as big as the lead in an ordinary lead pencil. These are made square.

From a piece of bamboo fishing pole, cut two pieces about one-sixteenth inch square, or a little over at one end, six inches long and tapered at one end, where it should be as large as the small end of a toothpick. This can be done by holding the piece on a sharpened plane. Hold it upside down in the left hand, and draw the stick over the cutting edge of the plane toward you, holding it down against the blade with the thumb of the hand holding the plane. The larger ends of the sticks are cut as shown

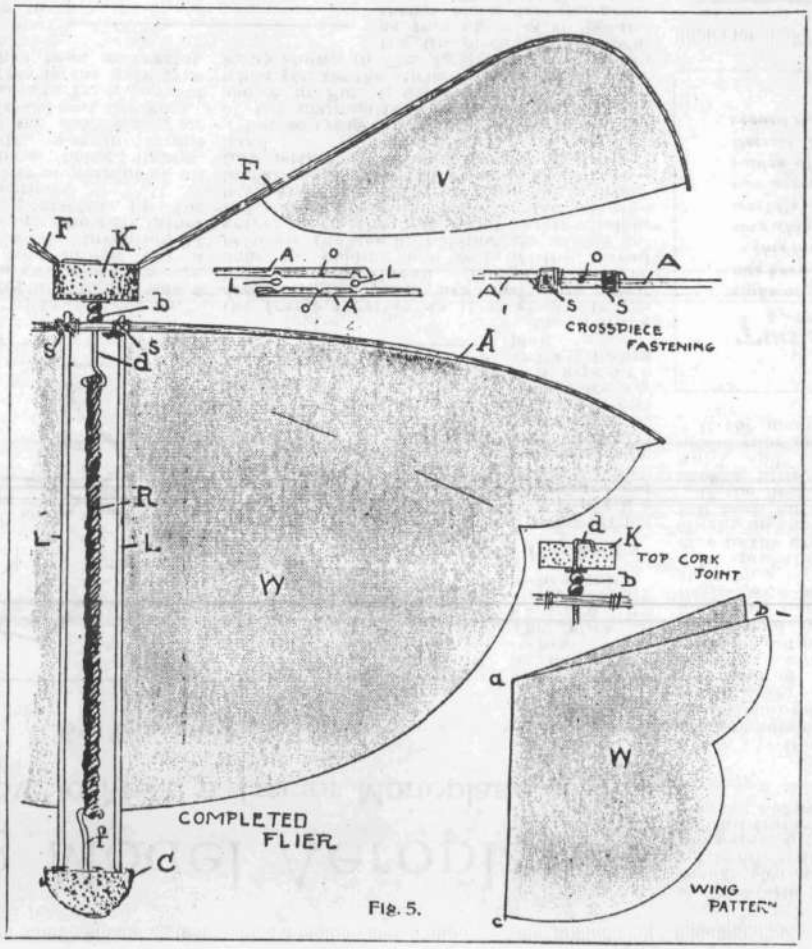


Fig. 5.

Your Aeroplane's Engine

NOW SLICE off the circle of cork K, three-eighths inch thick, and string this on to the hairpin, bending the wire over at d beyond, so that this cork will turn with the hairpin. Now, between the two hooks stretch a bunch of rubber bands it until you have a bundle almost one-fourth inch around. Adjust the length of the hook f so that these rubber bands do not pull, are not in tension, as they will get their power by twisting, not by pulling, and pulling may distort the framework if you get them too tight.

Now, in the top cork K fit the arms for the paper wings or propeller V. These arms F are made of bamboo seven and one-half inches long, split from a piece of fishing pole and are to be as big around as the sticks L which you made at first. By bending the bamboo between the fingers, you can curve these pieces to fit the curve shown in Fig. 5 and be sure that both pieces curve the same. Then cut two pieces of tissue paper just the shape of V in Fig. 5, making sure the two papers are just the same. You can cut them both out at once, if you wish, using a folded paper. Being sure that the curved sticks F fit the curve of this paper, smear these sticks with liquid glue and lay them down on the paper vanes V at the proper position and press them in place. When dry, these form the blades of the propeller, and they obtain their slant largely through the slack of the paper, as these curved pieces set practically verticle when the toy is not in action.

Between these arms A and frame sticks L are glued pieces of tissue paper W which might be said to form the wings of this aeroplane. Cut these wings out at the same time from folded tissue paper so that their area is identical, and glue them in place as you did the propeller papers V.

If all this work has been carefully done, and you have made the sticks light and balanced them so that the machine weighs the same on one side as the other, you are now ready for flight, after dropping a single drop of oil on the glass bead bearing.

By the way, remember this bearing, for it is a type used in practically every flying model, and *has never been improved upon to any extent*. You may use it in

Making Model Aeroplanes

III.—How to Make a Tractor Monoplane

By WILLIAM B. STOUT

NOW that we have learned the basic principles of flight and how the propelling part of an aeroplane is made, we are ready to make a real flyer. There are two types of aeroplanes, or airplanes, as they are called in England now, to distinguish them from seaplanes, which we have called in the past by that impossible word "hydro-aeroplanes."

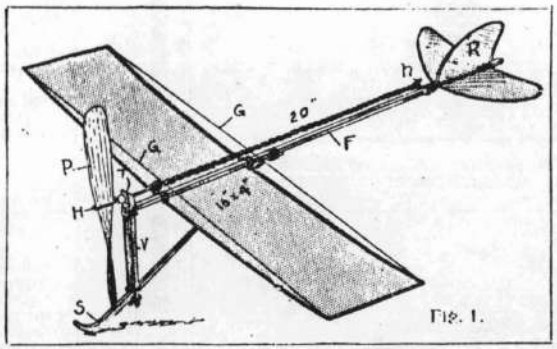


Fig. 1.

The first type of aeroplane to fly was a biplane, a machine with two sets of wings, one above the other, and braced like a bridge girder. This was the invention of Octave Chanute of Chicago, the real father of aviation. It was perfected by the Wrights under his directions.

The biplane is the most successful of all types for big machines, being lighter, stronger and faster. The war in Europe has almost eliminated the monoplane, or single wing type, so far as real use goes.

The monoplane, the second type, has but a single story wing. This is the only type of model flier which has been successful, for it is hard to make a biplane model with low enough head resistance to fly. It takes too much power to push it through the air.

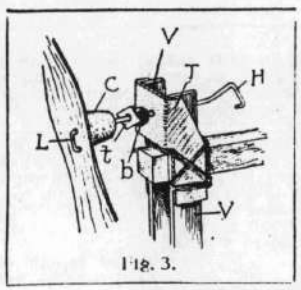


Fig. 3.

There are two main types of monoplane models, those with the propellers behind the wings, known as *pushers*, and those with the propellers in front, known as *tractors*. If it were not for one Chicago boy, I would say that the pusher type was far superior. This model experimenter recently doubled the world's endurance record for models with a tractor machine and so upset all the figures.

The trouble with tractors for models is the tendency to dive as the power runs out, and to turn instead of flying straight. The Hittle model—which made the record—has an automatic adjustment to get around this tendency which will be described when this model is brought up for discussion later in the series.

