

MODEL AIRPLANES

LEISURE HOBBY SERIES



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MODEL AIRPLANES

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FOREWORD

THE South Park System dates back to 1869. In 1900, a new development was undertaken, the erection, in small parks added to the existing system, of buildings for community use providing gymnasiums, baths, club rooms and assembly halls, designed at first to maintain vigorous health under city living conditions. The service of these buildings quickly developed into provision for creatively occupying the leisure time of the neighborhood population, and gradually this came to be recognized as an essential public service.

From the first, hobbies in the South Parks Service Program have been items of major appeal. With more than a quarter century spent in serving leisure needs, pioneering experience has established a background for definite contribution toward solving the problem now currently termed the "New Leisure."

The program of the parks has expanded to a degree originally undreamed. It has now resulted in the publication of a series of booklets intended, primarily, for the use of groups using the South Park Field Houses, but through the co-operation of The National Recreation Association, made available also to the country at large, since that organization has volunteered to aid in the distribution of these pamphlets on a nation-wide basis among group workers and individual hobbyists.

These booklets make no pretense of being complete text books. They are prepared for a specific South Park purpose. They are intended to furnish ideas and suggestions presented clearly in picture form, to stimulate creative thinking, and the exploratory pursuit of hobbies for the satisfactions they afford. Experienced recreation experts have supervised the work.

The making of these books continues an adventure in co-operation. Enthusiasts in the several subjects have contributed their experience and counsel. Technical engineers and mechanics have added their critical inspection and advice as experimenting progressed in shop, or club room. Draftsmen and artists have consulted to portray as simply as possible the essentials not only of pattern, but also of process. Editors have striven to avoid the indefiniteness of text, employing instead the simplicity of picture, in presenting each subject.

All have been moved by the feeling that life is carrying us into new dimensions, where what we have lost in perishable possessions may perhaps be compensated in imperishable satisfactions, to be achieved in our increased leisure if only that leisure be wisely employed to capitalize those hours which remain free from controls, and launch ourselves on adventurous voyages toward any new discoveries and new masteries for which we have individual taste and talent.

The Leisure Hobbies Series addresses itself not to the whole cycle of ends to which we may devote this leisure, but only to that segment in which materials, under the hand of the worker, are made to assume new pattern or composition, or are ordered to accomplish new purposes. The Series treats of the creative hobbies only, and even of those it concerns itself with such as best lend themselves to amateur and group attack.

Our presentation contemplates the formation of club groups to undertake together the working out of each project in the congenial company of fellow enthusiasts, equally interested in the matter in hand. Our hope is that such groups, by profiting through one another's experience and suggestion, may carry accomplishment into new fields of advanced technical development, open up other avenues for exploration, or experiment, and by association of local groups into national federations of clubs pursuing kindred subjects, may develop the means of intercommunication through the National Recreation Association, for exchange of information and experience, necessitating the publication from time to time of supplements to the first series of booklets, adding improved techniques or devices and new subjects for experiment or study. The radio grew that way. We hope that in the workshop of the home, and club room, these other hobbies will grow in similar fashion, until our present pages become obsolete in comparison with the new standards and improvements which developing skill will discover and make available to fellow craftsmen.

Correspondence, inquiry, criticism or suggestion may be directed to the Leisure Hobbies Series, South Park Commissioners, Chicago, or to The National Recreation Association, 315 4th Avenue, New York.

MODEL AEROPLANE INTRODUCTION

THIS booklet is the outgrowth of application of tools and materials by boys and young men over a period of fruitful years during their leisure time. Model airplane building and flying formed a part of their recreation program, stimulated by the park management and guided in their craftsmanship by the author. Designing, planning, building, and flying model airplanes lends itself in pleasant participation to all age groups. The pre-school child can find a performing project within the scope of his ability in the simple, solid wood glider, while the expert mechanic can find work to tax his greatest skills in attempting to produce a scale model to satisfy wind tunnel requirements for precision, and feel amply rewarded with a ship of accurate as well as beautiful lines. It is at once a sport, a craft, and an art.

The story of model airplane activity is a tale of adventure in a fascinating field. So rapid has been the rise in popularity of model airplane work that it has become extremely difficult to keep up with the development of the craft. While model airplanes were being built and books about them written many years ago it was not until quite recently that the craft took on nation-wide proportions. A few of the important factors which made for the rapid strides in recent years are the following:

- (1) Introduction of the use of balsa wood as material for construction.
- (2) Organization of a competitive program of park and other recreation model airplane clubs with individual and group competition.
- (3) Col. Lindbergh's solo flight from New York to Paris aroused an enormous favorable public interest in aviation in general.
- (4) Introduction of national model airplane tournaments.
- (5) Refinement of materials, methods of construction, and design of models.

- (6) Greater sharing of advanced ideas and methods by exchange of plans, and publication of improvements in newspapers, magazines, and books.

We are all familiar with the early model efforts of Leonardo da Vince and the later successful efforts of Langley, the Wright Brothers, Stout, and Laird. Their rise from the ranks of model experimenters demonstrates the practical application and educational merits of model airplane work. It may be safely said that the real aircraft industry has borrowed more from model aviation (and is continuing to do so) than is true in any other similar field.

And yet there is a genuine poverty of instructional material on the subject of dependable model mechanisms called airplanes. Early model work was done only by a few especially gifted craftsmen who worked alone on hunches and guesses. This produced a series of so called freak models.

Later observation and tutoring took their place in the development of model aviation. Today it is practical for an instructor to teach a group the pleasant art of model airplane construction and flying. The more comprehensive the text, plans or graphic instructions the easier the work of learning the craft, the better the product turned out, and the easier it will be to reduce the need for personal instruction.

In an attempt to bridge that gap—between seeing how it is done and doing it, this booklet had its birth. With the aid of this self instructor in model airplanes it should be possible for an inexperienced leader to carry a group through the simple steps in construction, and later to progress with them through the more refined parts of design.

The author enjoys the distinction of having been one of the committee of three who planned the First National Miniature Aircraft Tournament. Boys under his leadership rose to national competitive junior and senior championships.

Flying model airplanes are generally limited by conditions under which they are flown—conditions which are usually out of the control of the model flyer. Models are very sensitive to temperature, humidity and drafts. Obstructions hamper flight. A large auditorium with a high clear ceiling; without exposed beams or chandeliers; warm, dry, and free from drafts will give indoor models an opportunity to perform best. Model builders who live where such an ideal hall is not available are flying their planes under handicaps. Similarly outdoor flying performance depends a great deal upon weather conditions and the terrain. Some localities have natural geographic characteristics favorable to the flight of outdoor model airplanes while other places are flat, lack rising up-currents, and are naturally gusty making them unfavorable for long model flights.

This difference in flight conditions tends to influence the types of planes model builders will produce in various localities. For example, favorable outdoor flying conditions in Los Angeles make large, heavy planes practical, long duration performers, while Chicago "the windy city" (more aptly called the gusty city) calls for light ships with plenty of power. A short outdoor season has resulted in specializing in indoor types of planes.

The models which follow are arranged in step by step sequence—from the simple to the complex. They represent typical sample planes in each class which usually forms a section of a model airplane tournament. These models have been built in large numbers and are the result of experiment and development in the model airplane clubs of the South Parks of Chicago. As new, improved types are perfected we hope to modify these planes and add to them from time to time. Many happy landings.

The Model Airplanes described in this booklet fall into the following classes:

- I. As to function.
 1. Display models or non-flying.
 2. Flying models.
- II. As to place of flight.
 1. Indoor models.
 2. Outdoor models.
- III. Depending on power used.
 1. Rubber strand power.
 2. Other motive power as:
 - (a) Compressed air.
 - (b) Springs.
 - (c) Gasoline.
- IV. Structural variation.
 1. Stick models.
 2. Fusilage models. (Wakefield.)
 3. Commercial or original designs.
 4. Scale models.
 - (a) Flying scale models.
 - (b) Display or nonflying, sometimes called replicas.
- V. Types of planes as, in real airplanes as monoplane, biplane, etc.

The materials needed for model airplane construction depend on the type of model to be built and are specified in each plan. On the whole, this list contains the most important things to be used.

Balsa Wood.

Bamboo.

Japan Tissue Paper.

Music Wire. (Piano, Guitar String.)

Model airplane glue or nitro cellulose cement.

Banana liquid. (Pure banana oil.)

Strand rubber.

A complete discussion of each of these materials will not be attempted here since most of them are common enough today and can be obtained in model airplane supply stores.

Balsa wood comes from South America, is about half the weight of cork, and is so light and soft as to be easily shaped with light tools as a knife or razor blade.

Bamboo is still used on many planes to advantage where great strength and flexibility is needed, as in the landing gear of a commercial model. It may be easily bent.

MATERIALS FOR MODEL AIRPLANES

BALSA

Advantages.

1. Light.
2. Easy to cut.
3. Sticks tight with model glue.
4. Long, straight grained may be had.
5. Economical, little waste.

Disadvantages.

1. **Porous** open grain does not leave a smooth surface on solid scale models, poor finish.
2. **Brittle**, must be extremely thin to bend, and then should be steamed.

BAMBOO

1. Strong.
2. Flexible.
3. May be bent into permanent curves rather easily.
1. Heavy.
2. Knots about every fifteen inches or closer.

3. Only part with glossy surface should be used.
4. Ages poorly—drys out and becomes brittle.
5. Does not hold as well with any glue. Should be tied where strong joint is needed.

WHITE PINE

Advantages (cont.)

1. Good for strong parts of display scale models.
2. Smooth surface takes good finish.
3. Makes good thin, flexible propellers for heavy jobs as for compressed air motors.

Disadvantages (cont.)

1. Too heavy for flying models.
2. Harder carving than balsa, easier than bamboo.
3. Less flexible than bamboo, more flexing than balsa.

COVERINGS. Hakone Tissue. (Japanese.)

- | | |
|-------------------|-----------------------------|
| 1. Easy to apply. | 3. Takes dope well. |
| 2. Strong. | 1. Heavy for indoor planes. |

SUPERFINE TISSUE. (Japanese.)

- | | |
|------------------------------------|--------------------------------------|
| 1. Light — good for indoor models. | 1. Too weak for large outdoor ships. |
|------------------------------------|--------------------------------------|

MICROFILM. (See Instructions.)

- | | |
|---|--|
| 1. Lightest covering. | 2. Difficult to handle and to apply. |
| 2. Airtight. | 3. Fragile—must not be touched, does not last. |
| 3. Least skin irritation. | 4. Too weak for outdoor models. |
| 4. Excellent for indoor planes. | |
| 1. Difficult to obtain. Must be made by the user. | |

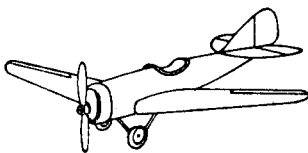
The tools needed are few and simple. The beginner's models can be made with merely a razor blade. As the worker becomes more ambitious more tools are needed as, a sharp pocket knife, pencil, ruler, small water-color brush, long nose pliers, diagonal cutters, candle, some straight pins, pin-vise, fine scale. In a group one of each of the more expensive tools may be used in turn by each member.

TYPES OF PLANES



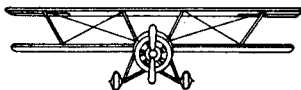
HIGH WING MONOPLANE

An airplane having one main supporting surface placed above the fuselage.



LOW WING MONOPLANE

An airplane having one main supporting surface placed at the bottom of or below the fuselage.



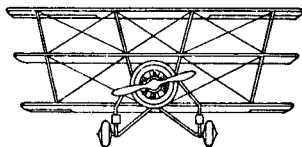
BI-PLANE

An airplane having two sets of wings, placed one above the other.



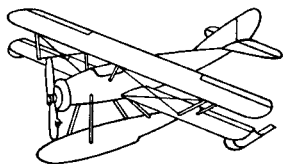
SESQUIPLANE

A biplane having two sets of wings, placed one above the other. The span of the lower wings being one half or less of the span of the upper wings.



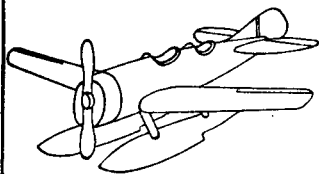
TRIPLANE

An airplane having three sets of wings, placed one above the other.



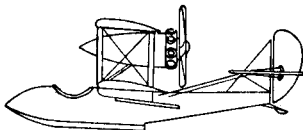
SINGLE PONTOON SEAPLANE

An airplane having a pontoon placed below the fuselage for landing on, and taking off from the water. Wing pontoons are carried near the tips of the wings.



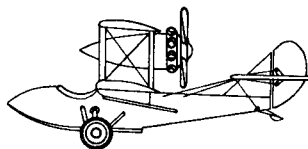
TWIN PONTOON SEAPLANE

An airplane having two pontoons placed side by side below the fuselage for landing on, and taking off from the water.



FLYING BOAT

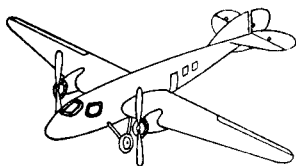
A seaplane having a fuselage shaped like a boat for landing on, and taking off from the water. Small auxiliary floats are carried near the wingtips.



AMPHIBIAN

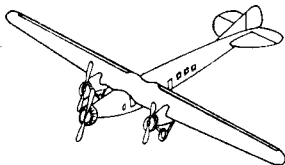
An airplane provided with pontoons or a boat-hull for landing on, and taking off from the water, and retractable wheels carried by the pontoons or boat for landing on, or taking off from the ground.

TYPES OF PLANES



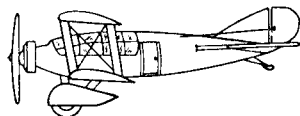
BI-MOTOR

An airplane having two motors.



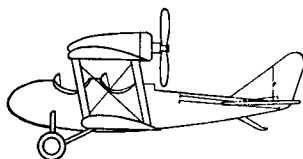
TRI-MOTOR

Any airplane having three motors.



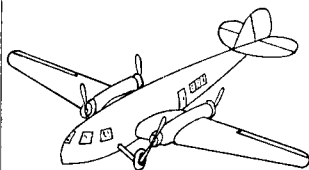
TRACTOR

A type of airplane having the propeller or propellers in front of the wings. The plane being thus, "Pulled" through the air.



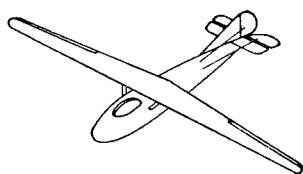
PUSHER

A type of airplane having the propeller or propellers in the rear of the wings. The plane being thus "Pushed" through the air.



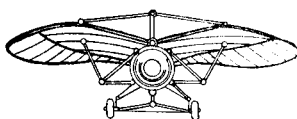
PUSHER-TRACTOR

A type of airplane having one or more propellers in front, and one or more propellers in the rear of the wings. The engines driving the respective front and rear propellers are usually placed in line.



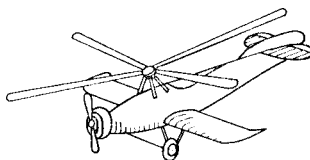
GLIDER

A type of airplane without a motor, capable of soaring in rising air currents.



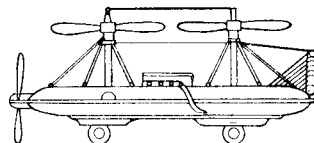
ORNITHOPTER

A machine capable of rising and moving forward by means of flapping wings, like a bird.



AUTOGIRO

A flying machine provided with narrow revolving wings which are turned by the air as the machine is driven forward by the propeller. The autogiro is capable of steep ascent and descent at a very low speed.

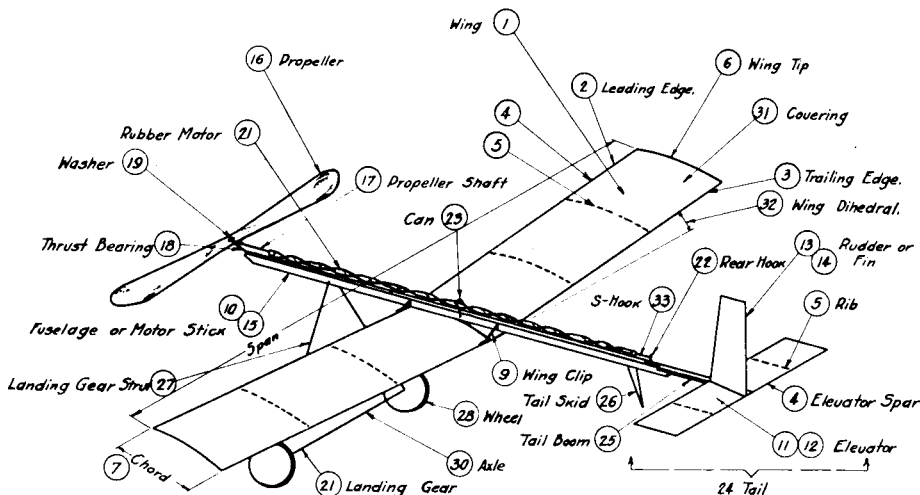


HELICOPTER

A flying machine capable of vertical ascent, sustentation, and vertical descent.

