KINGPIN

You'll never know some of the terrific things rubber models can do until you've built Kingpin.

THE REAPPEARANCE OF RUBBER has revived activity in one of the most fascinating phases of our sport. Much of this activity is, quite naturally, centered on that interesting rubber-powered class — the Wakefield.

Because of the great amount of work that has been done in this class, both here and abroad, the Wakefield model has become a highly refined machine. As such, its structure and flying tend to become rather intricate. Kingpin was created primarily to offset this tendency. To people who are short of time, inexperienced, or lazy, this is important.

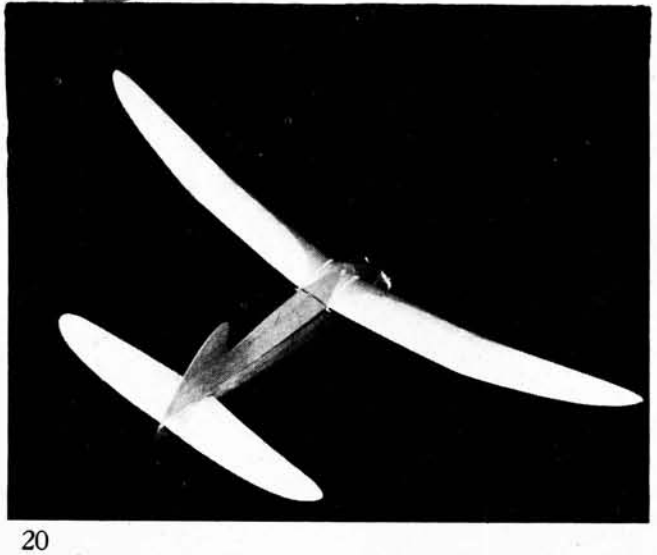
It is wrong to assume that this implies a lack of thought or care in design. For example, a great deal of effort was expended in juggling the various members to get the proper cross-section, incidence angles, and clearances built into the fuselage. So don't be deceived by the ship's apparent simplicity. It is the result of thought, not laziness. It was contrived, not accidental.

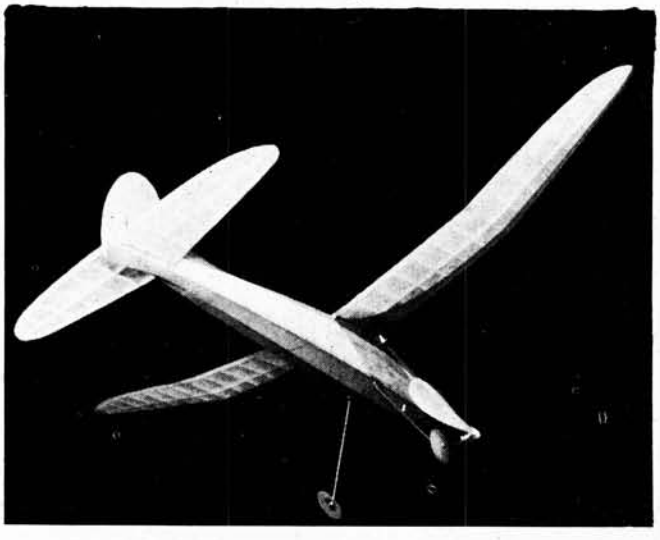
The net result of all this is a rugged, dependable ship that is easily and quickly built. Many difficulties have been eliminated in the design. A definitely fixed wing and stab and a permanently mounted fin help maintain adjustments. An unorthodox fuselage structure bypasses many opportunities for inaccurate construction. A sturdy, fixed landing gear with freely turning wheels insures smooth, trouble-free takeoffs. A really flush, folding propeller keeps the blades from acting as a rudder, thereby upsetting the adjustments in the glide. Adequate provision for handling the powerful motor saves a few more headaches.

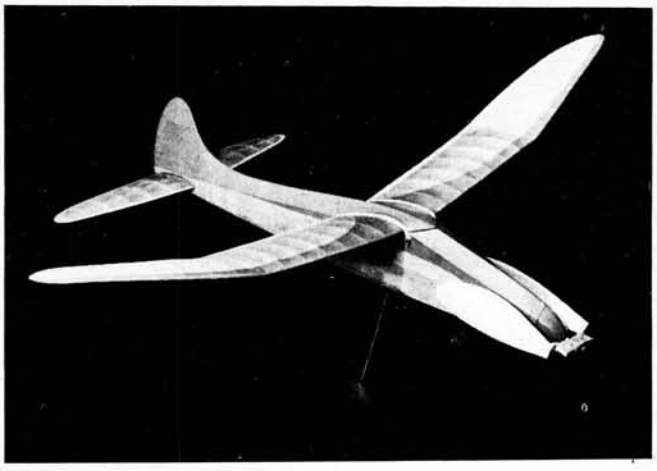
The formula for the ship's performance is an old and simple one: altitude. This requires a high proportion of rubber in the model's total weight, and calls for a weak mind and a strong back when winding. The end result, of course, depends upon the flyer's thermal-hunting ability but the height the model can reach enables him to take advantage of many of the weaker currents.