These should be about five inches long. The stick F should be about twenty inches long.

The Wings

THE STICKS for the wings are cut about ⅛ inch square and the main spar sixteen inches long. The end spars are ⅛ inch square and 4½ inches long.

In putting the frame together as it is shown in the drawing, the parts are tied with stout linen or silk thread. This can best be done by holding one end of the thread between the teeth, holding the sticks together with the left hand, and winding the thread about the joint in and out and back and forth with the right hand, bringing all up snugly and tying it securely before letting go of the fingers of the left hand.

Before tying the sticks V to the front end of the main spar F, cut out the pattern shown in Fig. 4, using light tin and then when you tie the sticks in place on the spar F, as shown in Fig. 3, you can also tie on the tin piece T as shown, as this piece is to be the thrust block for the aeroplane. The little lugs (a) at the bottom of the pattern of Fig. 4, curl around the back of the vertical sticks V which run up inside of the tin piece T clear to its top. This is the first joint on the frame that should be tied. The skid S is next cut and tied between these two sticks at the bottom end, its rear end tying to the main frame F, about eight inches from the front end. This skid stick should be a little more than ⅛ of an inch square at its lower end next to the curve, but can taper to ⅛ inch square at the other end.

The frame for the tail piece and rudder is formed of small stiff wires, preferably light gauge piano wire, and is shaped as shown in Figs. 1 and 2, being tied in place with thread. Be sure that a hook (h) is bent in the forward end of the rudder frame R at (h) to take the rear end of the motor strands.

to curve the wings upward slightly, just enough so that these threads clear the rubber bands without touching them. The tissue paper, of course, has been fastened on the tail frame and rudder frame with liquid glue as before described.

The Motor

NOW ADD rubber bands until you have a bundle about as big around as a lead pencil. Try the toy by winding up the propeller until the rubber band is full of its second row of knots and release the model with a slight start on a level keel.

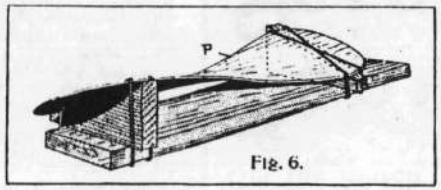


Fig. 6.

It probably will dive to the ground or climb up and then fall back on its tail.

If the first happens, slip the main wings back a little, if the latter, slip them forward, and keep experimenting until the model runs on an even keel.

If the model flies in a circle or tends to whirl over, increase the angle of the wings on the low side to give it more lift, and by a little experimenting you will soon learn what to do to make the model fly almost any way you want it to. When once the adjustments are made so you have obtained a straight flight drop, put glue on all of the tied joints and allow it to dry before you fly the model.

For best results, the tail at the rear should point down at an angle of about five degrees from the angle of the main wings.

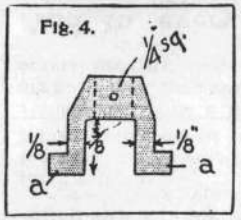
So much for the tractor model to launch from the hand as a beginning.

My next article will tell of a more pretentious model meant to fly greater distances. This, though larger, is no harder to make than the model just described, though you need the experience of the tractor model before going on to bigger machines, in order that you may know how to produce model flight.

THIS SERIES ON MODEL AEROPLANES, CONSTRUCTION AND DESIGN, by William B. Stout, has caused a tremendous stir among the model aeroplane clubs of America, as telling in a simple way the secret of correct model flight, which has been discovered by the foremost experimenters and present world's record holders in this line. Any model aero clubs or high school manual training boys who are missing this series are losing a knowledge of the principles on which will be based the world's next great revolutionary industry, that of the navigation of the air. The first two aeroplane articles appeared in the February and March issues. You can secure copies of these issues by sending ten cents for each issue to The American Boy, Detroit, Michigan. Mr. Stout's next article will deal with one of the present world's record machines and will tell you just how it was made.

Single propeller models of all kinds tend to be unbalanced, for the reaction of the propeller twist must be overcome by the wing and this twist varies with the amount the rubber motor is wound up. As the motor unwinds, it pulls less and so the balance is finally upset. Tractor single-screw models are fine for short flights in a vacant lot, however, and are the kind that had best be made first to learn how.

Fig. 4.



A Simple Model Tractor

A SIMPLE and successful tractor machine is shown in Fig. 1. This has a twisted wood propeller P at the front, with a rubber-band power plant fastened to its shaft like the one I described in the last article. This power plant runs along just over the stick that forms the main frame of the model, the stick shown at F.

The rubbers fasten to a wire hook on the frame at the rear, this hook being part of the wire tail frame, as shown.

The wings are rectangular in section with frames of wood and tissue paper covering. Of course one can make the wings of piano wire and silk if he knows how. But we haven't gotten that far yet and while learning how, we had better take the simpler way first and then the harder ways will be easier for us.

In front, the model is fitted with a skid to protect the propeller in landing.

Details of the construction and a plan are given in the other drawings.

Figure 1 is a perspective view of the model as it appears from above when ready to fly.

Figure 2 shows a plan view with dimensions.

Figure 3 shows a detail of the thrust bearing and a different propeller fastening.

Figure 4 is a pattern detail of the tin thrust block.

Figure 5 shows a different propeller fastening.

Figure 6 shows how the propeller is made and bent up.

In making this model, first cut out the main stick F. This is made about ¼ inch by ¼ inch, of very light pine or spruce.

In cutting the sticks, be sure that the plane edge is sharp, and by holding the plane upside down in the hand and drawing the wood over it toward you, the thumb pressing the wood on the cutting edge, you can make as thin sticks as you wish.

Cut two more sticks ⅛ inch thick and ⅛ inch wide for the front verticals V.

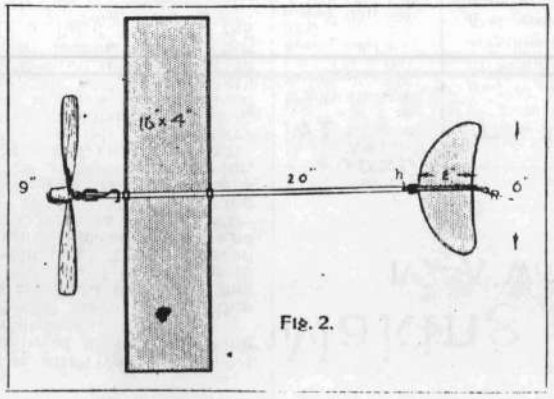
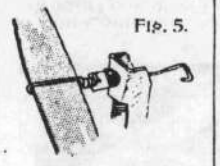


Fig. 2.

When this much is done, tie the wing frame together with thread as before. When it is finished, smear liquid glue on its lower surface and lay the frame down on a flat piece of tissue paper which has no wrinkles in it. When the glue is dry, the frame may be tied to the aeroplane frame F as shown. All of the tied joints should be smeared either with shellac or liquid glue to make them set hard, except the two places where the wings are tied in place.

Fig. 5.



The Propeller

FIGURE 6 shows how to make the propeller. For this, plane up a piece of wood one inch wide and less than ⅛ inch thick. By clamping the back end of the stick to the bench as you plane, you will have no difficulty in getting it this thin.