MODEL AIRPLANE NOMENCLATURE

STICK MODEL R.O.G. TYPE



- 1 — Wing — The main surfaces of an airplane for supporting the plane in the air.
- 2 — Leading edge — The front edge of a surface, such as a wing or elevator.
- 3 — Trailing edge — The rear edge of a surface, such as a wing or elevator.
- 4 — Spars — The main members of a surface, such as the wing or the elevator.
- 5 — Ribs — The fore and aft members of a surface such as the wing or the elevator which connect the leading edge and trailing edge, and to which the wing covering is fastened.
- 6 — Wing tips — The extremities of the wing.
- 7 — Chord — The fore and aft dimensions of the wing or distance from leading edge to trailing edge.
- 8 — Span — The dimension of the wing or elevator from tip to tip.
- 9 — Wing clips — The clips or clamps used to hold the wing to the fuselage or motor stick at the front and rear spars.
- 10 — Fuselage — The main body of an airplane containing crew, motor and usefull load.
- 11 — Elevator — A horizontal surface carried by the rear end of the fuselage and hinged so as to steer the plane up or down.
- 12 — Stabilizer — A fixed horizontal surface carried by the rear end of the fuselage to which the elevators are hinged, to make the plane stable longitudinally.
- 13 — Rudder — A vertical surface placed to the rear of the vertical stabilizer or fin to steer the plane to the right or left.
- 14 — Fin — A fixed vertical surface placed over the horizontal stabilizer or wherever convenient to keep the airplane directionally stable.
- 15 — Motor base or motor stick — A member taking the place of the fuselage on a stick model and carrying the rubber motor.
- 16 — Propeller — A narrow bladed screw carried by the fuselage or motor base and made to revolve to pull the airplane forward.
- 17 — Propeller shaft — The shaft on which the propeller is mounted and which turns with it.
- 18 — Thrust bearing — The support and bearing for the propeller shaft.
- 19 — Washer — A small washer on the propeller shaft, placed between the thrust bearing and the propeller to lessen the friction.
- 20 — Motor — Any device that makes the propeller turn.
- 21 — Rubber motor — Twisted rubber bands or strands fastened to the propeller shaft and the rear motor hook of the motor base to make the propeller turn.
- 22 — Rear hook — The hook carried by the motor base or fuselage to which the rear end of the rubber motor or S hook is fastened.
- 23 — Can — A support for the rubber motor carried by the fuselage or motor base. Used to keep the motor base straight to avoid breaking.
- 24 — Tail — A general name for all steering and stabilizing surfaces back of the main wings.
- 25 — Tail boom — A member fastened to the motor base on which the controls and stabilizing surfaces are mounted.
- 26 — Tail skid — A member projecting downward below the elevator to prevent damaging the tail of the plane in landing.
- 27 — Landing gear — The device which supports the airplane on the ground and is used for landing and taking off.
- 28 — Landing gear wheels — Wheels or rollers carried by the landing gear for moving on the ground.
- 29 — Landing gear struts — Members extending below the fuselage which carry the wheels.
- 30 — Landing gear axle — The axles connecting the struts and carrying the wheels.
- 31 — Covering — The material used to cover all wings control and stabilizing surfaces as well as the fuselage.
- 32 — Wing dihedral — The angle which a wing makes with the horizontal when viewed from the front.
- 33 — S hook — The hook fastened between the rubber motor and the rear motor hook. Used for winding with a converted egg beater or other mechanical winder.

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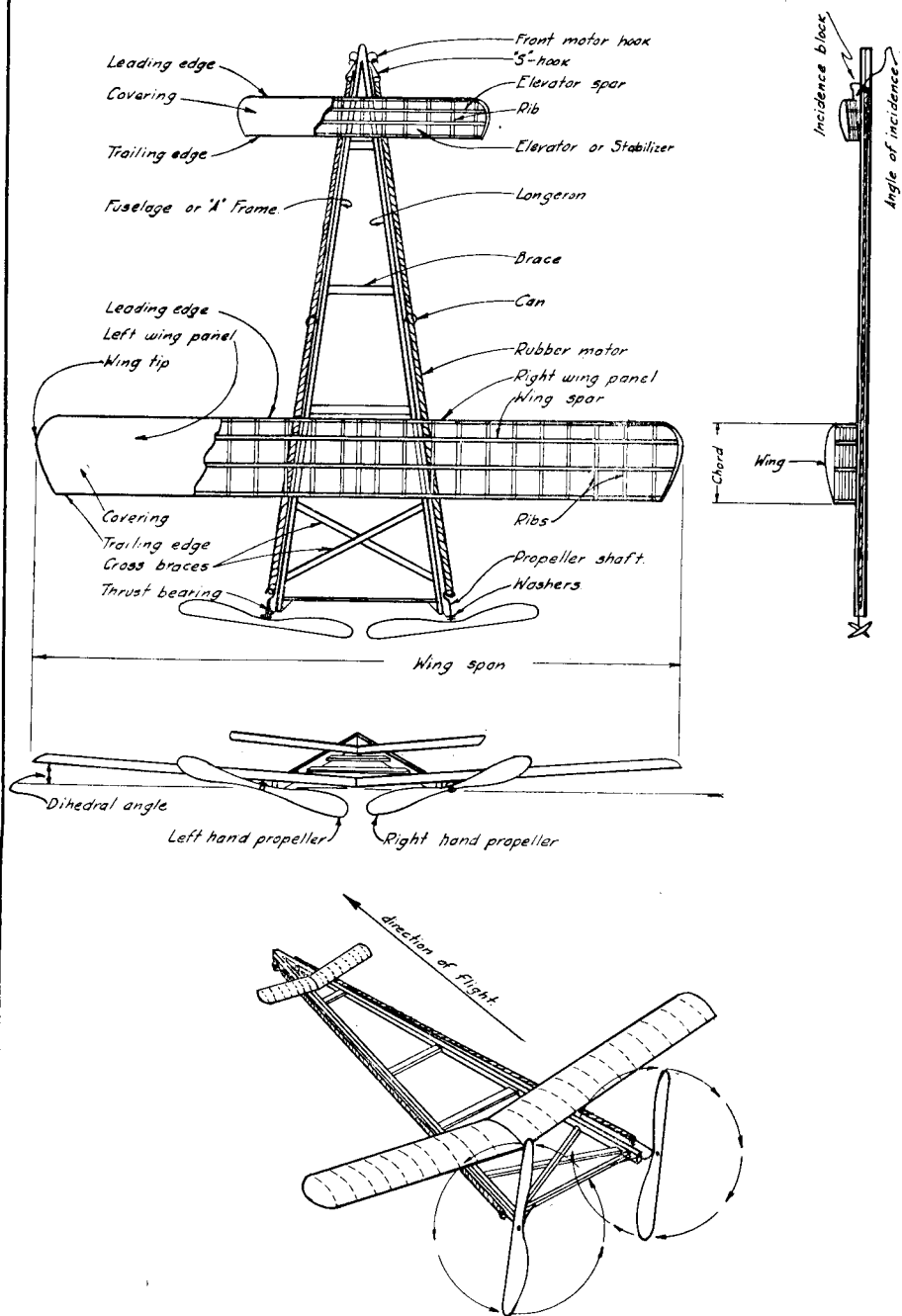
Designed by R.C.F.
Drawn by W.G.
Checked by R.C.F.

South Park Commissioners
GAGE PARK

MODEL AIRPLANE NOMENCLATURE
STICK MODEL
R.O.G. TYPE

MODEL AIRPLANE NOMENCLATURE

TWIN PUSHER TYPE



Designed by	J.R.
Drawn by	J.C.
Checked by	B.C.F.

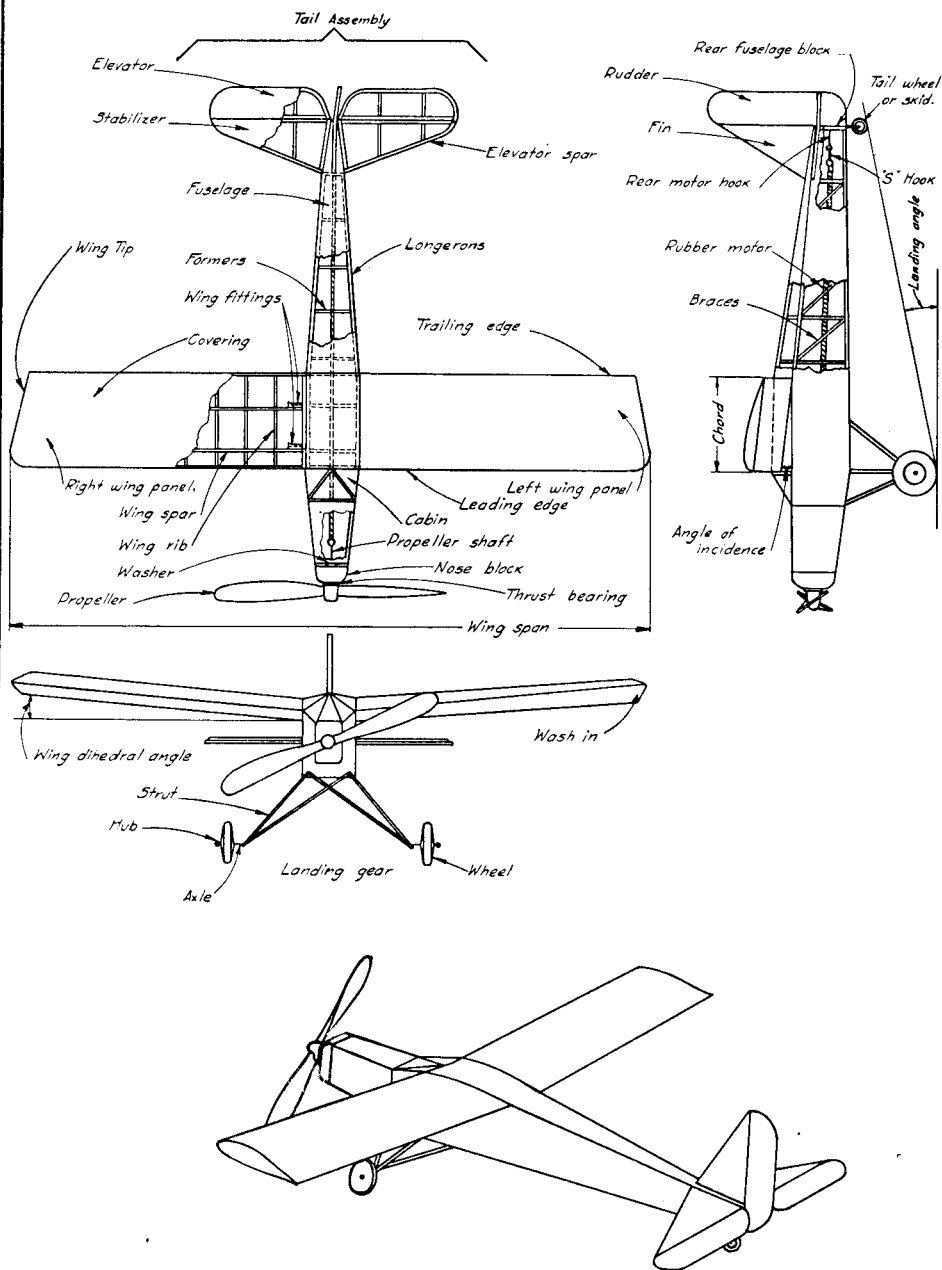
South Park Commissioners
GAGE PARK

MODEL AIRPLANE
NOMENCLATURE
TWIN PUSHER TYPE

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MODEL AIRPLANE NOMENCLATURE

COMMERCIAL TYPE



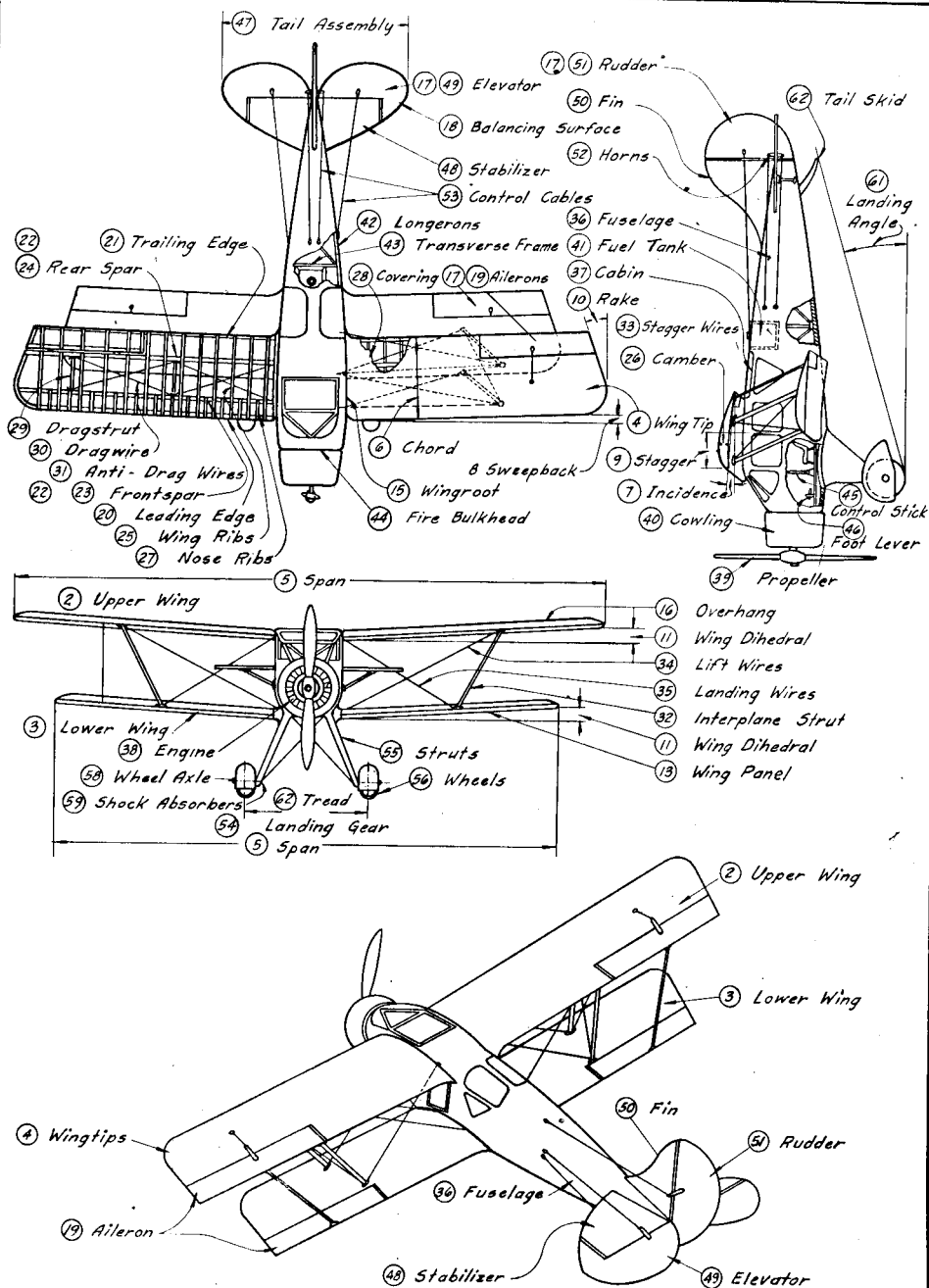
Designed by J.R.
 Drawn by J.S.M.
 Checked by R.R.S.

South Park Commissioners
GAGE PARK

MODEL AIRPLANE
 NOMENCLATURE
 COMMERCIAL TYPE

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NOMENCLATURE OF A REAL AIRPLANE



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 Drawn by De.G.
 Checked by

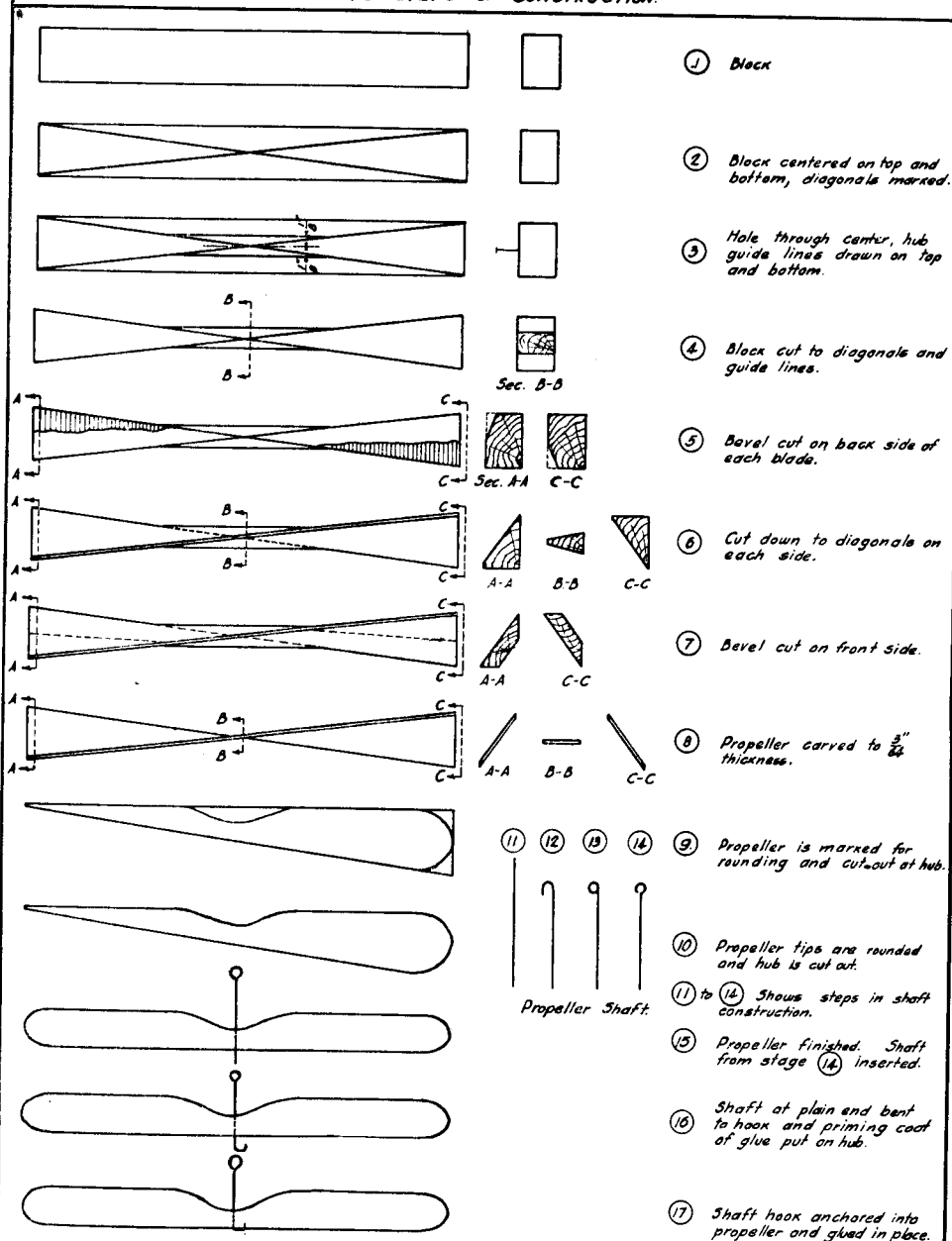
South Park Commissions
 GAGE PARK

NOMENCLATURE
 OF A REAL AIRPLANE

17B-11-120

MODEL AIRPLANE PROPELLER CARVING

SHOWING STEPS OF CONSTRUCTION.