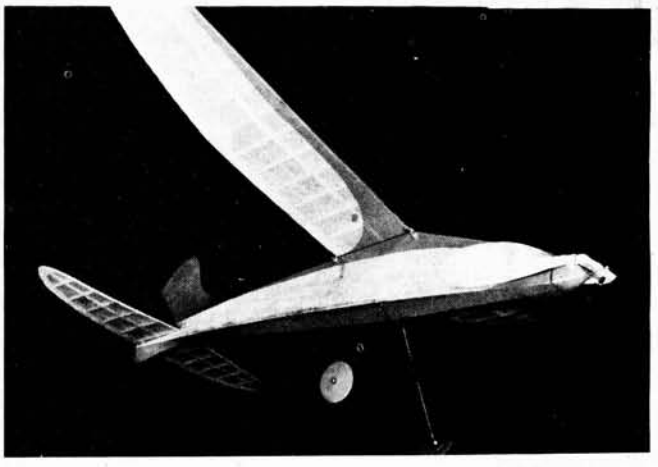
FUSELAGE CONSTRUCTION is almost ridiculously simple. Notice that the longerons are laid out perfectly straight. This requires a minimum of measurement in scaling-up the plans. Begin construction by laying out the $\frac{1}{8}$" square longerons and side stringers. Fill in the nose panel with $\frac{1}{8}$" sheet, keeping the grain at right angles to the longerons to eliminate any possibility of splitting. After inserting the $\frac{1}{8}$" by $\frac{1}{2}$" hard balsa piece that serves to anchor the rear end of the motor, you are ready to place the uprights. All that is necessary in this operation is the placing of three spots of cement on each of the longerons and on the side stringers. Merely lay the upright on top of this assembly and wait for the cement to dry. Then trim off the excess length of the uprights till they are flush with the outer edge of the longerons. Be sure to build one right and one left fuselage side. This may be accomplished easily by drawing the plans on tracing velum or by greasing ordinary paper to make it translucent. This will insure two exact sides. Before joining the sides cement the $\frac{1}{16}$" sheet on the inner face of each fuselage side at the rear motor anchorage as indicated.

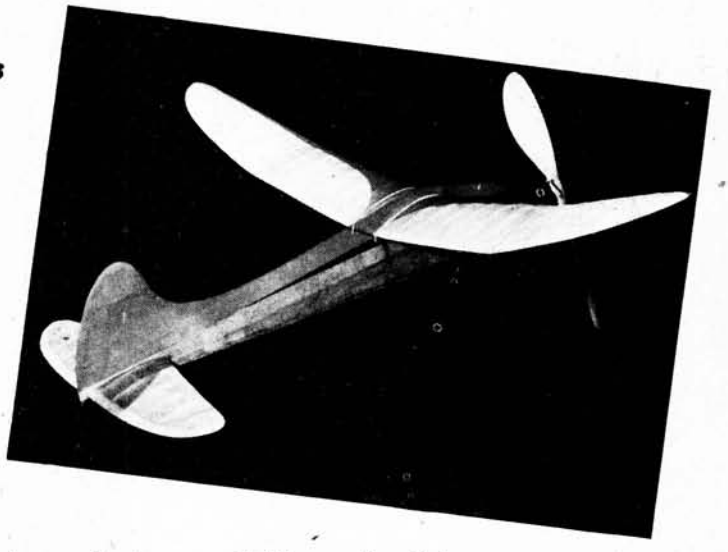
When joining the two sides, keep the uprights on the inside and place a two-inch wide block between them. This block serves only to insure proper spacing and alignment. Cement the first cross braces in place at the wing position. Then taper the tail post for an accurate fit and cement it. The next position to receive your attention should be that at the rear end of the motor. When this is fixed you can insert the remaining cross braces between the wing position and tail. You can now remove the spacing block and cement the top and bottom nose sheeting, again keeping the grain perpendicular to the fuselage length. All the other braces will now fall into position. Note that all the cross braces except those at the rear edges of the wing and landing gear and the forward edge of the rear motor anchorage sheeting, are behind the uprights. The landing gear can now be bent and cemented in position. The drawing











by Marvin L. Moss

makes this assembly clear. Just be sure to use plenty of cement to make a secure attachment.

Attaching the top and bottom stringers is relatively simple since the inner edges are straight and no fitting need be done. Cement the formers at the leading and trailing edges of the wing in place, and insert two gussets on either side of the bottom stringer at the landing gear position. A second 1/8" square is laminated to the side stringer to give it a total depth of 1/4". This second stringer is tapered toward the tail, disappearing at the rear rubber anchorage.

Build the vertical fin directly on the fuselage. The leading edge is automatically positioned by the two cross braces against which it rests. The rudder tab is attached with soft wire hinges.

At the nose, soft blocks are used to strengthen the area and conform to the fuselage shape. Additional blocks are placed inside the nose for increased rigidity. A small hatch is fitted at the rear as shown, for access to the rubber.