Soak this piece thoroughly in water, after *being sure that it balances at its middle point.* When fully soaked, tie this securely to a wooden form shown in Fig. 6. This is made of a flat stick with two wedge blocks (b, 1) of the same slant. This slant should be a little more than you want the pitch of the propeller to be. If these blocks are one inch long, they should be about ½ inch high at their high end and ¼ inch at their lower end. Face these blocks in opposite directions on the stick and tie the propeller in place as shown. Let it dry for a full day while tied in this form, or put it in the oven and bake it until thoroughly dry. When removed from the form, it will be found in permanent shape. A cork hub may now be glued to it, or a wire hub fastened around it as shown in Figs. 3 and 5. Any one of these ways is good.

The main shaft of the propeller, as shown at H, runs through the hole in the little tin piece T, but first slip on the wire (which, by the way, is a piece of ordinary hairpin), a square of tin, not over ⅛ inch on a side, and a glass bead for a thrust bearing. These are shown in Figs. 3 and 5 at (t) and (b) respectively. On the other side of the tin T, the wire terminates in a hook to which the rubber band motor is fastened. This consists of a number of strands of thin rubber bands connected between the hooks of the propeller shaft and the rudder. These rudders should be pulled snug but not stretched — just tight enough to hold the propeller and its head thrust bearing up against the tin T.

All that remains now is to stretch the guy wires, or rather threads, G. G. between the wing tips

will give the proper pitch for this model. Later I will tell more of propeller making and also of wing making.

The propeller should have blades thin enough so you can see light through them, and with strips of silk glued to the tips to keep them from splitting. The hub need not be over one-eighth inch diameter and a wire hairpin, bent back to prevent slipping, forms the shaft. After running through the brass bearing B it ends in a hook as shown. The rubber band motor, three strands of three-sixteenths inch rubber bands or three strands of ordinary binders looped together, furnishes the power. Do not stretch these rubbers. They should hang loose when unwound. With this length and diameter, it will take a long time to wind the rubbers without a winder, but turn until there is a third kink for the whole length.

To prevent the main stick buckling under the pull of the rubber bands, fit an aluminum or thin tin loop L just back of the main wings, as shown, to hold the stick steady. It is surprising what this loop will do.

You are now ready for your fun. You will probably break the first one within a short time, but make another, for only by making many, and each better than the last, can you hope to make a model that will really fly as this one should.

The next of Mr. Stout's articles, telling how to make a twin screw speed flier, will appear in THE AMERICAN BOY *for June.*

Making Model Aeroplanes

IV.—A World's Record Tractor Monoplane

By WILLIAM B. STOUT

THE MODEL described below was made by Donovan Lathrop, of the Illinois Model Aero Club, and is credited with a duration record of five minutes and a distance of four thousand feet. The original machine, which made this record in the first contest which it entered, was lost to sight after it had been in the air, according to the official judges, for five minutes. Although a reward of twenty-five dollars was published in the Chicago papers during the following week, no trace of the machine has been found. Duplicates have been built, however, and are wonderfully successful.

MODEL aeroplanes are tricky things. Some do one thing and some another and you can never depend on the same model doing the same thing twice. However, you can depend on their doing the things they are designed to do; provided you design right.

There are two things that work against the model or the big aeroplane. These are weight and "head resistance." In a slow machine, weight is the big object and resistance to the wind is of small account. In fast machines, wind resistance is the big factor and weight, within certain limits, is of small account.

The first model aeroplanes were built with speed in mind. Model makers wanted their models to "hurry up and get there before the rubbers unwound" and fitted short, stiff rubber motors and slow speed propellers with steep pitch. Some of these models—and I will tell you how to make one next—would make as high as thirty-five to forty miles an hour and went several thousand feet.

The trouble with these models with a single propeller was their tendency to turn over by the twist of the blades on the air, so they were made with two propellers with rotation in opposite directions. Thus each "Prop," as the boys call them, neutralized the twist of the other and the machine flew straight.

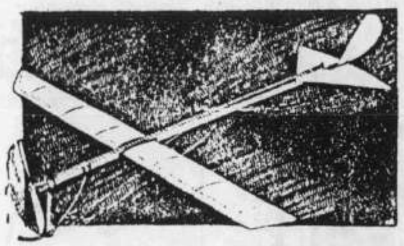
When all the model records were held by a machine of this type, the big machines were mostly flying with one high speed propeller and those using slow speed propellers used two.

When model makers tried to make the "tractor" or "propeller-in-front" type of model with one propeller, they met a new difficulty from the strong stream of air well, so finally it dawned on them that the secret was the long rubber band and small high speed propeller which gave little reaction of the wings to upset the model and which had but very little of the wings in the "slip stream" of the "prop" as the wings were set far back. Hence the model did not tend to dive abnormally and made some very excellent flights. This was the basis of a new series of experiments and a new interest in model experimenting.

In the slow type of model the tractor idea can be used and head resistance is not so important as weight reduction. All parts of the slow tractor must be brought down to minimum size and made very carefully as to balance.

The best way to learn of this type is to build a model. The drawings show the record holder which was developed by Donovan Lathrop, and which made the five-minute flight and four thousand feet distance.

This has first, the fuselage or main frame F, which in this case, is a straight pine stick thirty-six inches long, one-eighth inch wide and one-fourth inch deep. The wings W are made as shown in the small cross section with two cross spars one-sixteenth by one-eighth inch of light pine thirty-three inches long and one and one-half inches apart. The wing ribs are curved up of bamboo about one-thirty-second inch square. The outline piece is one-sixteenth inch square of bamboo. These are bent after heating in a lamp or alcohol flame. The ribs are bound to the main spar with thread, and then the whole frame shellacked, or glue can be put on the joints. The wing frame is then smeared lightly with liquid glue and laid on a piece of thin tissue paper which thus sticks to it flat. When dry, the edges



If You Could See Air, This Is the Way It Would Look With This Model in Action.

sent back by the screw. When the model was fully wound up, the screw turned faster and stronger, and when it unwound got continually weaker. Thus, if the machine was balanced to fly level when the rubbers were fully wound, it would dive as the rubbers unwound and always strike on its nose with full force.

If the model was arranged to climb steeply at the start, it would level off after getting to a certain height and then dive, but always on its nose. It also had a tendency to swing to the side opposite to the propeller pull and upset at the start or swing in a circle, so that on the start those experienced in models steered clear of the tractor models with single screw and built twin screw "pushers" with the propellers behind so the wings were not in the draught.

A New Departure in Models

ABOUT this time a certain young man named Hittle, of the Illinois Model Aero Club, came to one of the meets with a small tractor model. He had a scheme for turning the rudder as the rubber unwound and a *small high speed propeller on long rubber bands.* On his appearance with the model, the boys admired the work, but shook their heads at his lack of knowledge on tackling this type of design. They were surprised when the model began to win races and to show stability. It did not do the things which they thought this type of model should do and even Hittle hardly knew why. When he disconnected his rudder scheme of steering, the model flew as

are trimmed to the frame, and the other side covered. Application of thin spar varnish or banana oil will make the paper stiff and set the shape. Be sure the wing is balanced, as you have learned on former models which I have described.