STEPS IN CONSTRUCTION

As shown in details from 1 to 17

MATERIALS

Qty.	Size	Material	Parts
1	$\frac{1}{16} \times \frac{3}{8} \times 5"$	Balsa	propeller
1	$1\frac{1}{2}$ No. 8	Music wire	Shaft.

Designed by	B. C. F.
Drawn by	B. C. F.
Checked by	B. C. F.

Scale 0 $\frac{1}{2}$ 1"

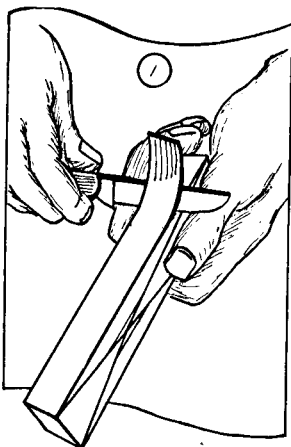
South Park Commissioners
GAGE PARK

MODEL AIRPLANE
PROPELLER CARVING
SHOWING STEPS OF CONSTRUCTION

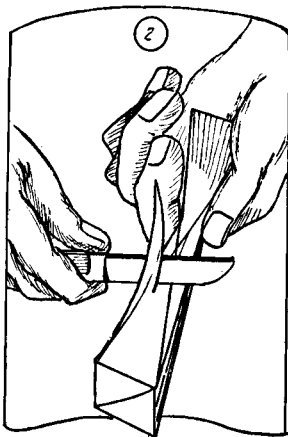
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MODEL AIRPLANE

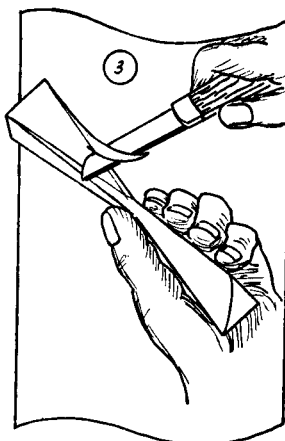
PROCESS OF CARVING PROPELLER



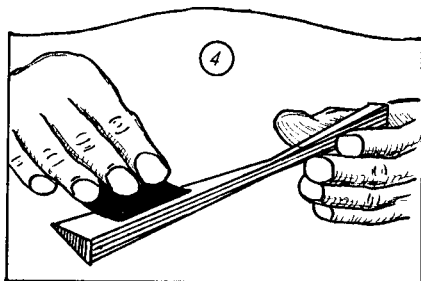
CUTTING TO DIAGONAL LINES
AND GUIDE LINES



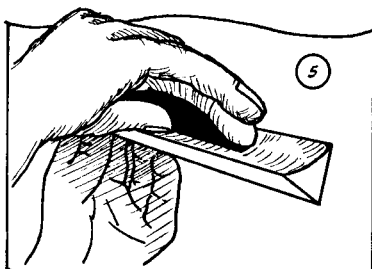
CUTTING TO DIAGONALS
ON ONE SIDE



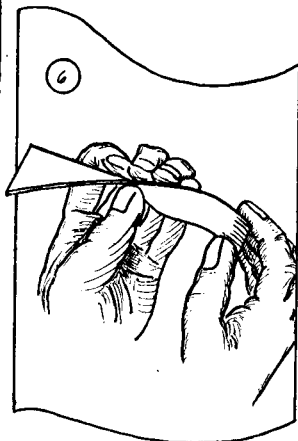
CUTTING TO DIAGONALS
ON OTHER SIDE



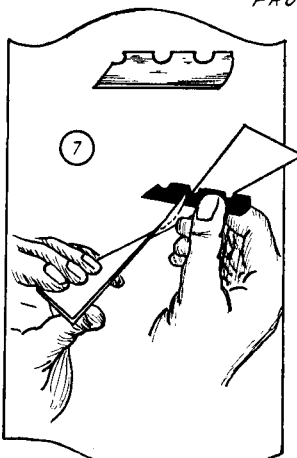
SANDPAPERING TO LINES



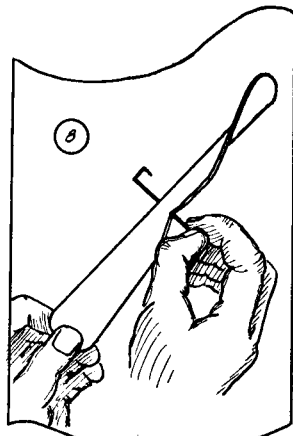
SANDING A CAMBER
PROPELLER BLOCK



PROPELLER SANDED
SHOWING THE THICKNESS

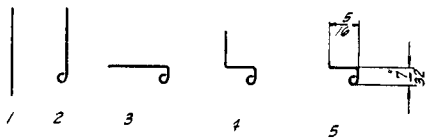
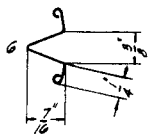
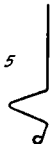
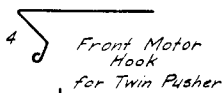
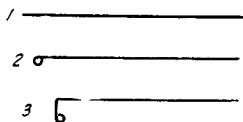


CUTTING OUT HUB

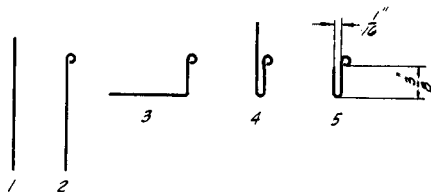


PLACING
178-11/129 PROPELLER SHAFT

METAL FITTINGS



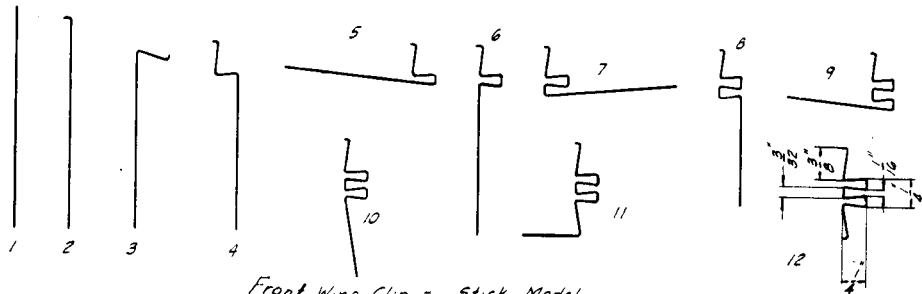
Rear Hook - Stick Model



5 - Hook



Front Wing Clip - Indoor Tractor



Front Wing Clip - Stick Model

<i>Designed by</i>	D&G	<i>Scale</i>	0
<i>Drawn by</i>	D&G		
<i>Checked by</i>			

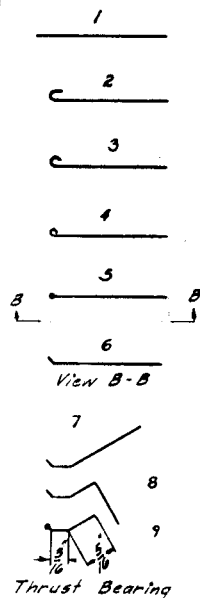
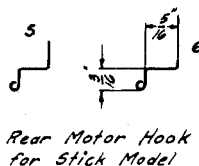
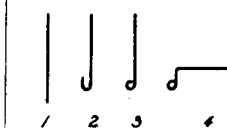
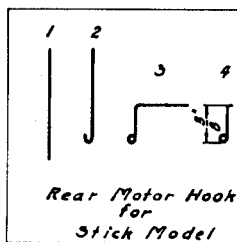
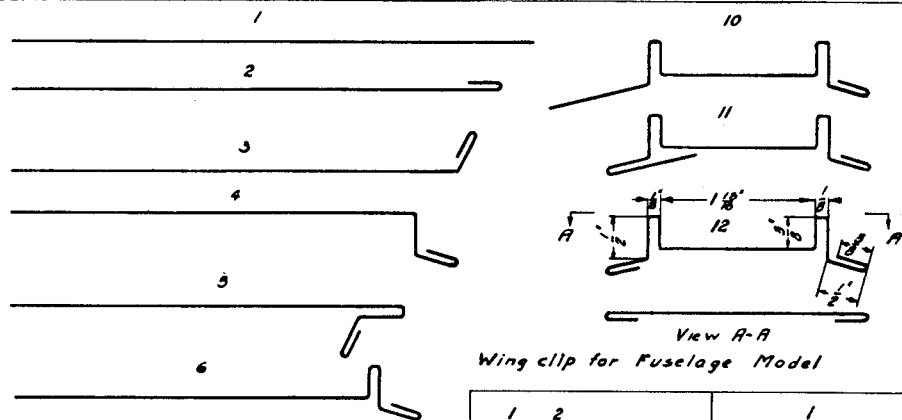
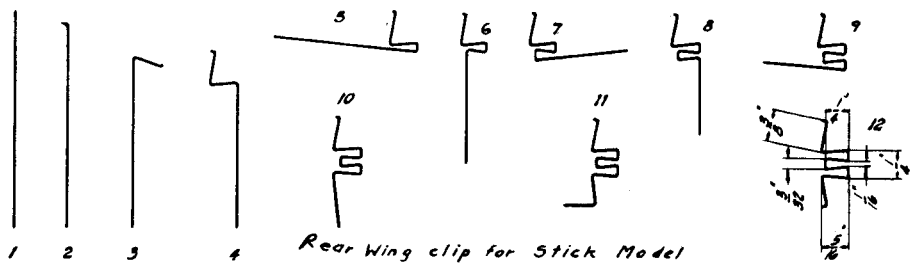
in inches

South Park Commissioners
GAGE PARK

METAL FITTINGS

17A-4-125

METAL FITTINGS



Designed by D.G.
Drawn by D.G.
Checked by

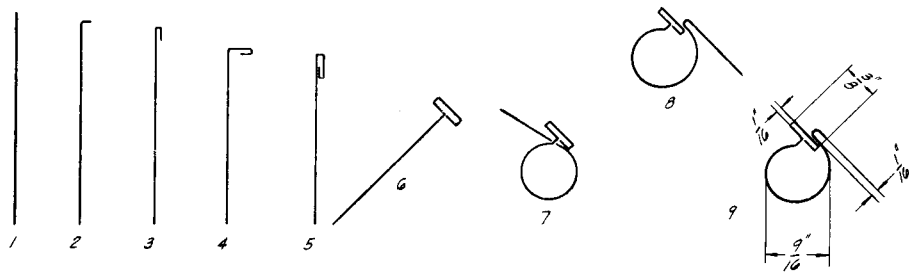
Scale: 0 1
inches

South Park Commissioners
GAGE PARK

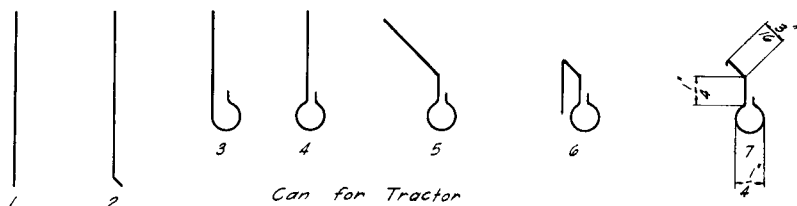
METAL FITTINGS

17A-A-123

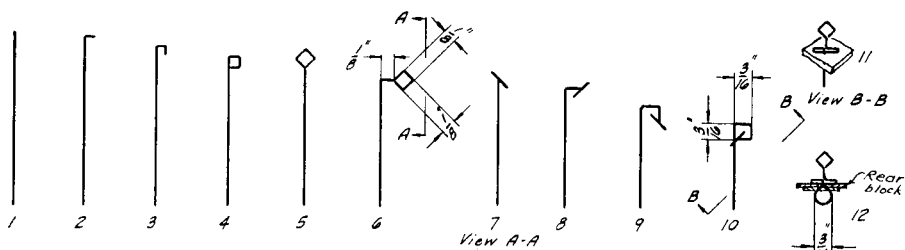
METAL FITTINGS



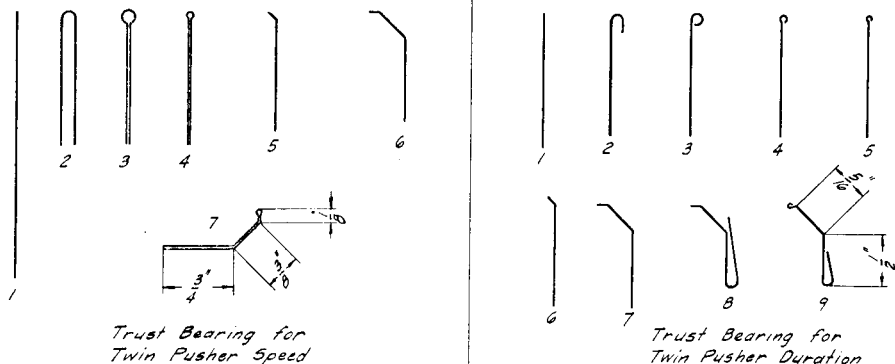
Can for Twin Pusher



Can for Tractor



Rear Motor Hook for Fuselage Model



Trust Bearing for Twin Pusher Speed

Trust Bearing for Twin Pusher Duration

Designed by DeG
Drawn by DeG
Checked by

Scale:
inches

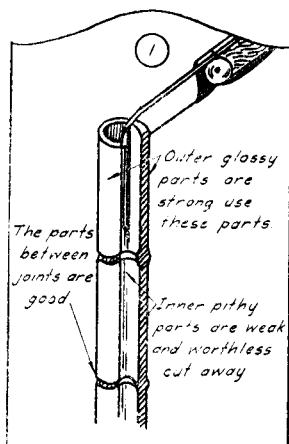
South Park Commissioners
GAGE PARK

METAL FITTINGS

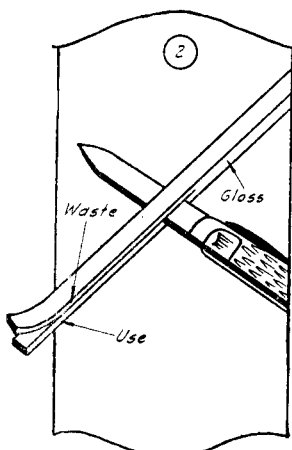
17A-4-124

MODEL AIRPLANE

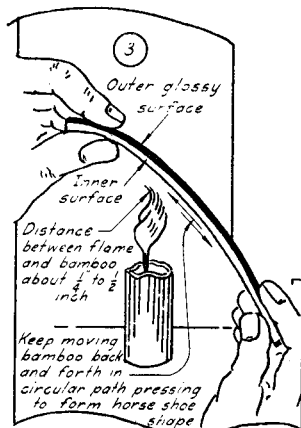
PROCESS OF WING TIP CONSTRUCTION



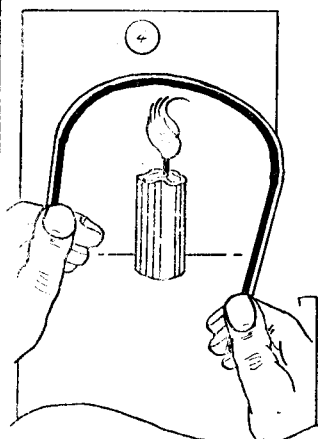
THE PARTS OF BAMBOO USEFUL FOR MODEL AIRPLANE WORK