The wing clip C, shown in a small lower sketch, fastens to the front spar and centers the wing from sliding sideways. The wing is flexibly held to the frame stick by a rubber band R.

The Framework

THE FRAMEWORK of the tail at the rear is made of thin bamboo, bent as shown, and covered with tissue. Its construction is too simple to need explanation other than the dimensions. The front end of the rudder frame can be bent in a loop or if made of light wire can be made into a hook H for the rear end of the rubber motor.

The skid K at the front of the frame is fastened as shown, and is of small rattan or bamboo. It is mainly to protect the propeller in landing.

At the front of the frame stick is a small brass piece B tied to the top of the stick and curving up front, as shown, with a hole big enough for a hairpin wire, through its end. This is the bearing for the main shaft.

The lower left sketch shows how it is fitted.

The propeller is cut like a small thin windmill from a stick ten inches long, one inch wide and five-eighths inch thick. This

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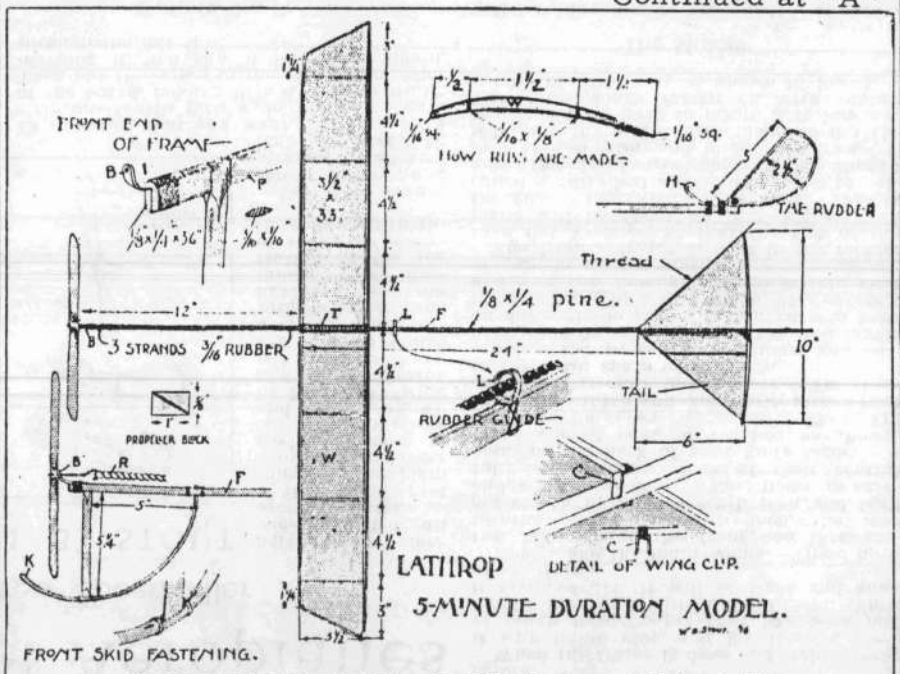


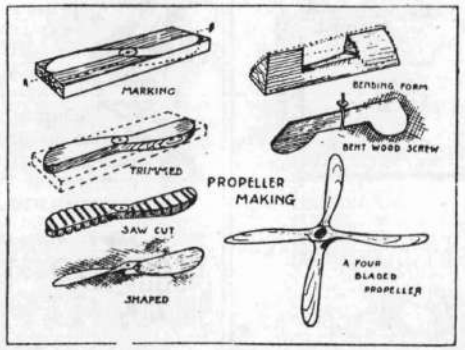
This Model Is Not Hard to Make; the Difficulty Comes in Balancing It.

Making Model Aeroplanes

V.—A Twin Screw Speed Flier

By WILLIAM B. STOUT

THE aeroplane is the eye of war. The past year has perfected new types of flying machines so that to-day aviation offers to the young the greatest engineering opportunity available in America. These new machines, some of them carrying as much as twenty-four hundred horsepower in motors, and three tons in useful load, are being used in raids two hundred miles inland from the firing lines. Others for scouting are traveling at one hundred and sixty miles an hour.



Yesterday England was two hours from the continent and her fleet was ample protection for her shores. To-day one flies to France in the time you would take to walk six blocks, and thousands of planes soon will be flying over the channel commercially.

America to-day is nowhere in aviation, though we developed aviation first. We have not a single military cross-country aviator. We have but a few who can fly at all. We have machines woefully inefficient and antiquated, only allowed to be used in schools abroad, and then only after being fitted with European motors. There is need for the development of real planes to fit some of the fine motors that we soon will have available, when the new generation of Americans here finds its opportunity.

America should command the air. It should have a fleet of tens of thousands of planes in peace uses, but available at any minute for protection. It is up to the young of America to perfect air travel, and there is no better way to start study than by model making.

Emil Laird, of the Illinois Model Aero Club, and Harry Wells of the same club, after two years' model making, built full-sized planes and taught themselves to fly. Several others of the same club will be flying this summer. Boys of this type who add to their model experimenting the advantages of college training are to make the big airmen of the next generation.

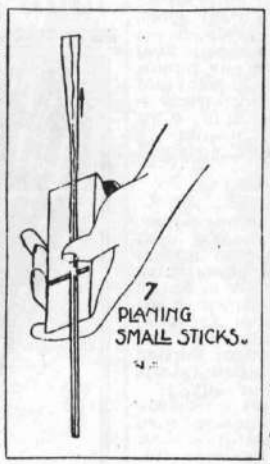
nois boys and since widely copied all over the world.

About the first thing to explain about these larger models is how to cut the small sticks and this is shown in Fig. 7, showing how a block-plane is held in the hand and a stick pulled over it until the proper size and lightness is obtained. The illustration at the top of the page shows the propeller making.

For the frame, select a dry and straight-grained pine board as long as the stick that you want, and saw off a strip one-fourth inch wide, the full length of the board, holding it in a vise vertically. Then put this piece in the vise again, after marking it, and saw it lengthwise again, through the flat side.

Cutting the Frame

WHEN THIS is done, take the plane in your left hand, with the thumb over the cutting blade, and slip the stick between the blade and your thumb so the thumb can press down as you pull the stick toward you and thus shave off a strip. Turning the stick as you cut, from one face to the other, you will have no trouble in cutting sticks as thin as you need.



The main frame, as you see in Fig. 1, is a triangle, formed of two long side sticks F, nine-thirty-seconds inch wide by three-thirty-seconds inch thick and forty-three inches long, separated by four thin cross-sticks, the longest one, C, being nine inches long. These are one-sixteenth inch square and fastened across between the side sticks by pointing their ends to a sharp wedge, inserting them in a split in the side sticks and binding them with thread, as in Fig. 3. A drop of glue on the wedge ends before they are inserted holds them tight.

The stick C is fastened between the side sticks about one inch in from the ends, which leaves room to tie on the thrust bearings. These are shown at T and are made by taking a inch in diameter, planed down as described before.

When the frame is done and right, smear it with liquid glue, and lay it on a piece of tough tissue paper that has been just barely dampened with a damp cloth. When it becomes dry, it will be tight and snug on the frame.