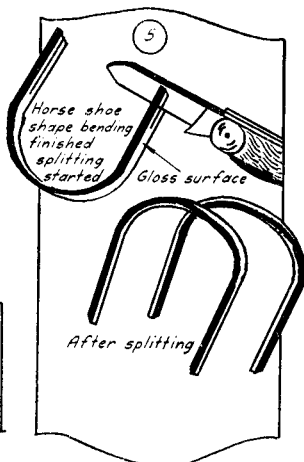
SPLITTING BAMBOO FOR WING TIPS



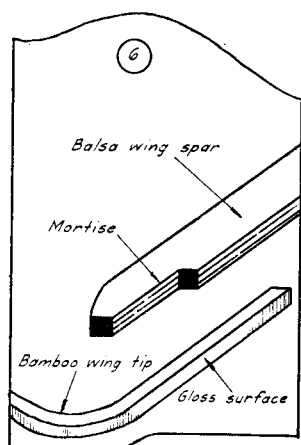
BENDING BAMBOO WITH CANDLE FLAME WING TIP CONSTRUCTION



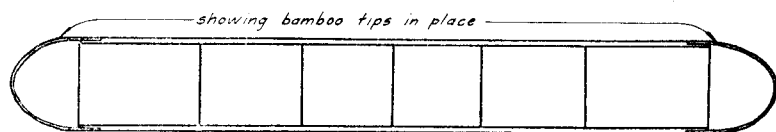
BENDING BAMBOO HORSE SHOE SHAPE



WING TIPS

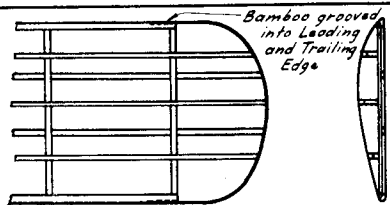


MORTISE FOR WING TIP



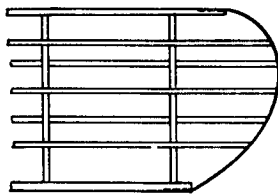
WING 7

DIFFERENT TYPES - DOUBLE SURFACE WING TIPS



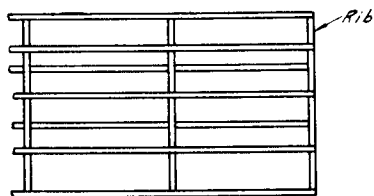
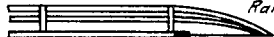
(1)

Round Bamboo Tip



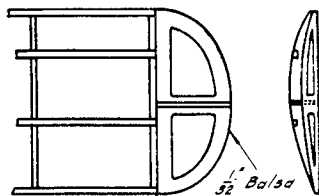
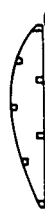
(2)

Rake Bamboo Tip



(3)

Square Tip

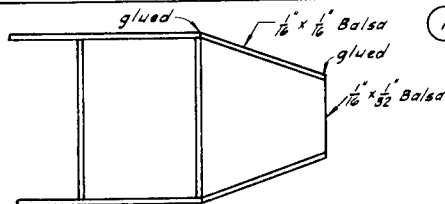


(4)

Round Balsa Tip

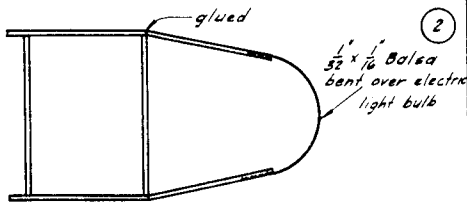


DIFFERENT TYPES - SINGLE SURFACE WING TIPS



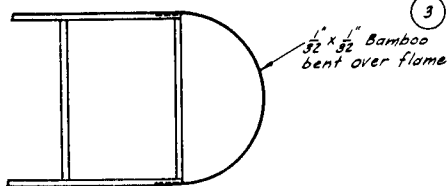
(1)

Flat Wing - Tapered Straight Tip



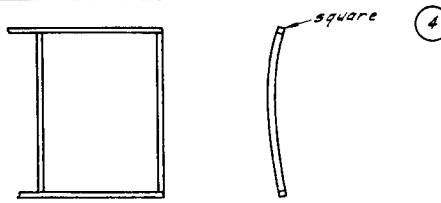
(2)

Flat Wing - Tapered Round Balsa Tip



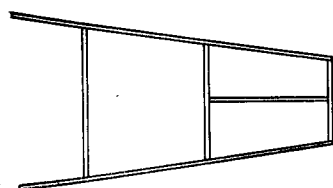
(3)

Flat Wing - Round Bamboo Tip



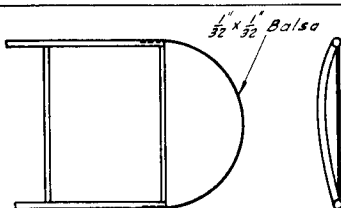
(4)

Cambered Wing - Square Tip



(5)

Cambered Wing Tapered Tip

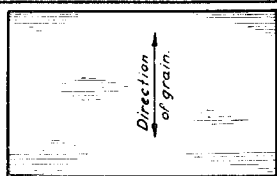


(6)

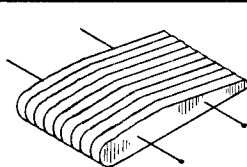
Cambered Wing - Round Balsa Tip



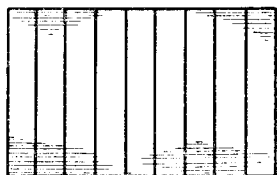
PROCESS OF MAKING RIBS



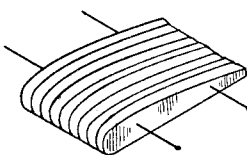
①
Sheet of balsawood
cut to size.



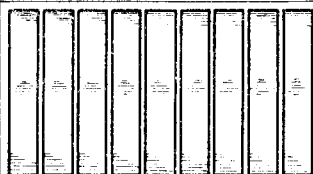
⑧
Nose rounded
and pared smooth



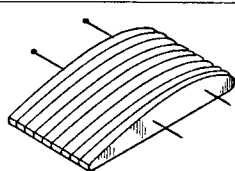
②
Sheet penciled
for cutting
strips.



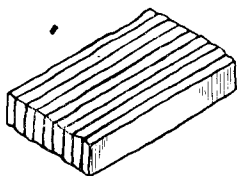
⑨
Nose and top
sanded smooth.



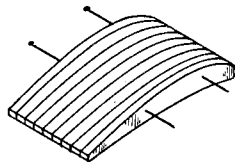
③
Strips are cut



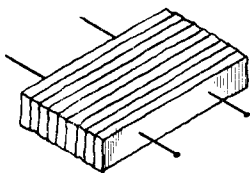
⑩
Rear edge
finished.



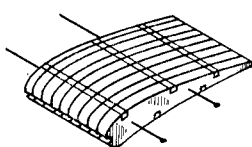
④
Strips placed
edgewise side
by side.



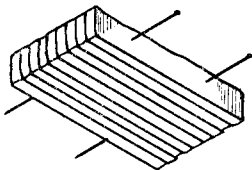
⑪
Bottom side
curved and
finished.



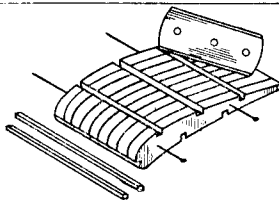
⑤
Strips collectively
pinned together.



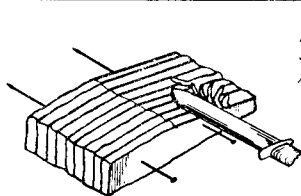
⑫
Top and bottom
marked for
grooving.



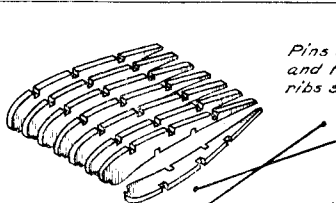
⑥
Bottom side
smoothed.



⑬
Grooves cut with
razor blade to
fit spars.



⑦
Rear upper
side cut and
pared smooth.



⑭
Pins withdrawn
and finished
ribs separated.

170-5-122

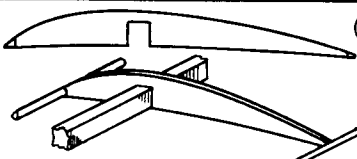
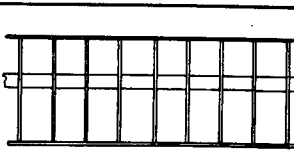
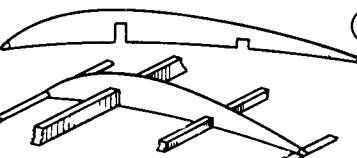
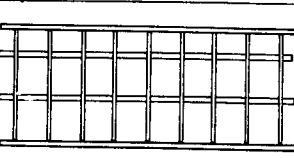
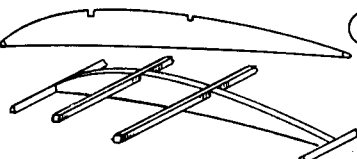
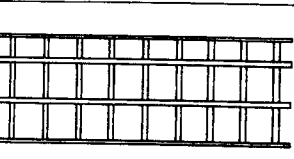
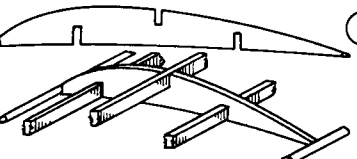
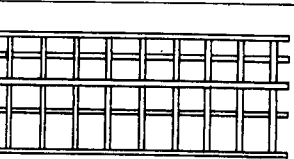
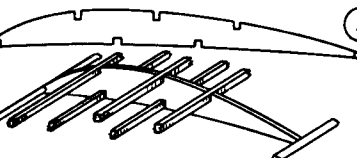
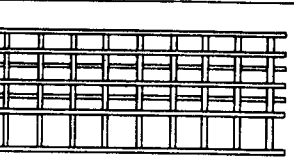
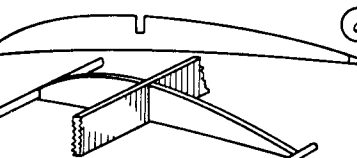
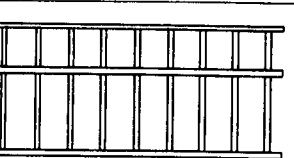
Designed by
Drawn by
Checked by

South Park Commissioners
GAGE PARK

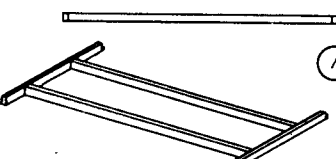
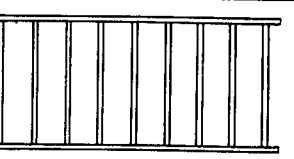

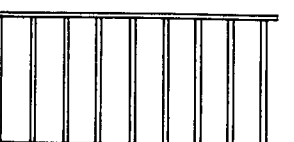
PROCESS OF MAKING
RIBS

2

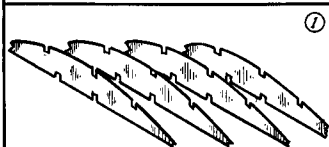
PROCESS OF MAKING DOUBLE SURFACE WINGS

	<p>① Heavy center Spar Light leading and trailing edge Simple construction</p>	
	<p>② Two medium center spars Light leading and trailing edge Tends to distribute strains</p>	
	<p>③ Two light center spars Leading and trailing edge Rather weak</p>	
	<p>④ Three center spars Leading and trailing edge Strong - Distribution of strains</p>	
	<p>⑤ Five center spars Leading and trailing edge Strong great distribution of strains</p>	
	<p>⑥ One center spar Leading and trailing edge Very light and strong but tends to twist.</p>	

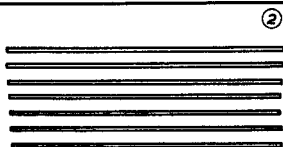
PROCESS OF MAKING SINGLE SURFACE WINGS

	<p>① Simple flat rib construction Easy to make Weak - apt to warp</p>	
	<p>② Cambered rib construction More difficult to make, but strong and efficient</p>	

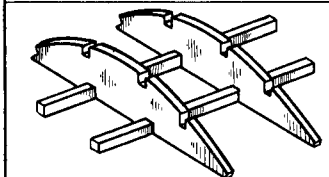
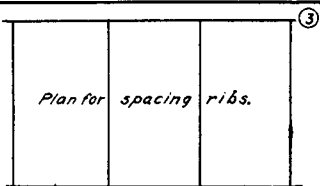
PROCESS OF MAKING DOUBLE SURFACE WINGS.



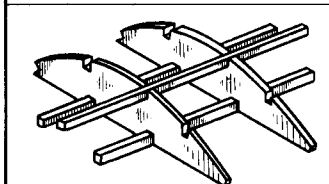
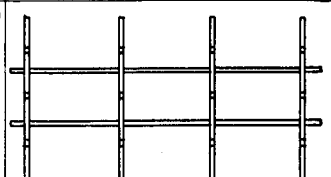
Ribs arranged ready for use.



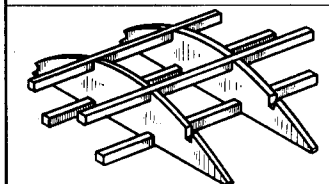
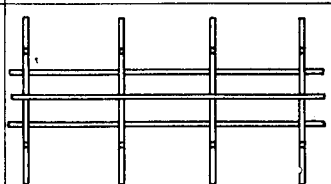
Spars arranged ready for use.



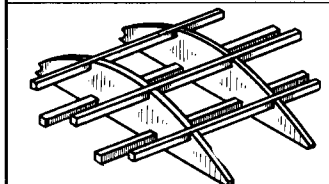
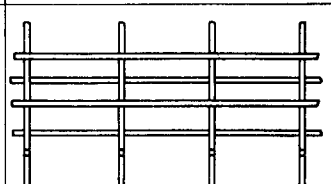
Two bottom spars glued to ribs.



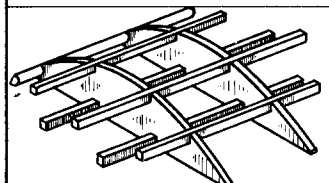
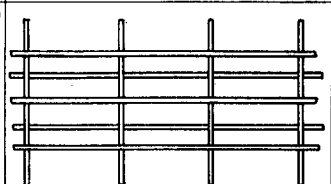
Center top spar added to.



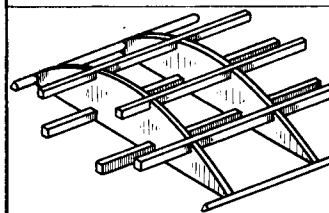
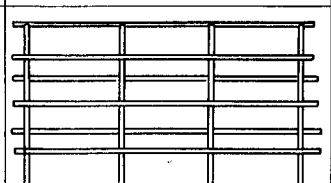
Front top spar added to.



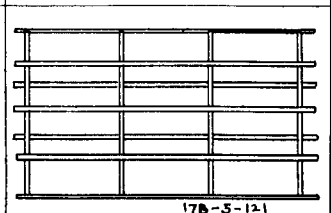
Rear top spar added to.



Leading edge added to.



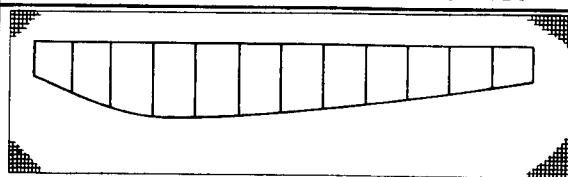
Trailing edge added to.



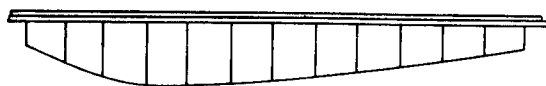
MODEL AIRPLANE

PROCESS OF MAKING FUSELAGES ~ SIMPLE TYPE

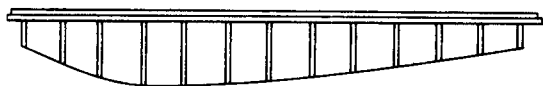
SHEET #1



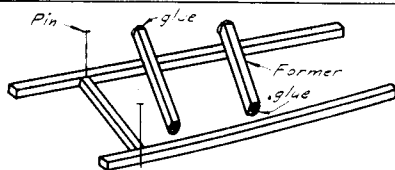
① Take a piece of Beaverboard or 3-plywood and draw to actual size a side view of the Fuselage.



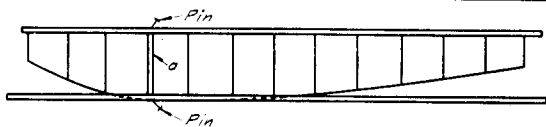
② Cut two pieces of Balsa Langerons $\frac{1}{2}$ " longer than necessary and place them together as shown



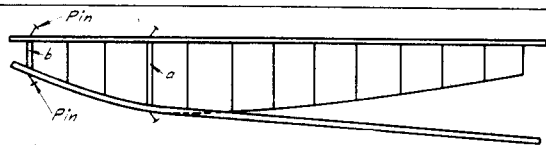
③ Cut Formers to length as shown (Two of each, one for each side).



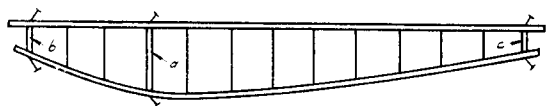
④ Apply a full drop of glue to the Butt-Ends of all Formers, but do not apply glue to the Langerons. One Former is shown glued to Langerons. Stick Pins in board to hold Langerons and Formers together.



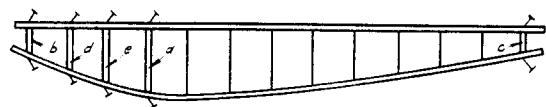
⑤ Place Bottom Langeron as shown parallel to the Top Langeron and glue the Former (a) to both Langerons. Stick Pins in board to hold Langerons and Formers together



⑥ Bend Bottom Langeron up in front and glue in the Front Former (b). Add pins to hold Langerons and Formers together. The bottom Langeron will spring out back of (a) as shown.



⑦ Bend Bottom Langeron up back of Former (a) and glue in the rear Former (c). Add Pins to hold Langerons and rear Former together.

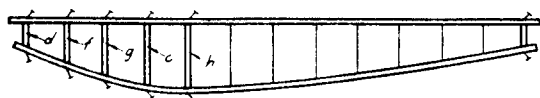


⑧ Glue in the Formers (d) and (e) intermediate (a) and (b). Add Pins.

MODEL AIRPLANE

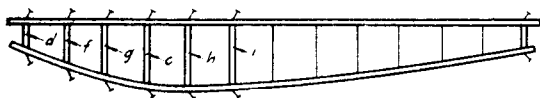
PROCESS OF MAKING FUSELAGE ~ SIMPLE TYPE

SHEET #2



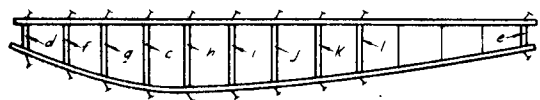
(9)

Glue in Former h back of c and add pins.
This Former must be put in first to correct the bellying out of the lower Longerons.

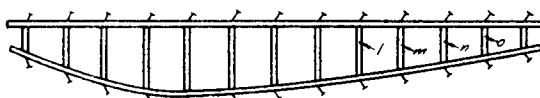


(10)

Glue in successively all intermediate Formers between h and e and add Pins for each Former

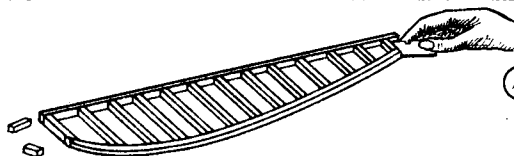


(11)



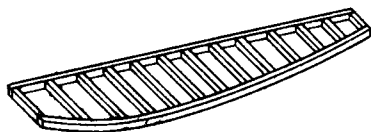
(12)

All Formers glued in.
Set aside to dry.



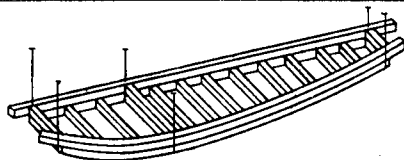
(13)

When glue is dried Pins are removed and the ends of the Longerons are trimmed with a Razor Blade



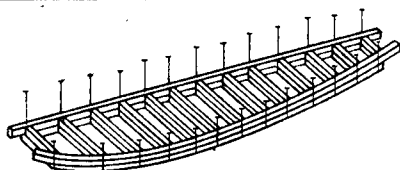
(14)

One Side Frame of Fuselage completed



(15)

The second Side Frame must be exactly like to the first The Longerons of the second Side Frame are placed on top of those of the first Side Frame and process 6 to 12 is then repeated Stage #7 is here shown.



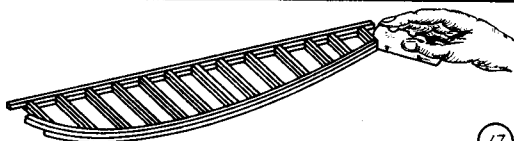
(16)

All Formers have been glued in the second Side Frame It is set aside to dry

MODEL AIRPLANE

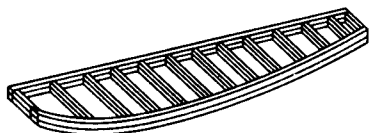
PROCESS OF MAKING FUSELAGE ~ SIMPLE TYPE

SHEET #3



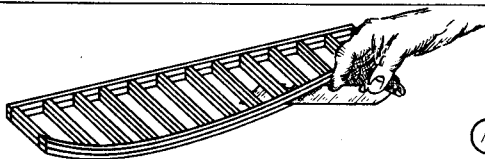
17

When second Side Frame is dry, the Pins are removed and the Longerons are trimmed at the ends with a Razor Blade.



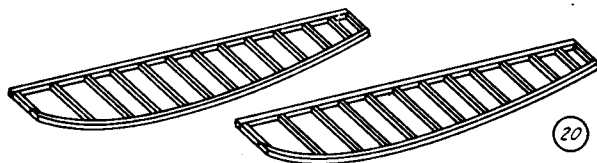
18

After trimming both Side Frames completed are exactly alike. The excess glue on the Formers makes them stick together.



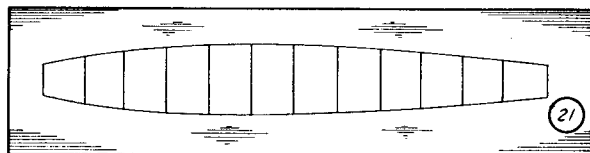
19

The Frames are now pried apart by inserting a Razor Blade between the Longerons and Formers



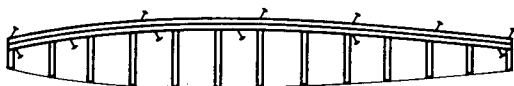
20

The two Side Frames are separated and have been touched up with glue.



21

Take a piece of Beaverboard or 3 Ply wood and draw to actual size a Top View of the Fuselage.

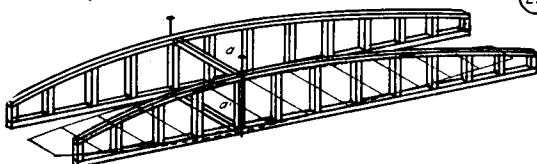


22

Place Side Frames together on edge and hold them together with Pins. Then cut top and bottom Formers to size. Two Formers should be cut for each of the Formers shown.



Plan



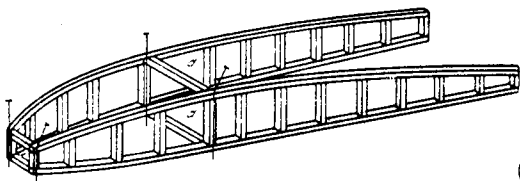
23

Place Side Frames on edge opposite each other and glue on top and bottom Formers a and a'. Add Pins to keep Frames and Formers together.

MODEL AIRPLANE

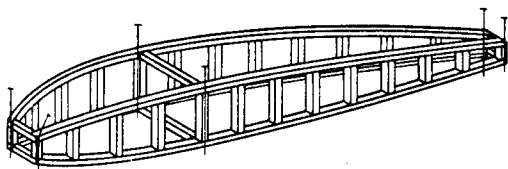
PROCESS OF MAKING FUSELAGE — SIMPLE TYPE

SHEET #4



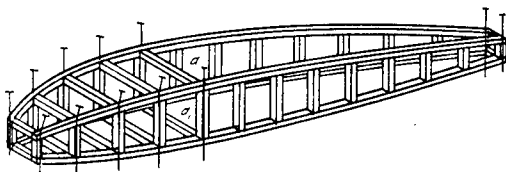
24

Bend Side Frames together in front and glue in Front Formers. Add Pins to hold Formers together. They will spring outward beyond Formers a-a, as shown.



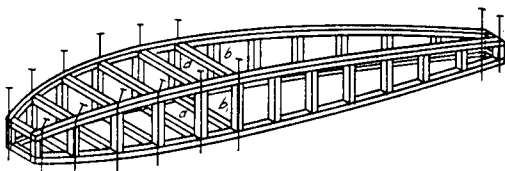
25

Bend Formers together Back of Former a-a, and glue in the Rear Formers. Add Pins to hold Frames together.



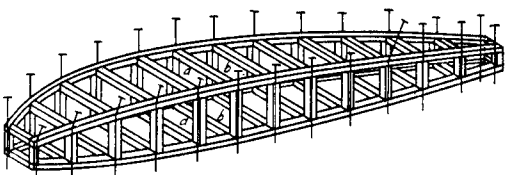
26

Glue in Formers intermediate front and a-a, and add Pins.



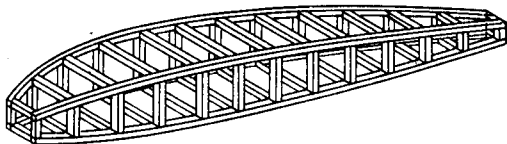
27

Glue in the Formers b-b, back of a-a, in order to give Frames the proper initial curvature. Add Pins.



28

Glue in consecutively all remaining Formers from b-b, back and add Pins. Set aside to dry.



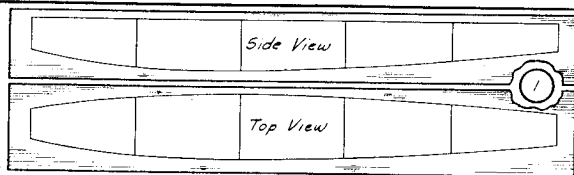
29

After drying remove all Pins. Fuselage Frame is now complete.

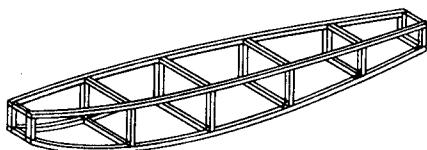
MODEL AIRPLANE

PROCESS OF MAKING FUSELAGE ~ ADVANCED TYPE

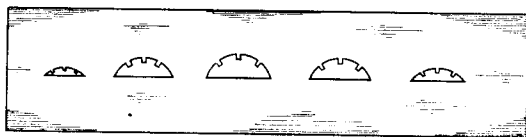
SHEET #5



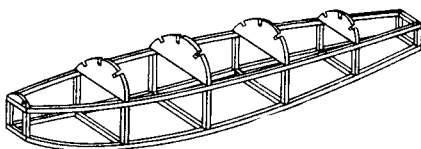
Outlines of Fuselage are made on sheets of ply wood or beaver board and the Fuselage is constructed in the same manner as for the simple Fuselage illustrated on sheets 1, 2, 3, and 4



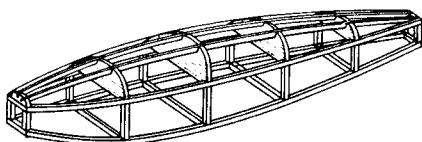
The main structure of the Fuselage completed with Longerons and Formers glued together.



The turtle-back Formers are drawn on a sheet of $\frac{1}{32}$ balsa cut out and notched for Longerons

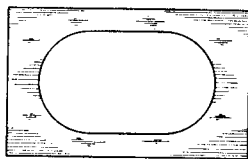


The turtle-back Formers are glued in place.

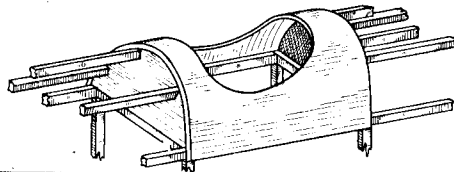


The turtle-back Longerons are cut to size, placed in position glued in the notches of the Formers and after drying, trimmed at the ends.

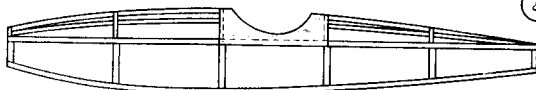
PROCESS OF MAKING COCKPIT ~ ADVANCED TYPE



Layout outline of Cockpit cover on sheet of $\frac{1}{32}$ sanded balsa and cut out



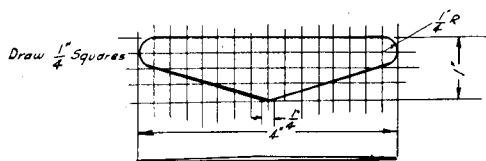
Cut out turtle back Longerons between Formers in Cockpit section of Fuselage and glue the Cockpit cover over the Formers and to the outside of the upper Fuselage Longerons.



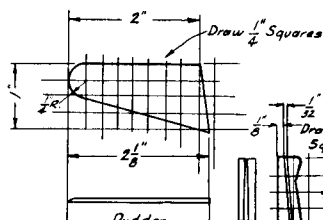
Side View of Fuselage frame complete with Cockpit.

MODEL AIRPLANE GLIDER

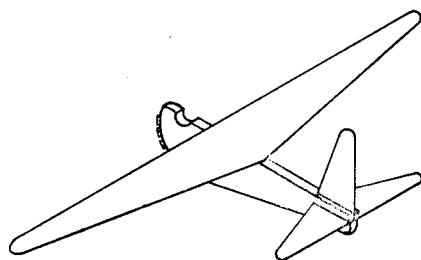
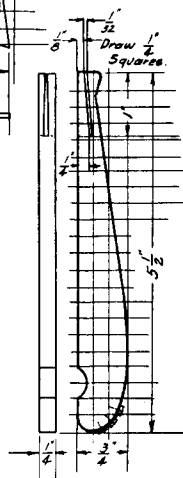
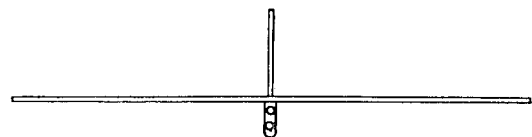
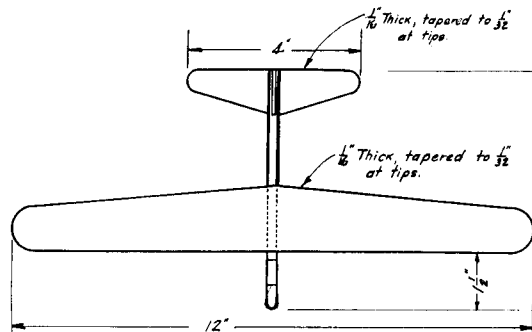
SOLID TYPE



Stabilizer



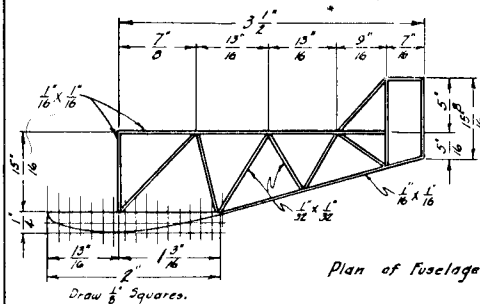
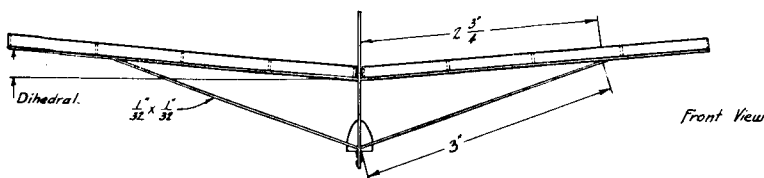
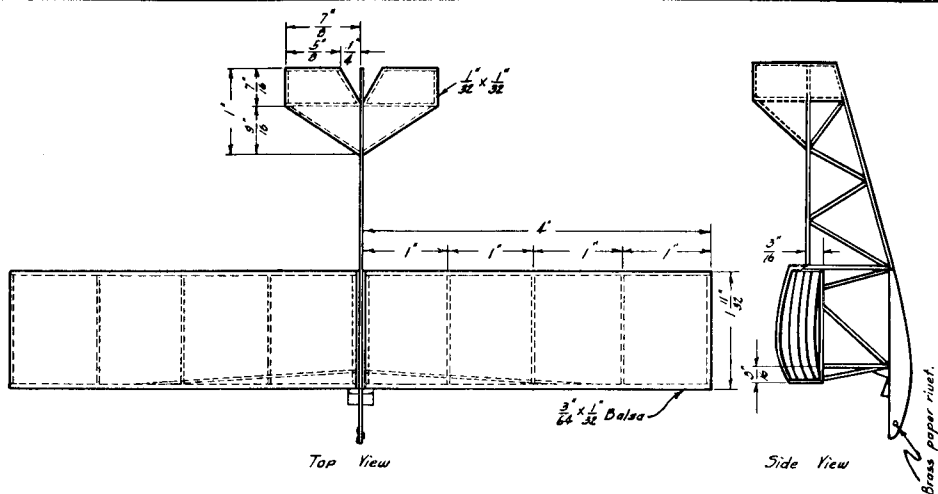
Rudder



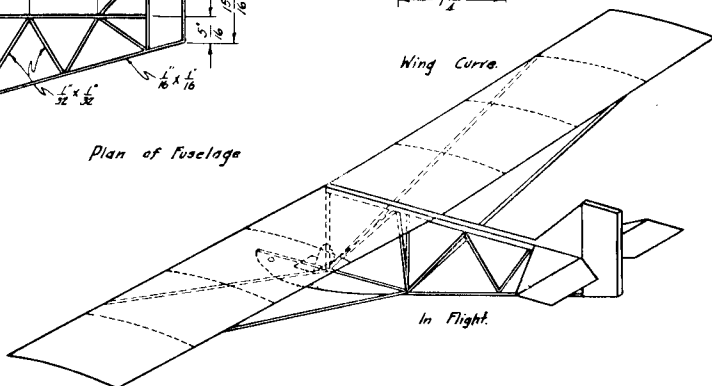
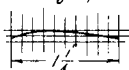
STEPS IN CONSTRUCTION

					Qty.	Size	Material	Part
1	Elevator.				1	$1\frac{1}{2} \times \frac{3}{4} \times 5\frac{1}{2}$	Balsa	Fuselage
2	Rudder.				1	$\frac{1}{2} \times 1\frac{1}{4} \times 12$	Balsa	Wing
3	Wing.				1	$\frac{1}{4} \times 1 \times 4$	Balsa	Elevator
4	Fuselage.				1	$\frac{1}{16} \times 1 \times 2$	Balsa	Rudder
5	Assemble and glide				3	small tacks	Iron	Weight
Designed by	J.R.	Scale	0	1	South Park Commissioners			MODEL AIRPLANE GLIDER
Drawn by	J.R.	Scale	0	1	GAGE PARK			SOLID TYPE
Checked by	J.R.	Scale	0	1				17B-5-107