Next make the main wings. These have two main spars, the front one three-sixteenths by one-sixteenth inch, the rear one-eighth by one-sixteenth inch and both eighteen inches long. Plane these up carefully and balance them at their central point on the back of your knife blade.

Fit curved ends of bamboo as shown, and then tie seven ribs across. These are of bamboo three and one-fourth inches long and one-sixteenth inch square. Tie them to the main spars as shown.

When the wing frame is done and balanced, smear it with glue also, and lay it on damp tissue paper, taking care to keep it smooth. Thus the wings are covered, and you can now give them a thin coat of banana oil for finish.

The front elevator is bent in the middle to a flat V-shape, so that the tips of the plane will be about an inch higher than the center line where it is bent. This is called a "dihedral angle" and helps to balance the front. A rubber band slipped over the elevator and under the frame F will hold the elevator in place so flexibly that it will be hard to injure it in landing. The main wings fasten on with rubber bands the same way as shown in Fig. 2.

The Motors

THE rubber motors are bundles of three-sixteenths inch wide rubber strands, enough used to make the bundle about one-fourth inch in diameter. These are fitted to a small hook (h) Fig. 4, at one end, and at the other slip over the hook H of the propeller shaft shown in Fig. 3. They should not be stretched but allowed to hang several inches loose when unwound. It is the twist of the bands, not the pull, that gives the power. To have them pull would only twist the frame. Rubber binders looped end-to-end can be used for experiment.

The hooks (h) at the front end, of course, are hooked into the eyes of the front wire E.

A separate diagram, Fig. 8, shows about propeller making. The cut propeller type is shown in the left column of this drawing. First take a stick of pine nine and one-half inches long, two and three-fourths inches wide and three-fourths inch deep. Draw a line down the center of the flat side. Draw a one-fourth inch circle at the center of the piece. Mark off the blades of the propeller, one on either side of the line a-b. This will make the dimensions of each block from which a blade is cut three-fourths by one and three-eighths inches in section. With a saw and knife, you now cut the piece to the shape of the sketch called "trimmed" in Fig. 8.

The next drawing called "saw cut" shows how the wood of the blade is cut away between the dotted lines shown, and from both sides of the piece, so that but a thin section of wood is left between the cut-away parts. A sharp knife will then trim off the three-cornered blocks that the saw cuts have made easy to remove, and the propeller will look like the lower drawing, and will be of the right pitch and area for this model. A little experience will lead to excellent propellers by this method. Make the blades thin enough, however, so that you can see light through them when held up to the window and glue a thin strip of silk along the outer edge to prevent splitting.

Each propeller should be carefully balanced at its center so it will run true. The two propellers should, of course, weigh just the same and turn in opposite directions—that is, face opposite ways on the machine.

A small hole through the center of the propeller, made before it is cut at all, by the way, takes the hairpin wire shaft T. This wire propeller shaft is bent over and back to keep the propeller from slipping.

The other drawings of Fig. 8 show how to make a bending form for another type of twisted wood propeller, which is good for toy models but not for record winners, and also the arrangement of two of these propellers we have just made, crossed into a four-bladed screw. This is of advantage only on machines where diameter is limited.

Now unhook the hooks on the front end of the motors, and hook these to the hooks on your egg-beater winder. Turn the crank until the bands have acquired their third kink for the full length, replace the hooks and your model is ready to let go.

By this time you should be quite a proficient model-maker, and ready to tackle the loop-the-loop hydro for next time.

In making models, the greatest requirement is patience. Patience to make things accurately and weigh them up to balance right, and patience to take care in every operation. If model-making teaches you to take pains, it will pay for all the effort you put into it.

The drawings show a speed aeroplane model, the fastest type ever built. It is fitted with two large high speed screws turning in opposite directions, driven by rubber band motors along each main stick of the frame F. The motors are shown at M. This model has flown two thousand eight hundred and seventy-five feet distance.

Figure 1 shows the model as it will look when done, before the rubbers are wound up. Fig. 2 is a top view or plan of the model, while Fig. 3 gives the details of the bearings for the propellers and how the cross stick C is fastened to the side frame members F, by slit and thread binding.

Figure 4 shows the front end of the frame, showing the binding and the way the end wire E is bent to take the hooks from the rubber band motors after they are wound up.

Figure 5 explains the wing construction, and shows how the ribs are bound in place to the spars, and how the bamboo end-piece fits on.

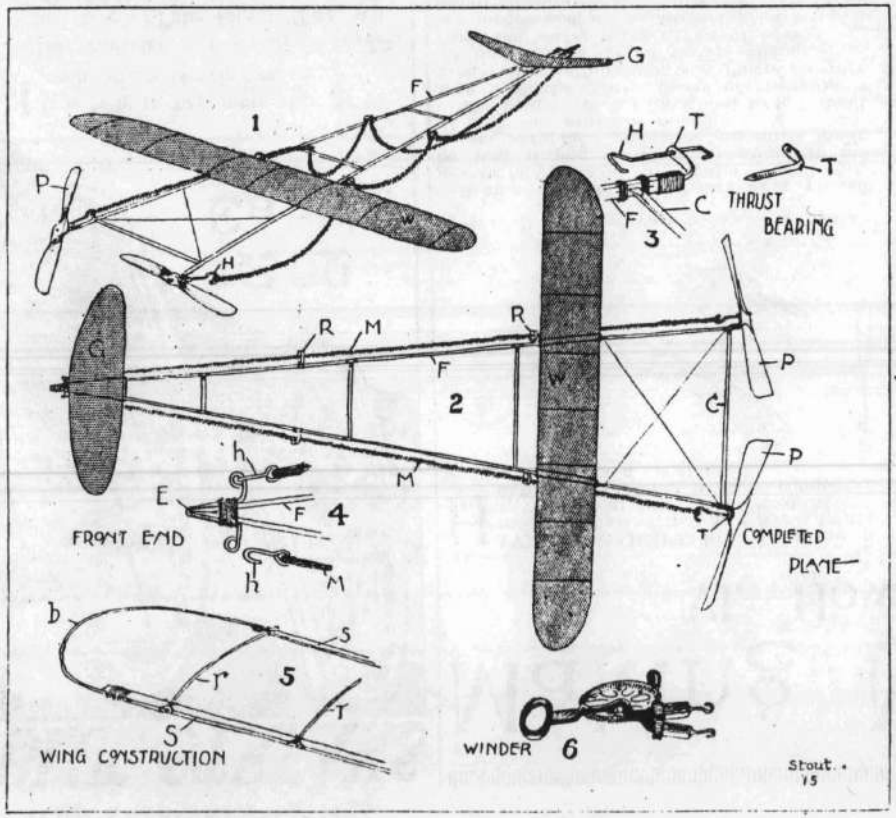
Figure 6 is a drawing of the egg-beater winder, developed by the Aero Club of Illi-

piece of brass wire, or a brass nail, hammering one end flat and drilling a one-sixteenth inch hole through the flat part next to the end with the sharpened handle end of a file, if you have no small drill. Bend the piece then at right angles a half-inch from the hole, and bind the rest to the side of the sticks F with the flat end of the "L" out as at T, Fig. 3. It is through the hole in T that the propeller shafts will run.