MODEL PRIMARY GLIDER



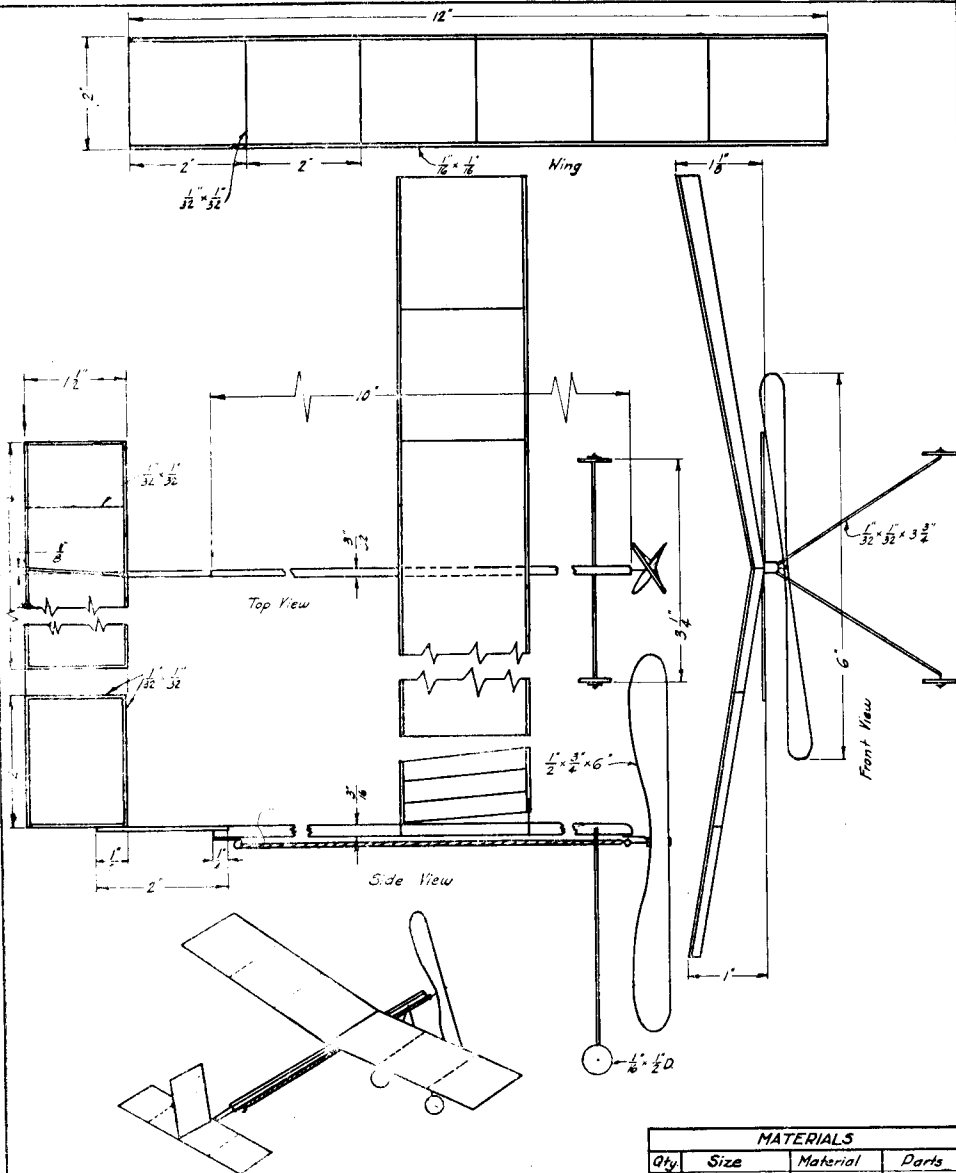
Draw $\frac{1}{8}$ Squares



STEPS IN CONSTRUCTION		QTY.	SIZE	MATERIAL	PART
1.-Fuselage.	6-Cover surface with tissue using banana liquid as a glue.	2	$\frac{1}{32} \times \frac{1}{32} \times 10"$	Balsa	Wing
2.-Elevator.	7-Assemble the plane with wing and elevators in their places & attach paper rivet for weight.	1	$\frac{1}{32} \times 2" \times 3"$	Balsa	Misc.
3-Cut-board pattern of wing.	8-Adjust and glide.	1	$\frac{1}{32} \times \frac{1}{16} \times 24"$	Balsa	Fuselage
4-Cut wing ribs.		1	$\frac{1}{16} \times \frac{1}{4} \times 2"$	Balsa	Fuselage
5-Wing.		1	small paper mat		Weight
Designed by A.C.F.	South Park Commissioners	MODEL PRIMARY GLIDER		17B-6-103	
Drawn by H.G.	GAGE PARK				
Checked by A.C.F.					

MODEL AIRPLANE

RUG RISE OFF GROUND TYPE 1



MATERIALS

Qty	Size	Material	Parts
1	$\frac{1}{16} \times \frac{1}{2} \times 24$	Balsa	Wing
1	$\frac{1}{16} \times 2 \times 4$	Balsa	Ribs
1	$\frac{1}{16} \times \frac{3}{8} \times 10$	Balsa	Motor slice
1	$\frac{1}{16} \times \frac{1}{2} \times 6$	Balsa	Propeller
1	$\frac{1}{16} \times \frac{1}{2} \times 2$	Balsa	Wheels
1	12" No. 6	Music wire	Fittings
1	$\frac{1}{16} \times \frac{3}{8} \times 20$	Rubber	Motor
1	$\frac{1}{16} \times \frac{1}{2} \times 12$	Bamboo	Landing gear
1	$\frac{1}{16}$ with hole	Shim brass	Washer

STEPS IN CONSTRUCTION

1. Elevator
2. Rudder
3. Wing
4. Motor slice and tail boom
5. Landing gear and wheels
6. Wire fittings

CONSTRUCTION CONTINUED

7. Carve propeller
8. Cover surfaces with tissue
9. Assemble the plane with all parts in place
10. Glue, adjust and fly finished plane

Designed by B.C.
 Drawn by D.W.
 Checked by P.F.

Scale
 inches

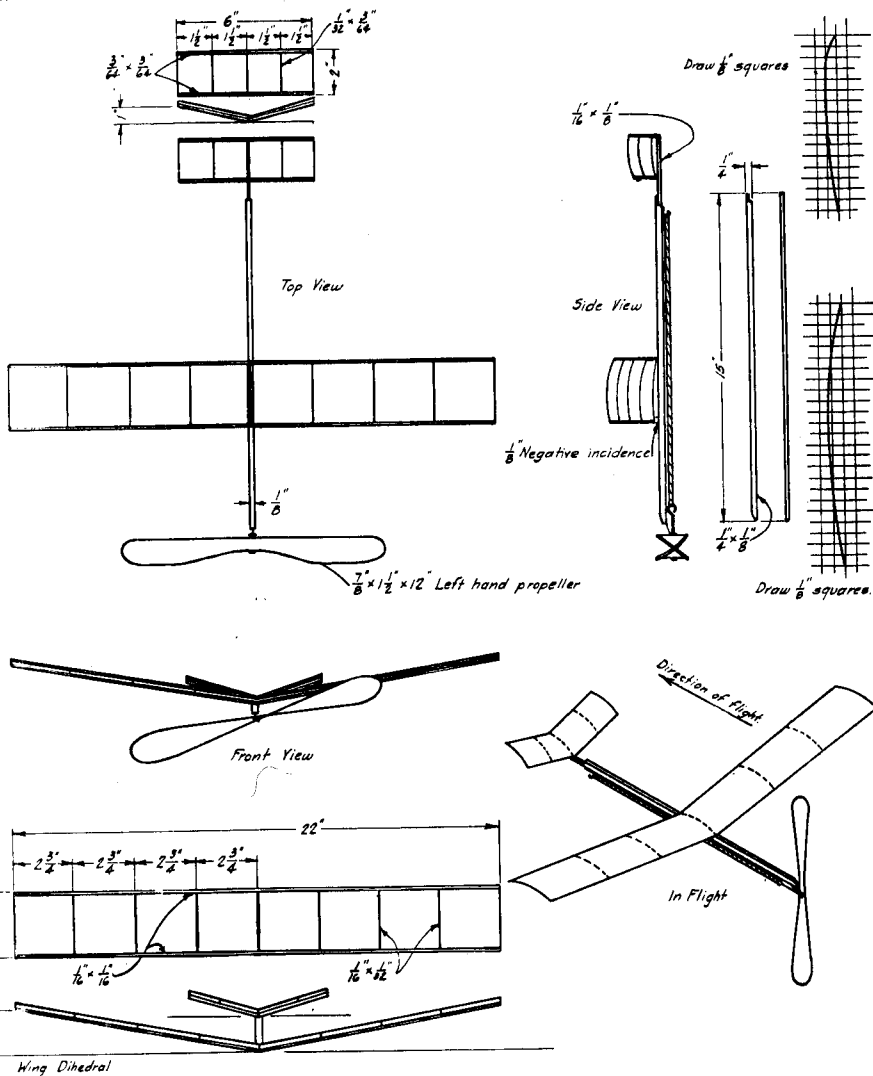
South Park Commissioners
 GAGE PARK

MODEL AIRPLANE
 RUG RISE OFF GROUND
 TYPE 1

17B-6-104

MODEL AIRPLANE

INDOOR PUSHER DURATION



STEPS IN CONSTRUCTION

Make the parts in this suggested order:

1. Elevator.
2. Rudder.
3. Wing.
4. Motor stick.
5. Carve the propeller.
6. Wire fittings.
7. Cover surfaces with tissue.
8. Assemble the plane with all parts, in place.
9. Adjust and fly.

MATERIALS

Qty.	Size	Material	Parts.
2	$\frac{1}{16} \times \frac{1}{16} \times 24$	Balsa	Wing spars
1	$\frac{1}{8} \times 2' \times 6"$	Balsa	Ribs & braces
1	$\frac{1}{8} \times \frac{1}{4} \times 15"$	Balsa	Motor stick
1	$\frac{1}{8} \times 1\frac{1}{2} \times 12"$	Balsa	Propeller
1	12" No. 10	Music wire	Wire fittings
1	18" x 24"	Japanese pap.	All surfaces
2	$\frac{1}{8}$ with $\frac{1}{16}$ hole	Shim brass	Washers
1	$\frac{1}{8} \times \frac{1}{4} \times 30"$	Rubber	Motor

Designed by J.Y.V.
 Drawn by J.Y.V.
 Checked by G.C.F.

Scale 0 1 2 3 4 5
 in inches

South Park Commissioners
 GAGE PARK

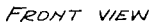
MODEL AIRPLANE
 INDOOR PUSHER DURATION

17B-5-126

S. P. C. - M-10



PLAN



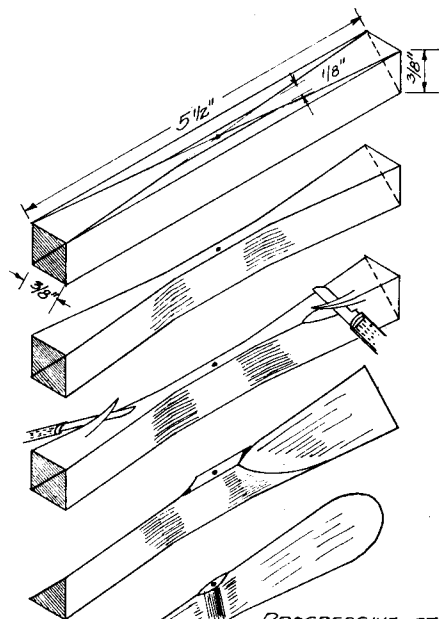
FRONT VIEW

BILL OF MATERIAL

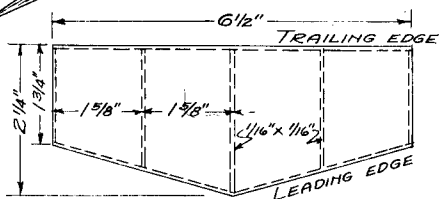
- 1 PIECE Balsa, $1/8" \times 1/8" \times 10 1/4"$ FOR MOTOR BASE
1 PIECE Balsa, $1/16" \times 1/2" \times 10 1/4"$ FOR FUSELAGE
2 PIECES Balsa, $1/16" \times 1/16" \times 12"$ FOR WING SPARS
1 PIECE Balsa, $1/32" \times 2" \times 3"$ FOR RIBS
1 PIECE Balsa, $1/16" \times 2" \times 2"$ FOR WHEELS.
1 PIECE Balsa, $3/8" \times 3/8" \times 5 1/2"$ FOR PROPELLER BLOCK
1 PIECE BAMBOO, $1/32" \times 1/16" \times 5 1/2"$ FOR LANDING GEAR
JAPANESE TISSUE PAPER FOR FUSELAGE, WING & TAIL COVERING
NUMBER 8 MUSIC WIRE FOR METAL FITTINGS.
1 PIECE RUBBER, $1/32" \times 3/32" \times 20"$ FOR MOTOR.
THRUST WASHERS, MODEL GLUE & BANANA LIQUID.

NOTE JAPANESE TISSUE
IS TO BE PLACED ON /
SIDE ONLY THIS AERO-
PLANE WAS DESIGNED
& BUILT BY B.C. FRIED-
MAN, SOUTH PARK
COMMISSIONERS, CHICAGO
ILL.

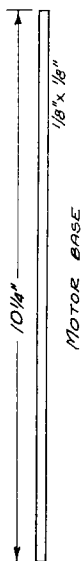
MODEL AEROPLANE DETAILS - S.P.C. - M.10



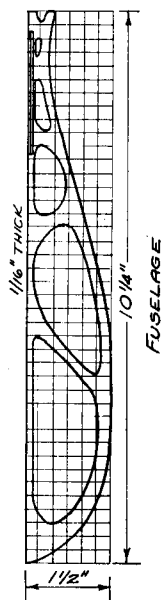
PROGRESSIVE STEPS
IN CARVING THE PROPELLER.



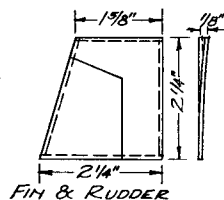
STABILIZER & ELEVATOR



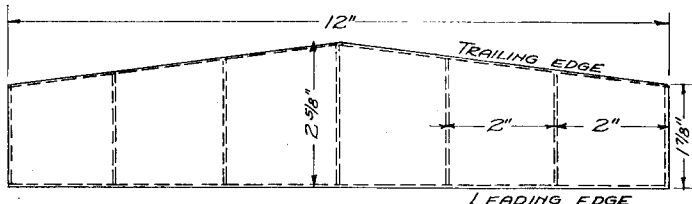
MOTOR BASE



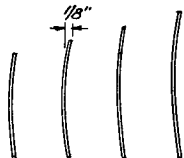
FUSELAGE



FIN & RUDDER



TOP OF WING



RIBS

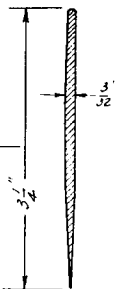
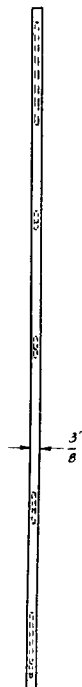
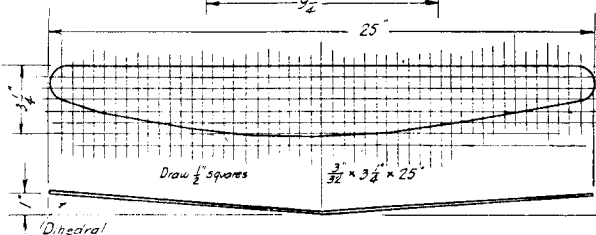
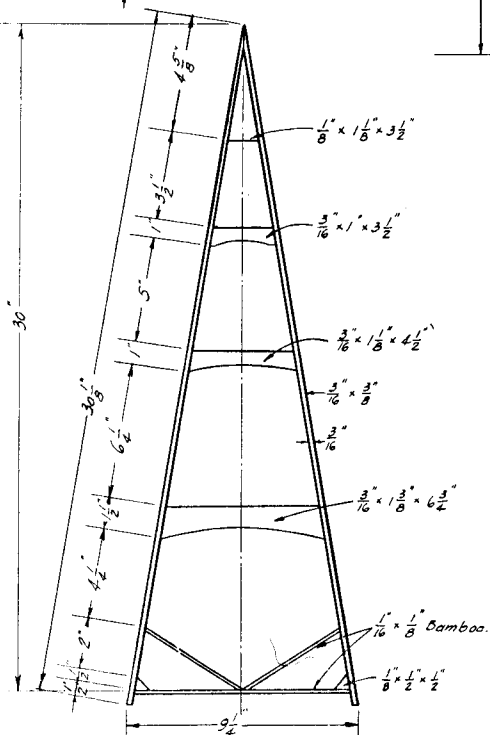
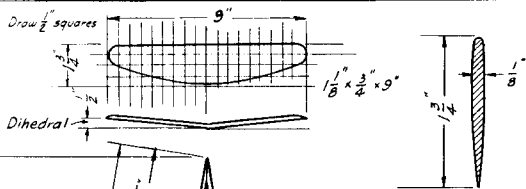


FRONT OF WING

OUTDOOR TWIN PUSHER

SPEED MODEL

PART



STEPS IN CONSTRUCTION

Make the parts in this suggested order.

1. A Frame with braces
2. Elevator
3. Wing
4. Curve propeller
5. Wire fittings
6. Assemble plane with all parts in place
7. Adjust and fly finished plane

MATERIALS

Qty	Size	Material	Parts
2	$\frac{1}{8} \times \frac{3}{8} \times 30"$	Balsa	A Frame
1	$\frac{3}{16} \times 2 \times 24"$	Balsa	Braces
1	$\frac{1}{4} \times 2 \times 10"$	Balsa	Elevator
1	$\frac{3}{16} \times 3 \frac{1}{2} \times 26"$	Balsa	Wing
2	$\frac{1}{2} \times 1 \frac{1}{4} \times 5 \frac{1}{2}"$	White pine	Propeller
4	$\frac{1}{8}$ with $\frac{1}{32}"$ hole	5/16 cross washer	
2Ft	No 14	Music wire	Fittings
2	$\frac{1}{4} \times \frac{1}{4} \times 10"$	Bamboo	Braces

Designed by _____
 Drawn by JRS
 Checked by _____
 Scale 0 1 2 3 4 5
 In inches

South Park Commissioners
GAGE PARK

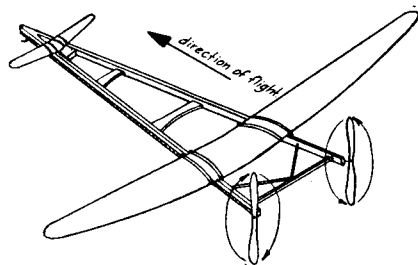
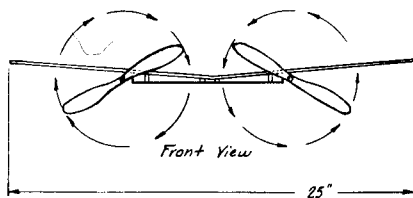
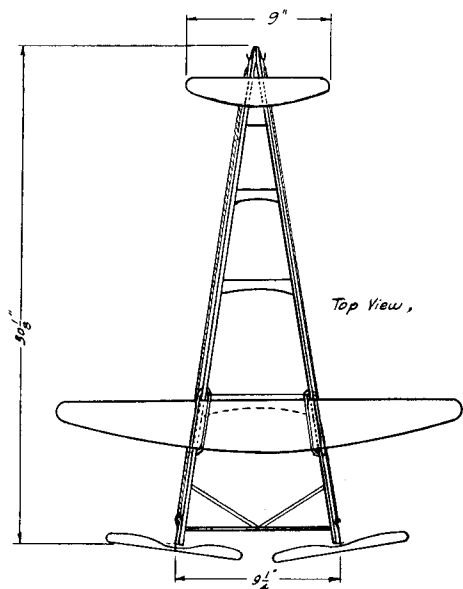
OUTDOOR TWIN PUSHER
 SPEED MODEL

17B-6-118

OUTDOOR TWIN PUSHER

SPEED MODEL

PART 2



Designed by	F.N.	Scale	0 1 2 3 4 5 6
Drawn by	J.T.D.		
Checked by	B.C.F.		

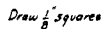
in inches

South Park Commissioners
GAGE PARK.

OUTDOOR TWIN PUSHER
SPEED MODEL

117B-6-119

PART 1

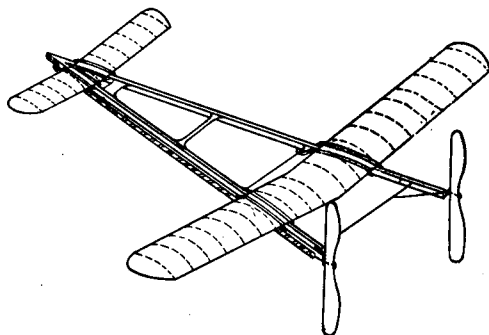
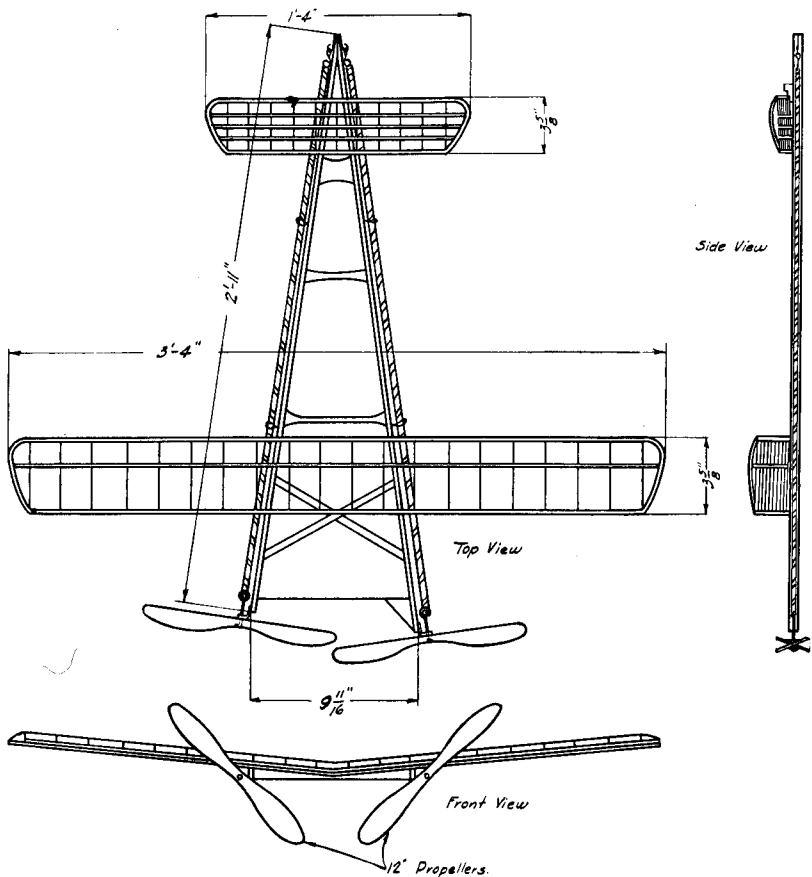


Draw $\frac{1}{4}$ " squares

STEPS IN CONSTRUCTION		MATERIALS				MATERIALS			
Make the parts in this suggested order:		Qty.	Size	Material	Part	Qty.	Size	Material	Part
1	"A" Frame or fuselage	2	$\frac{1}{8}" \times \frac{1}{8}" \times 36"$	Balsa	"A" Frame	2	$\frac{1}{32}" \times \frac{3}{32}" \times 24"$	Balsa	Wing spars
2	Elevator	1	$\frac{1}{8}" \times 2" \times 12"$	Balsa	Braces	5	$\frac{1}{8}" \times \frac{1}{8}" \times 24"$	Balsa	Elevator spars
3	Wing	1	$\frac{1}{8}" \times 2" \times 12"$	Balsa	Braces	1	$\frac{1}{8}" \times \frac{1}{4}" \times 10"$	Bamboo	Brace
4	Wire fittings.	2	$\frac{3}{32}" \times 2" \times 24"$	Balsa	Ribs	2	$\frac{3}{8}" \times \frac{1}{2}" \times 12"$	Balsa	Propeller
5	Cornie one right hand propeller.	2	$\frac{1}{8}" \times \frac{1}{8}" \times 24"$	Balsa	Wing spars	2	$18" \times 24"$	Japanese paper	All surfaces
6	Cornie one left hand propeller	2	$\frac{1}{8}" \times \frac{1}{8}" \times 24"$	Balsa	Wing spars	17#	No 12	Music wire	Wing fittings
7	Assemble the plane with all parts in place					4	$\frac{1}{8}"$ with $\frac{1}{32}"$ hole	Shim brass	Washers
8	Cover surfaces with tissue					17#	No 14	Music wire	Fittings
9	Glue, adjust and fly finished plane					17#	No 8	Music wire	Fittings
Designed by J.C.		South Park Commissioners				TWIN PUSHER DURATION			
Drawn by J.R.G. Scale 0 1 2 3 4 5 6 7		GAGE PARK				DASHER 1			
Checked by J.R.						17B-5-110			

TWIN PUSHER DURATION

PART 2



Designed by S.R.
 Drawn by J.F.B.
 Checked by D.C.F.

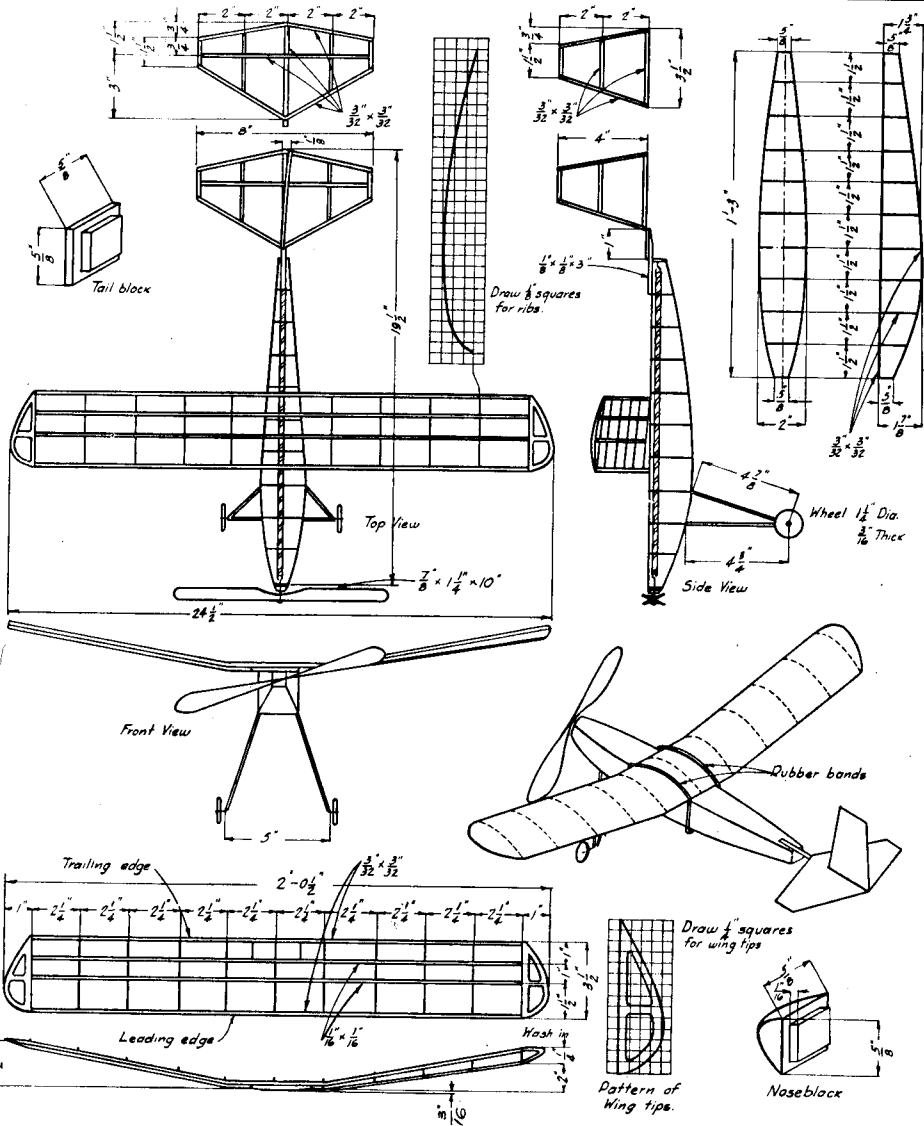
South Park Commissioners
 GAGE PARK

TWIN PUSHER DURATION
 PART 2

17B-5-111

MODEL AIRPLANE

OUTDOOR COMMERCIAL ADVANCED WAKEFIELD.



STEPS IN CONSTRUCTION

- 1 Make two side views of fuselage.
- 2 Cut top & bottom formers and glue together.
- 3 Elevator.
- 4 Rudder.
- 5 Cut ribs for wing.
- 6 Wing.
- 7 Landing gear and wheels.
- 8 Front and rear fuselage blocks.
- 9 Propeller.

WIRE FITTINGS

- 10 Wire fittings
- 11 Cover both surfaces with tissue.
- 12 Assemble the plane with all parts in place
- 13 Glide, adjust and fly finished plane.

MATERIALS

Qty.	Size	Materials	Part
14	1/2" x 1/2" x 24"	Balsa	Fuselage
1	1/2" x 2" x 24"	Balsa	Wing ribs
1	1/2" x 1/2" x 1/2"	Balsa	Nose block
2	1/2" x 1/2" x 1/2"	Balsa	Tail block

MATERIALS CONTINUED

Qty.	Size	Material	Part
1	1/2" x 1/2" x 6"	Balsa	Tail boom
1	1/2" x 2" x 6"	Balsa	Wheels
1	1/2" x 1/2" x 10"	White pine	Propeller
1	1/2" x 1/2" x 6"	Bamboo	Landing gear
1	12" No. 10	Musical wire	Fittings
4	1/2" with 1/2" hole	Shim brass	Washers
2	18" x 24"	Japanese pop	All surfaces

Designed by B.C.F.
 Drawn by B.C.F.
 Checked by B.C.F.

Scale 0 1 2 3 4
 in inches

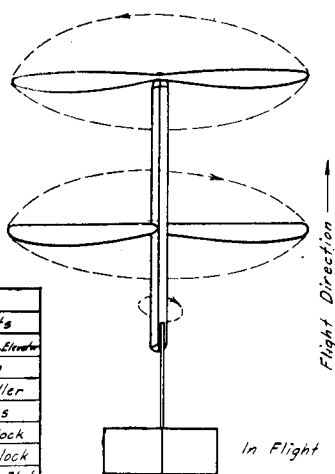
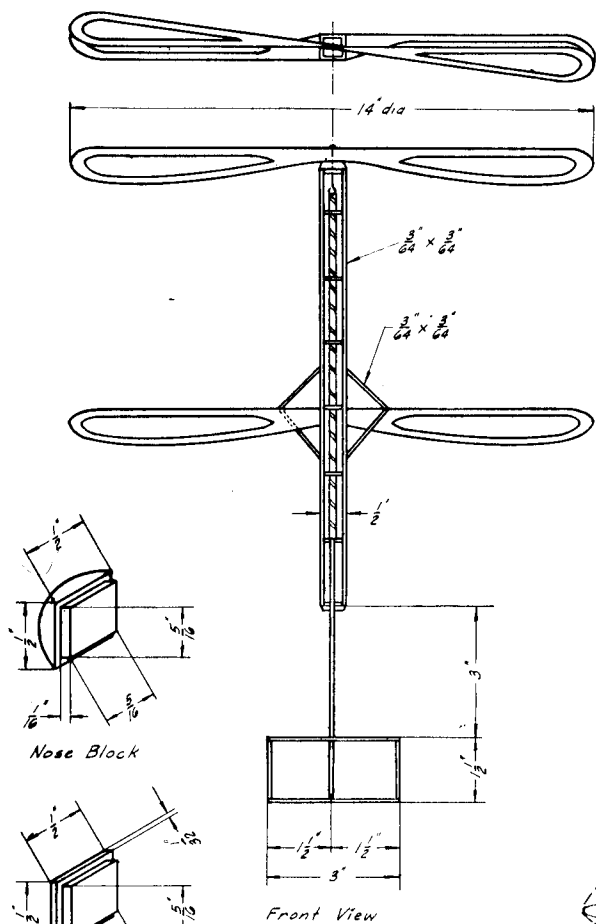
South Park Commissioners
 GAGE PARK

MODEL AIRPLANE
 OUTDOOR COMMERCIAL
 ADVANCED WAKEFIELD

17B-6-115

MODEL AIRPLANE

MODEL HELICOPTER



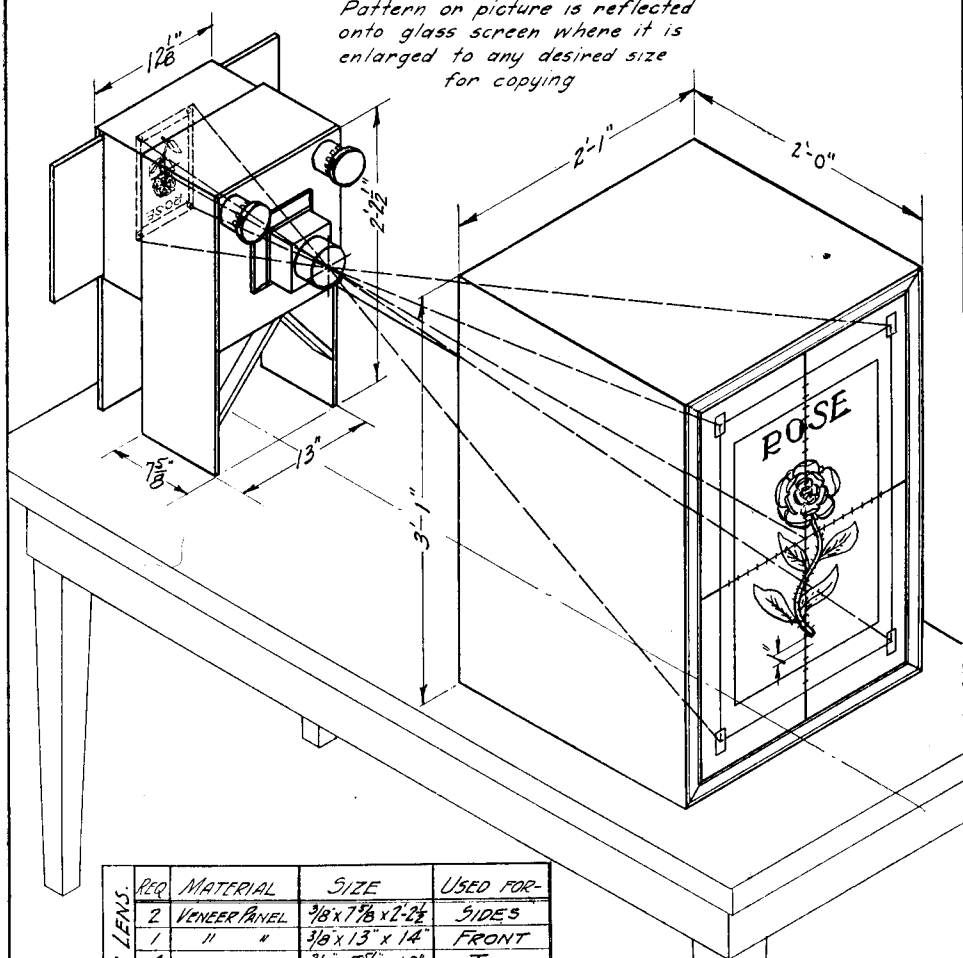
178-5-121

STEPS IN CONSTRUCTION		MATERIAL		
Make the part in this suggested order	Qty	Size	Material	Parts
1 Make two side views of fuselage	4	$\frac{3}{16} \times \frac{3}{16} \times 24$	Balsa	Fuselage & Elevator
2 Cut top view farmers & glue together	1	$\frac{1}{2} \times \frac{1}{2} \times 5$	Balsa	Boom
3 Make Elevator and Boom	2	$\frac{1}{2} \times \frac{1}{2} \times 14$	Balsa	Propeller
4 Make one right hand propeller	1	$\frac{1}{2} \times \frac{1}{2} \times 12$	Balsa	Braces
5 Make one left hand propeller	1	$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$	Balsa	Nose Block
6 Cut center of both propellers out $\frac{1}{2}$ from the edges	2	$\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$	Balsa	Rear Block
7 Cover surface with tissue	1 ft.	No. 6	Muslin Wire	Wire fittings
8 Assemble plane with all parts in place	1	$\frac{1}{2} \times \frac{1}{2} \times 20$	Rubber	Motor
9 Adjust and fly Helicopter	1	4×18	Japanese paper	All surfaces