Along the sides of F, at the points shown, bind light brass curtain rings, R, for the rubber motors to run through. These are necessary to prevent the rubber bringing a side strain on the frame from sagging when partly wound up.

The front end of the frame is tied together in a point, but includes in the tying a wire E, bent as shown, with the small eyes, a half an inch out from the frame sticks F, to fasten the rubbers to. This you see in Fig. 4.

In making the wings, make the elevator or front wing first. This has a bamboo frame. Split this from a fish pole, and after drawing accurately on paper the size and shape of this wing, which is nine by two and one-half inches in dimension and oval in shape, bend the bamboo to fit. In bending bamboo, always heat it over a lamp or a match so that it will bend freely and take a permanent bend. The bamboo for the elevator is just over one-sixteenth



Making Model Aeroplanes

VI.—How to Make a Model Seaplane

By WILLIAM B. STOUT

HAVING LEARNED how to make a model aeroplane that will fly, it is not a very great task to build a hydro-aeroplane, or what is more commonly known to-day as a "seaplane."

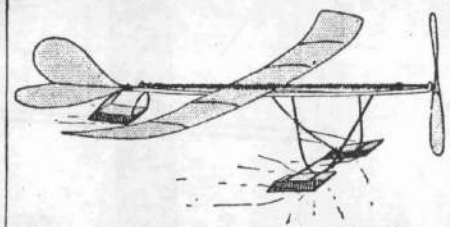


Fig. 1. Prospective View of Model Seaplane.

Seaplanes and flying boats have played a very conspicuous part in the present war, so that if one would really complete his model aeroplane education he must make at least one seaplane model.

The model which I am about to tell about was made by Ward Pease of the Illinois Model Aero Club and was flown recently off a meat platter of water—rising from the water after a run of only six inches—before a banquet of five hundred automobile engineers of Detroit. After leaving the water, the small model looped the loop over the heads of the banqueters in real professional style.

Figure 1 is a perspective view of this model seaplane, giving a general idea of its arrangement.

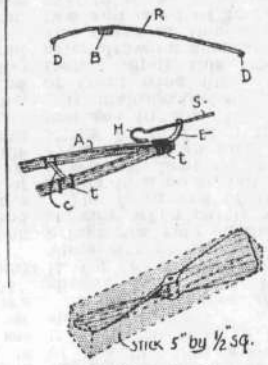


Fig. 5. Construction of Parts.

Figure 2 is a top and side view of the 'plane, showing the frames which hold the float.

Figure 3 is a detail of the main frame of the machine.

Figure 4 shows the framing and structure of the wing which is shown in section in Fig. 5. Fig. 5 also shows the method of fastening the propeller bearings and also how the propeller itself is cut from

The framework for the floats is made of bamboo, split from a fishpole and bent in the heat of a match. This wood is less than one-sixteenth of an inch in diameter, being split off very fine. It is formed of loops, one from either side, each loop being three inches deep, the ends fastening to the frame side three inches apart and two and one-half inches from the front end.

These sticks cross each other slightly below the framework, being tied so the bends of the "U" are two and one-half inches apart where they would rest on the ground. Two cross-sticks A, each five and one-half inches long are tied to the lower part of the "U" crosswise to support the float F. All of this may be clearly understood from the drawings.

The floats are made as shown in Fig. 6, the dimensions being given on that sketch. They are made of ordinary writing paper and pasted together very carefully, after which they may either be varnished to make them waterproof or dipped in melted paraffin wax. This will stop all leaks and

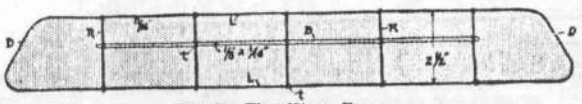


Fig. 4. The Wing Frame.

make the paper waterproof. The cross-sticks are then tied to the floats F by wrapping with black thread held in place by shellac. The rear float F is fastened by two smaller bamboo loops shown in the drawing. The side view of Fig. 2 shows the angle at which these floats should be set.

The tail part T is bent in outline from a piece of bamboo a little less than one-sixteenth inch in diameter or square. This is bent over a burning match so that it will keep a permanent bend after it cools.

The rudder or directing vane V is shown in the side view of Fig. 2, this being three and one-half inches long and one and one-half inches wide at its widest part. The ends of the wooden loop, which form its frame, are tied to the rear end of the main frame A, as shown in Fig. 2.

The elevator frame or tail frame T is tied under this rudder frame V, as shown. Before tieing these in place, they should be smeared with glue and laid on a piece of very light tissue paper. When the glue is dry, the paper may be trimmed off around the edge of the frame. This will form the tail and rudder surfaces in the simplest manner.

A wire hook H, Fig. 2, is tied just forward of the tail frame to take the rear end of the rubber band motor.

This motor will run between this hook and the hook H at the front end of the machine on the propeller shaft.

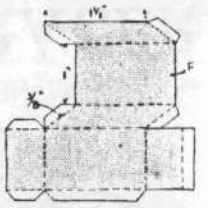


Fig. 6. Float Pattern.

Making the Wings

THE wings for this model are very simple, but must be balanced with an unusual amount of care. First, there is the main wing spar B, twelve inches long, one-eighth inch wide and one-sixteenth inch thick. To these are fastened five cross-ribs three inches apart, these ribs being two and one-half inches long, one-thirty-second inch square and bent as shown. Front and rear wing spars L are of bamboo one-sixteenth inch square, while the ends of the wings D tie to the ends of these front and rear wing spars and are of bamboo one-thirty-second inch square. All this bamboo is bent under heat at the point where bending is to occur.

The wing frame is put together by tying with silk thread, a drop of shellac or glue, making the joint permanent after tying. All of this is shown in Fig. 4, although the wing section is shown in the upper section

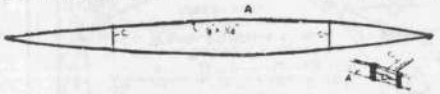


Fig. 3. Main Frame Construction.

of Fig. 5. This wing is fastened on top of the main frame by means of a rubber band looped under the frame over the wing and down under the plane again, forming a flexible connection which will save many a broken wing in landing and which also allows a wing adjustment for varying flight.

The exact position of this wing can only be found after experiment.

a square stick of wood.

Figure 6 is a pattern for the floats which can be enlarged, cut, folded, and pasted together to form the size of float needed.

The main wings of this machine measure eighteen by two and one-half inches, while the main frame is twelve inches long and one and one-fourth inches wide at its widest part. The propeller is five inches long, which figures give you the general idea of the size of this machine.

Making the Frame

FIRST, plane up some pine sticks one-eighth inch wide by one-sixteenth inch thick and about twelve inches long. Tie these two together at the ends and spread the frame apart in the center, as in Fig. 3, by fitting small sticks C crosswise through little knife cuts in the side of the sticks, as in the small sketch. The main sticks are shown at A with the little slots through them, through which these cross-sticks C fit. These sticks are arranged three inches from either end and are finally held in place by a drop of glue. By binding the sticks A on either side with a few turns of thread, splitting will be prevented.