Scale: 0 1 2 3 4
inches

PATTERN ~ ENLARGING PROJECTOR

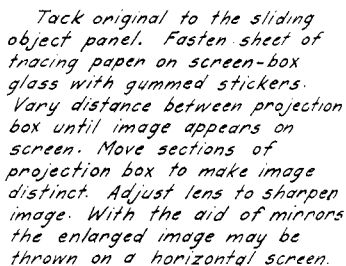
Pattern on picture is reflected onto glass screen when it is enlarged to any desired size for copying



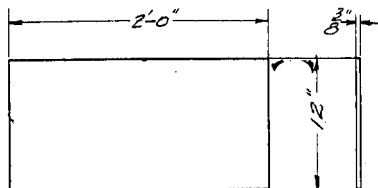
REQ	MATERIAL	SIZE	USED FOR
2	VENEER PANEL	$\frac{3}{8} \times 7\frac{7}{8} \times 2'-2\frac{1}{2}"$	SIDES
1	" "	$\frac{3}{8} \times 13" \times 14"$	FRONT
4	" "	$\frac{3}{8} \times 7\frac{7}{8} \times 13"$	TOP
1	" "	$\frac{3}{8} \times 7\frac{7}{8} \times 12\frac{1}{4}"$	BOTTOM
4	" "	$\frac{3}{8} \times 2\frac{1}{8} \times 4\frac{1}{2}"$	LENS BOX
4	MOULDING	$1" \times 1\frac{1}{8} \times \frac{1}{4}"$	" "
2	PINE	$\frac{1}{2} \times 1" \times 8\frac{3}{4}"$	BRACES
1	PIECE	$1" \times 1" \times 7\frac{7}{8}"$	GLUING BLOCK
2	VENTILATOR		
1	DOUBLE LENS	$3\frac{1}{2}"$ DIA.	
2	VENEER PANEL	$\frac{3}{8} \times 2'-1" \times 2'-0"$	TOP & BOTTOM
2	VENEER PANEL	$\frac{3}{8} \times 2'-0" \times 3'-0"$	SIDES
4	PINE STRIPS	$\frac{3}{4} \times 1" \times 2'-0"$	FRAME TOP & BOTTOM
4	" "	$1" \times 1" \times 3'-0"$	FRAME SIDES
2	" "	$\frac{1}{4} \times \frac{3}{4} \times 22\frac{1}{2}"$	GLASS FRAME TOP & BOTTOM
2	" "	$\frac{1}{4} \times \frac{3}{4} \times 22'-10\frac{1}{8}"$	GLASS FRAME SIDES
22	BLOCKS	$\frac{3}{4} \times \frac{3}{4} \times 2"$	GLUING REINETS
1	GLASS	$\frac{1}{8} \times 22\frac{1}{8} \times 34\frac{1}{8}"$	IMAGE PANEL

MATERIAL, REAR BOX - OBJECT.			
REQ	MATERIAL	SIZE	USED FOR
2	VENEER PAN.	$\frac{3}{8} \times 7\frac{1}{2} \times 13"$	SIDES
2	" "	$\frac{3}{8} \times 8\frac{3}{4} \times 12\frac{1}{8}"$	TOP & BOTTOM
1	" "	$\frac{3}{8} \times 2\frac{1}{4} \times 11\frac{3}{8}"$	SHELF
2	" "	$\frac{3}{8} \times 1\frac{1}{4} \times 2\frac{1}{4}"$	SHELF SUPPORTS
2	" "	$\frac{3}{8} \times 1" \times 12\frac{1}{8}"$	STOP
2	PINE	$\frac{5}{16} \times \frac{9}{16} \times 11\frac{3}{8}"$	STOP
1	VENEER PAN.	$\frac{3}{8} \times 12" \times 12\frac{1}{8}"$	SUPPORT
1	PINE	$1" \times 1" \times 12\frac{1}{8}"$	GLUE BLOCK
2	LIGHT SOCKET	PORCL'N.	#14 RL. WIRE
1	EXTENSION CORD & SOCKET.		
2	LAMP	-WATT	
2	REFLECTOR	7" DIA.	
1	VENEER PAN.	$\frac{3}{8} \times 12" \times 2'-0"$	

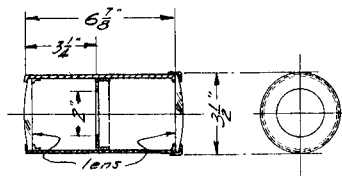
DETAILS



SCREEN BOX.



SLIDING OBJECT PANEL.



PROJECTION LENS

14" focal length
Bausch & Lomb or similar
catalog # 41-53-44 model # 4044*

Kitecraft and Kite Tournament. Miller, Charles M. Manual Arts Press
Peoria, Ill. 1914. 144 Pp. \$2.00.

43 pictures

56 diagrams

Glider Pp. 108-111

Self Propelling air devices Pp. 112-114

Airplane model Pp. 115-117

Airplane model—favorite Pp. 117-123

Propellers, motors and gears Pp. 121-126

Model airplane tournaments Pp. 127-139

Boy Mechanic, The. Popular Mechanics Press, Chicago, Ill. 1915. 473
Pp. \$2.00.

85 pictures

910 diagrams

Paper glider P. 109

Aeroplane kite, and Pp. 11-112

Tandem aeroplane glider Pp. 113-114

Outdoor Sports the Year 'Round. Popular Mechanics Press, Chicago,
Ill. 1930. 336 Pp. \$2.00.

412 pictures

147 diagrams

Model airplanes, making of Pp. 154-172

Popular Mechanics Blue Prints Series Nos. 500-750, Inc. Popular
Mechanics Press, Chicago, Ill. 250 Pp.

Page size: twenty-two by sixteen inches.

185 pictures

250 diagrams

Catapault-rubber, to launch model plane P. 517

Winder for model planes P. 556

Tractor plane model, simple P. 558

Plane, long flight model P. 559

Plane, commercial model P. 541

Biplane or monoplane, model P. 513

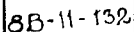
Model plane, scale—Ford tri-motor P. 721

Model plane, transport P. 704

Helicopter, twin-propeller P. 674

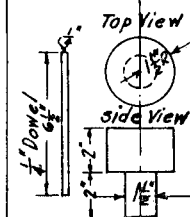
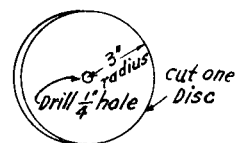
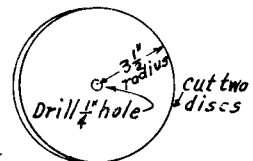
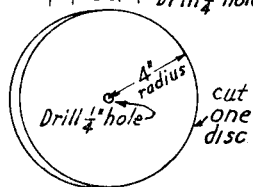
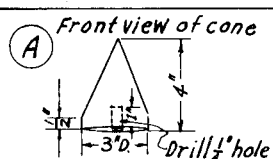
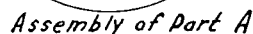
- Every Day Science Projects.* Smith, Edith Lillian. Houghton, Mifflin Co., Chicago, Ill. 1925. 341 Pp. 96c.
 89 pictures
 46 diagrams
 Model airplanes, simple Pp. 307-308
- Carpentry and Woodwork.* Foster, Edwin, W. Doubleday, Page & Co., New York. 1911. 566 Pp. \$1.00.
 93 pictures
 156 diagrams
 (a) Monoplane, the Pp. 75-83
 (b) Model aeroplane, the Pp. 68-74
- Toy Making in School and Home.* Polkinghorne, R. K. and M. I. R. Frederick A. Stokes Co., New York. 1920. 299 Pp. \$3.00.
 52 pictures
 163 diagrams
 Toy kites, gliders and aeroplanes Pp. 249-259
- Home Workshop Manual, The.* Wakeling, Arthur. Popular Science Publishing Co., New York. 1930. 494 Pp. \$5.00.
 518 pictures
 117 diagrams
 Monoplane, indoor model Pp. 218-222
 Model airplane, Tudor Morris Pp. 227-236
- Making Things with Tools.* Hall, A. Neely. Rand, McNally & Co., Chicago, Ill. 1928. 57 Pp.
 42 pictures
 28 diagrams
 Airplane, an air-mail Pp. 17-18
 Airplane glider, model Pp. 16-17
- Manual Training Play Problems.* Marten, William. Macmillan Co. Chicago, Ill. 1917. 144 Pp. \$1.25.
 77 pictures
 65 diagrams
 Airplane and glider model, Pp. 100-101
- Playwork Manual, The.* MacBeth, Ann. Robert M. McBride Co., New York. 1918. 143 Pp. \$1.25.
 17 pictures
 61 diagrams
 Model airplane Pp. 136-137

MESSENGER
(PARACHUTE TYPE)

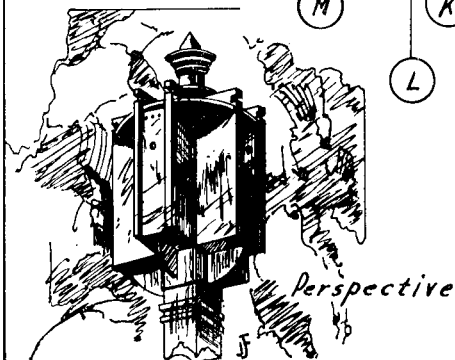


OF ♦ THIS ♦ SERIES

Isometric View



Note: All discs of part A to be $\frac{1}{2}$ " Thick

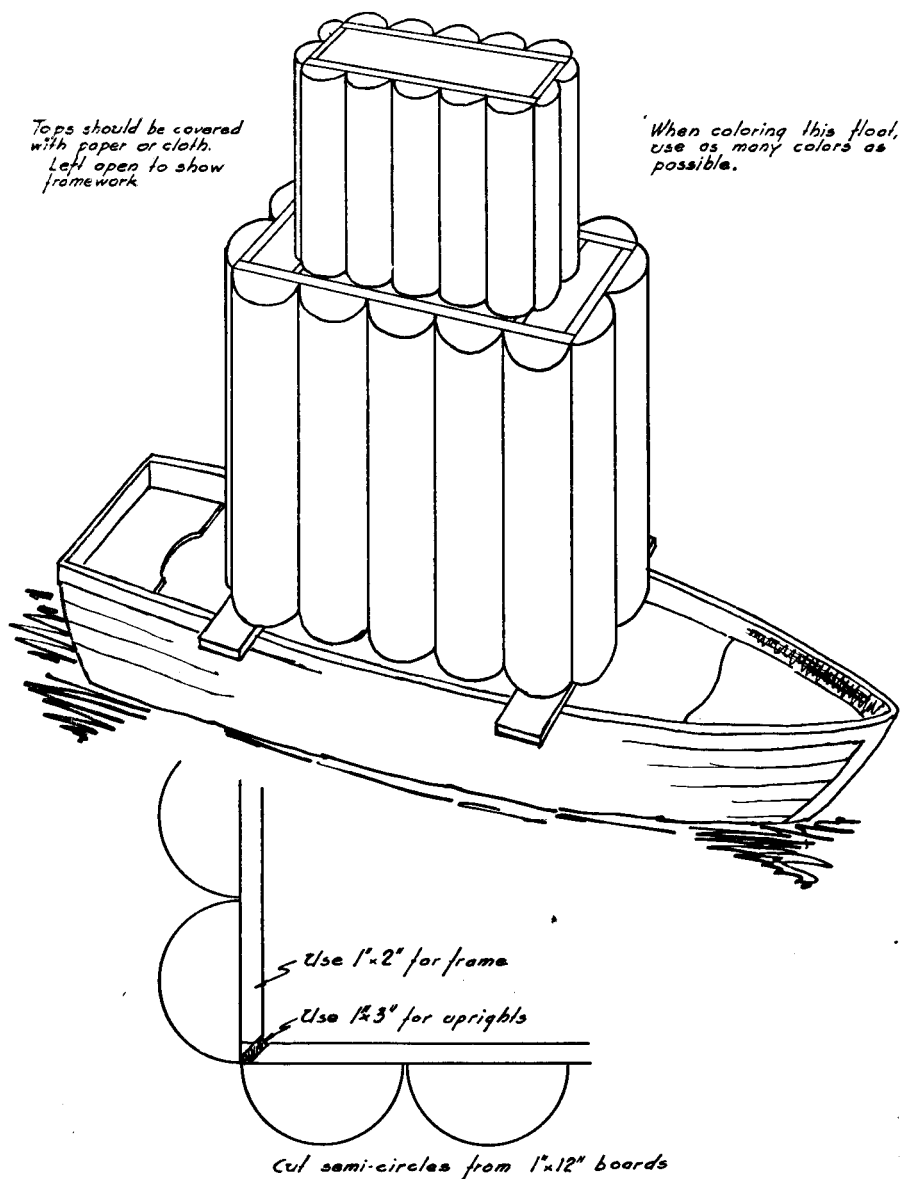


SAMPLE PAGE FROM
LANTERNS AND FLOATS
OF • THIS • SERIES

SUGGESTIONS FOR A FLOAT

ART-CRAFT

MODERN DESIGN



SAMPLE PAGE FROM
MASKS AND COSTUMES
OF * THIS * SERIES



Make headdress of cardboard. Paint gray shading to black at outer edge. Paint ornament silver and black.

Fig. 1

- 1 Green-flesh
- 2 Blue-purple
- 3 Blue-green
- 4 Red-purple
- 5 Black
- 6 Crimson
- 7 Outline in Green-brown
- 8 Silver

Fig. 1



Fig. 2

- 1 Light flesh
- 2 Deeper flesh
- 3 Vermillion
- 4 Deep purple
- 5 Light purple
- 6 Yellow
- 7 White
- 8 Black
- 9 Deep red
- 10 Olive

Add braids of bright red raffia

Fig. 2

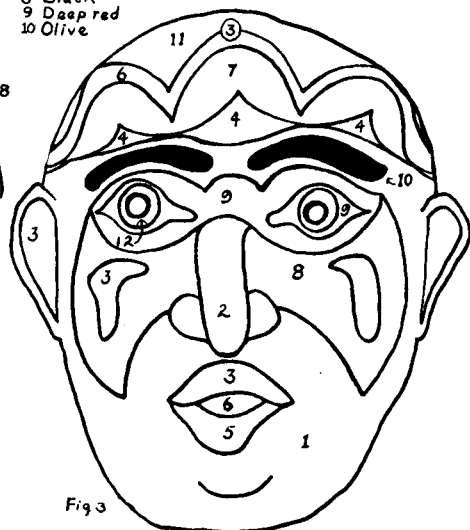


Fig. 3

- | | |
|--------------------|----------------|
| 1 Light Orange | 8 Yellow-green |
| 2 Deep Orange | 9 White |
| 3 Vermillion | 10 Black |
| 4 Light purple | 11 Gray green |
| 5 Deep purple | 12 Blue |
| 6 Dark purple-blue | |
| 7 Turquoise | |

PAPIER-MÂCHÉ MASKS

Fig. 3

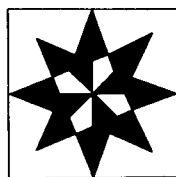
QUILTING

OF + THIS + SERIES

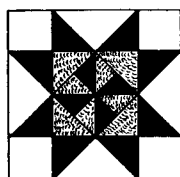
QUILT PATTERNS

TRADITIONAL AND HISTORIC- SINGLE BLOCK AND ASSEMBLED

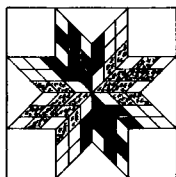
(CLASS I.)



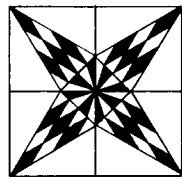
ENIGMA



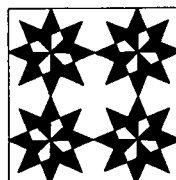
MARTHA WASH. STAR



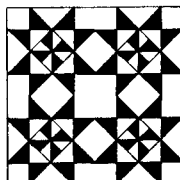
DOVES IN THE WINDOW



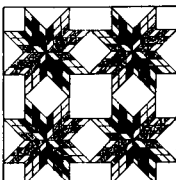
STAR OF MANY POINTS



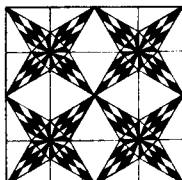
INDIAN CANES



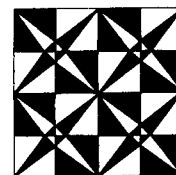
MEXICAN STAR



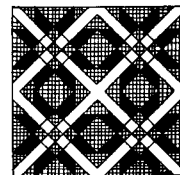
ST. LOUIS STAR



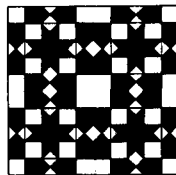
PROVIDENCE



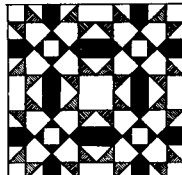
BLACK BEAUTY



LINKED DIAMONDS



OLD MAID'S PUZZLE



SINGLE IRISH CHAIN