At the front end of the frame A is a piece of curved sheet brass E, bound in place at the peak of the frame, as shown, and with a small hole at its upper end to take the hairpin shaft S, having a hook H at its rear end as shown.

The thread bindings are shown at (t).

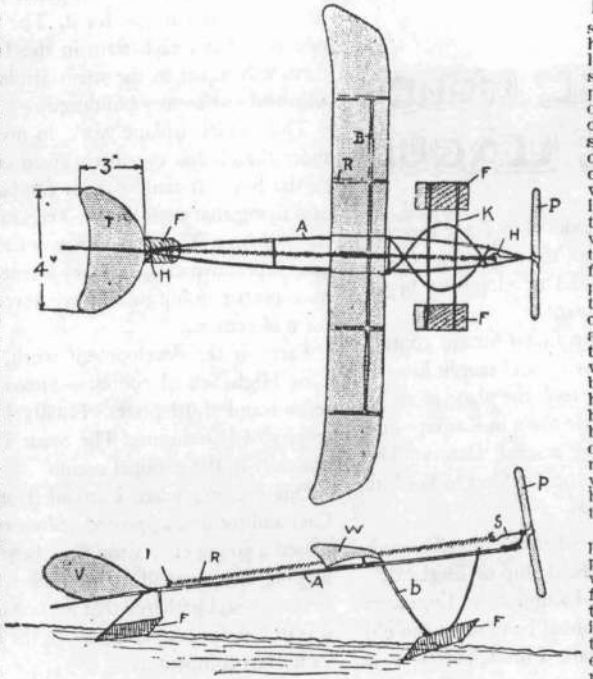


Fig. 2. Plan and Side View of Seaplane.

The Propeller

THE lower sketch in Fig. 5 shows how the propeller is cut from a stick of soft pine or basswood one-half inch square and five inches long. The hole for the shaft XX should first be made with a hatpin or a small drill. This should be on the line drawn diagonally from corner to corner on one face of the stick, and on a line crossing in the opposite direction on the other side of the stick. By cutting away the wood between these two lines, leaving only a very thin section and tapering it toward the center, you will form a propeller, as shown in the drawing, of just the proper pitch for the best lift. In mounting the propeller, thrust the hairpin shaft S through the hole in the propeller and on the opposite side turn it around and back so that when the shaft turns the propeller will have to turn with it. For efficiency's sake, slip a brass washer, formed by knocking the head off a brass tack, onto the shaft S between the propeller and the shaft bearing E, Fig. 5. Two strands of one-eighth inch rubber will drive this model, though if you cannot get this you may loop together ordinary rubber binders until you get sufficient to form your power plant.

This is the last of a series of six progressive articles on model aeroplanes. If you have experimented with each of the different models, from month to month, as the directions have been published for making them, you will now understand the principles of aeronautics well enough to go on with your experiments and to make some original models.

Prize Contests For Model Aeroplanes

THE readers of THE AMERICAN BOY who have followed Mr. Stout's lessons in the building of model aeroplanes will now be ready to participate in the monthly contests for model fliers under the auspices of the Aero Club of America. Cash prizes are awarded each month from the National Aeroplane fund to the winners.

If you wish to enter your own model and to compete for the national duration or distance record, you may do so, no matter what part of the country you may live in. The first thing to do is to call a meeting of boys in your town interested in model aeroplanes and to form a local aero club. Then write to the Contest Committee of the Aero Club of America, 297 Madison Avenue, New York City, and request entry blanks for your club. The Aero Club of America will appoint an official to judge the local meet and to measure distances and duration of flights.

The official appointed by the Aero Club will make all measurements with a steel tape and the duration flights will be timed by an accurate stop watch. The General Regulations of the International Aeronautic Federation will be used to govern any points in dispute. The same model may be entered in any number of events, but it cannot be entered by more than one contestant. Each model is allowed three trials, and the best flight is counted. Only six members of the local club are permitted to enter the contests each month. They will be selected in each case by preliminary flights.

The contests are held monthly for seven months of the year, and should be scheduled after the tenth day of each month. Cash prizes of thirty, twenty and ten dollars are awarded each month to the winners whose fliers are driven by mechanical power other than that of rubber bands. This includes motors driven by air, gasoline or steam. Cash prizes of twenty-five, fifteen, ten and five dollars are awarded to the winners of the events in which rubber-band motor-driven fliers are entered. Contests for both classes of aeroplanes are held each month for seven months. The prizes are awarded to the winners of the flight and endurance records for that particular month, irrespective of the local clubs to which these members belong. The Harry S. Villard Trophy cup, a handsome silver loving cup, is warded annually to the local club whose members collectively have made the best showing in the seven contests. This is determined by a point system from the individual scores. When the cup is won three consecutive times by any club, it becomes the property of that local organization.

The contests open with the month of April and continue through the month of October. If you wish to participate this fall, organize your local club at once. Write to the Contest Committee of the Aero Club of America, 297 Madison Avenue, New York City, so that your local official to act as judge may be selected and approved in time to take part in the August flights. The August and October contests are for distance; the September flight is for duration.

Science In the Selection of Wall Paper

THE NEXT TIME your father is picking out wall paper you can make a suggestion worth while if you remember that light papers reflect light while dark papers absorb light. A test of common wall papers of different colors showed that white paper absorbed only thirty per cent. of the light that fell upon it, chrome yellow absorbed thirty-eight per cent., orange fifty, yellow sixty, pink sixty-four, green eighty-two, brown eighty-seven, red eighty-eight, blue eighty-eight, chocolate ninety-six. A room may be made lighter without changing either windows or lighting fixtures by substituting colors that reflect light for colors that absorb light.

I HAVE already told about the first model club I got together in St. Paul in the early 1900's, and about the beginnings of the Illinois Model Aero Club. Later model development began to mean more than just a kid's experiment.

Matty Laird, one of the boys in the first Chicago contest, built himself a real plane when he grew up and taught himself to fly it at Cicero Field in Chicago. He took the plane to an oil man he knew in Wichita—a little prairie town in Kansas—and Jake Molonieux backed him in starting a small factory. The success of the Laird Swallows brought other builders to Wichita in the expansion I've already mentioned.

My boys in the Chicago club finally held all the model records internationally, except one—the Wakefield Cup of England.

As early as 1915 the Detroit Society of Automotive Engineers asked me to speak on aviation at its annual banquet at the old Pontchartrain Hotel. To enliven my talk, I brought four boys over from the Chicago Model Club. The youngsters flew their models from the speakers' table at the end of the room out over the audience and, with twisted rubber triggers, dropped paper "bombs" on the crowd.

The last model, a flying boat with floats, took off from a big meat platter full of water on the speakers' table, and flew the length of the room.

Thus was model aviation introduced to the automobile executives of Detroit. This evening also served to introduce me to Detroit as primarily an airplane man. It might be said that at that meeting aviation got its start in Detroit. Not long after, Fred Alger bought a Wright plane, and Will Scripps a Curtiss boat.

In the next few years I began to get Detroit interested in model building. First I gave a series of lectures at Cass Technical High School to the manual-training teachers of Detroit. I instructed them and they then taught their classes how to build models.

But the boys needed a greater incentive. After some visits with management, and after writing a series of model-airplane stories for *The American Boy,* I interested this magazine in backing a national model-airplane contest.

The idea took hold. *The American Boy* engaged Merrill Hamburg, one of the manual-training teachers in Detroit, to take charge of the program.

By the time we had our Ford Airport open and things beginning to move, we were ready for a national contest among the boys' clubs.

We arranged to hold the affair in Detroit, and Edsel Ford threw open the airport for it. The contestants were to include two boys from each state in the Union. Afterward we gave them a banquet in the main airplane hangar, which by now adjoined our factory building.

This model-airplane work, in my opinion, accomplished far more than it has ever been given credit for. It did something to the boys. It taught them fundamentals of airplane design and flying that even Boston Tech failed to get over to many of its graduates. These boys knew what made a plane fly and what gave it performance, and they learned a type of free competition and sportsmanship that I have never seen equaled in any other form of contest.

Early in the development work, I put up some prizes for Cass High School contests—$10.00, $5.00 and $2.50 for first, second and third prizes. Finally I designed and made up a trophy of Duralumin. The Stout Trophy is still contested for annually in the national event.

One evening when I attended one of these contests in the Cass auditorium, a spirited indoor contest was going on. As I passed a young chap sitting on the stage floor, with his assistant helping him to wind up the rubber bands of his model for the next contest, I gathered that he, one of the smallest of the group, was in line for second place. In the last heat his plane had tied its nearest competitor.

Next day, he said, was his mother's birthday and he was doing his best to win the contest so that he could buy her some flowers. By a few extra turns of the rubber bands without breaking them, he managed, this time, to add a few seconds to his plane's flight in the air and won second place.

This promising young man was Aram Abgarian, an Armenian. His mother must have given him good backing at home, for he appeared in all contests after that.

When we came to our first international meet, the outdoor contests were held at the State Fairgrounds in Detroit. It was a tricky day. Several times the outdoor models got caught in thermals, and even after their propellers stopped turning they were carried on and up and disappeared from sight.

According to the rules, the judges counted the time as that in which the model was "in sight."

Up to the last night of the outdoor contest, England, Canada and Hawaii had not placed. Our Detroit boys had taken every world's record in the meet.

In Aram's event both his plane and the English entrant's model had disappeared from sight. The judges had timed the visible flight of Aram's plane a quarter of a second longer than its English rival's. On this basis he might have won.

The committee came to Aram, however, and explained that as a matter of club sportsmanship they did not think it would be good ethics to deprive the English of a win on so close a margin and on one based merely on the judgment of the timers as to when the models ceased to be visible.

The prize was a round trip to Europe with all expenses paid. It was no small thing for a boy to lose. To be a good sport, however, Aram gave up his trip to Europe and allowed the judges, without protest or complaint from him, to award the outdoor contest to England.

But he was not through. The next day was the international indoor contest for endurance. Aram had no model ready. Late that night when Aram got home he went to work on the kitchen table with scissors, razor blade, glue, tissue paper and microfilm. His mother made strong coffee and stayed up with him all night to help him keep awake.

At ten o'clock the next morning he appeared at the big stock amphitheater in the Fairgrounds where the contest was to be held, ready to fly his new model.

It weighed a quarter of an ounce complete, stayed in the air for twelve and a half minutes, broke the world's record, and Aram went to England after all!

This was one of the finest exhibitions of nerve and determination and sportsmanship I have ever heard of in any sport.

The model-airplane club finally had 400,000 members. It received little recognition from the press because it was backed by a magazine, but it did more than any other thing I know of to condition a generation and make it able to solve the aviation problems of an imminent war. It would be interesting to determine the proportion of war pilots and designers who got their beginnings from model-airplane work sponsored by *The American Boy*. Clarence Budington Kelland was on the magazine's staff at this time, just getting his big start in journalism. The magazine and its owners have passed on, but it was a great human achievement.

Ford Airport was hardly open and running when we held the national meet. It rained and the planes coming in and out got stuck in the mud. The *Detroit Times* reporter went out of his way to describe the bath of mud and the soggy areas of the "sunken" airport.

Just what sort of result he was after, I have never understood. I don't think he was a crusader. His article didn't make him popular at the field. The next day when he came out for the meet, he was put outside the gates and his car pushed out after him, even though he was the Press.

The meet was a success, in spite of the rain. In the long run the mud story in the *Times* did us good. Within a few weeks Mr. Ford decided concrete runways were the thing. He had installed at Ford Airport the first concrete runway at any airport, and the actual building of real airports had begun.

From Book SO AWAY I WENT!
by William Bushnell Stout
Published by The Bobbs-Merrill Company, 1951

INDEX

INDEX: MODEL ADS

PAST EVENTS INFLUENCE OUR FUTURE

This is a complete collection of model airplane articles, hints and AMLA News which was published in the AMERICAN BOY magazine from September, 1927 to August 1934. Included are samples of advertisements and regular features which appeared during that period. The model airplane ads are indexed but are not in chronological order.

The formation of the AIRPLANE MODEL LEAGUE OF AMERICA and the publication of the model articles could not have been timed better. The newspapers were headlining flights Charles Lindbergh was making across the country after his trans-Atlantic flight on May 20, 1927. It was an era during which the whole world became aviation conscious. So, it was no wonder that youngsters flocked to join the AMLA and fly model aircraft while their older brothers were just aching to get into the cockpit of full size aircraft.

The AMERICAN BOY initiative had a major and lasting influence on the future of model aviation as we know it. It is quite possible that the number of "free flight" model builders may have numbered less than a few thousand before 1927. Yet, just a few years later, the free flighters numbered in hundreds of thousands. The AMERICAN BOY accomplished this by publishing plans and articles of free flight models. Besides the plans and hints, AMERICAN BOY provided a source of complete kits at a reasonable cost. It should be mentioned that the models of that era were relatively simple and within the capability of most youngsters. The prop was the major hurdle. In fact, we used to judge a model builder by the workmanship of his props. And, finally, by adding the spice of competition, and with its attending publicity, the AMERICAN BOY had a combination hard to beat: the excitement and wonder of free flight, and a chance to win prizes and be mentioned in the hometown newspaper.

It should be obvious that the AMERICAN BOY did not have millions of readers to influence toward becoming model plan builders. But by offering its program and reprints of articles to newspapers, department stores and other businesses eager to reap the publicity, millions were made aware of model aviation. Free flight model contests provided action which merited newspaper coverage; the aim of the sponsors. And it was this huge pool of active youngsters which made it attractive for companies to continue sponsoring model airplane free flight activities long after the AMERICAN BOY ceased to do so.

In retrospect, the most valuable legacy left to us by the AMERICAN BOY was the network of AMLA chapters. After the magazine could no longer support the AMLA, these chapters kept active, developing leaders which still influence the organizational structure we now have. And thus, the momentum initiated by the AMERICAN BOY is still with us.

Many popular magazines, published during the era noted above, are now gone and forgotten. But, because it took on the cause of MODEL AVIATION, the AMERICAN BOY magazine will be part of our history. Founded in 1827, July-August, 1941, was the last issue of the AMERICAN BOY.

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