Since a true running wheel is a necessity for smooth R. O. G. take-offs the special construction is used as shown. A 1/16" birch plywood disk and a 1/8" balsa sheet are cemented together. Insert a 7/8" large face bushing, and peen down the end using a small metal ball. Then force through a 1/16" inside diameter bushing to act as the bearing surface.

THE NOSE BLOCK is formed of a single block with two cross-grained layers of hard 1/8" sheet cemented to the rear face.

Both wing and stab construction are conventional and offer no peculiar problems. It will be easier to maintain accurate dihedral angles if the wing main spar is completely assembled before construction is begun. The trailing edge of the wing is notched at the center section to act as a key for the hold-down rubber. Fuselage contour is maintained over the top of the wing by the stringer and formers as shown.

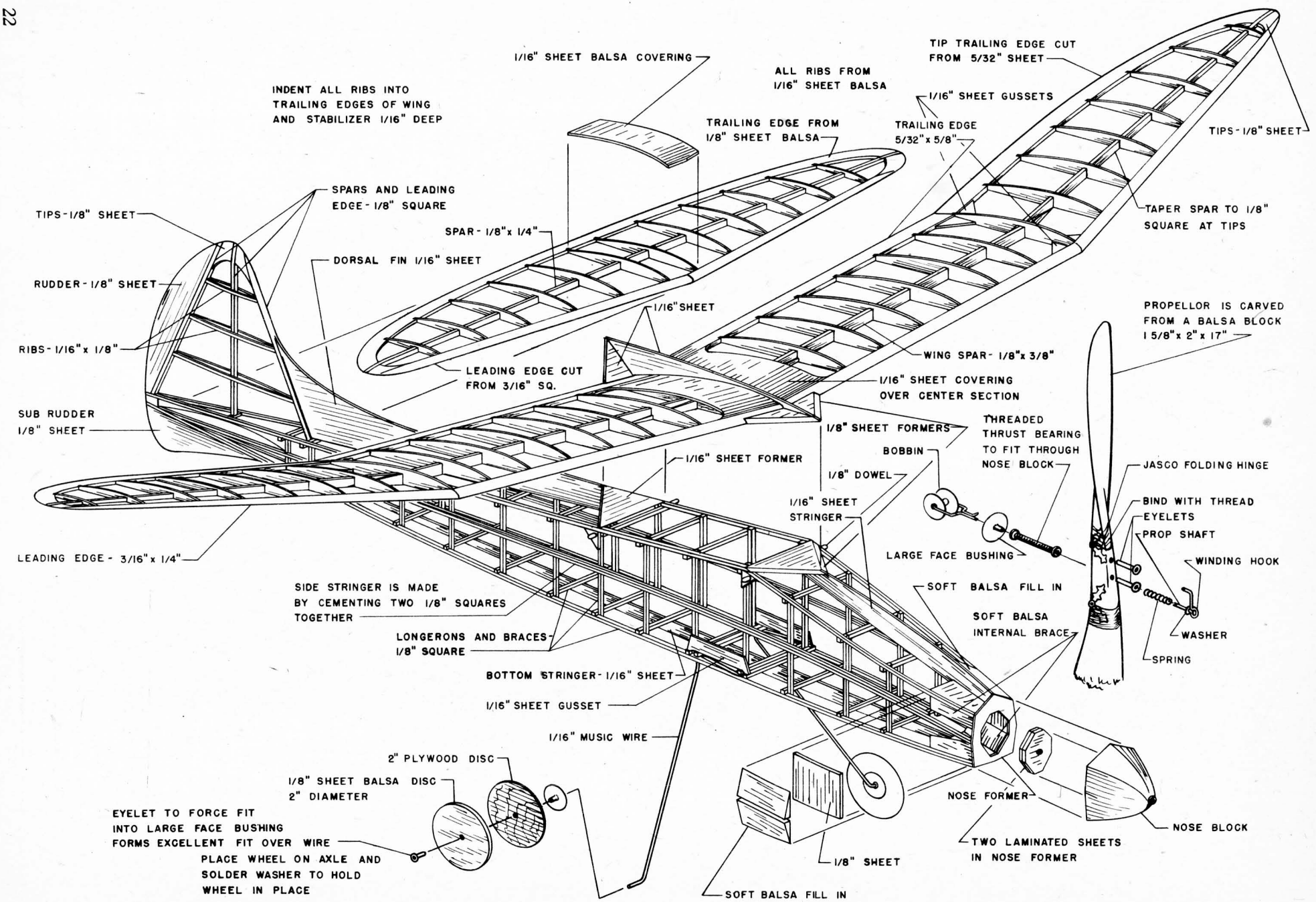
Prop carving has always been an exacting art. The generation of modelers that grew up during the war years has not had an occasion, probably, to try one. Some of the machine-cut blanks now on the market should make it easier to obtain a satisfactory product. The only advice that space will allow here is to keep the blades balanced, in all respects, through all stages of the carving.

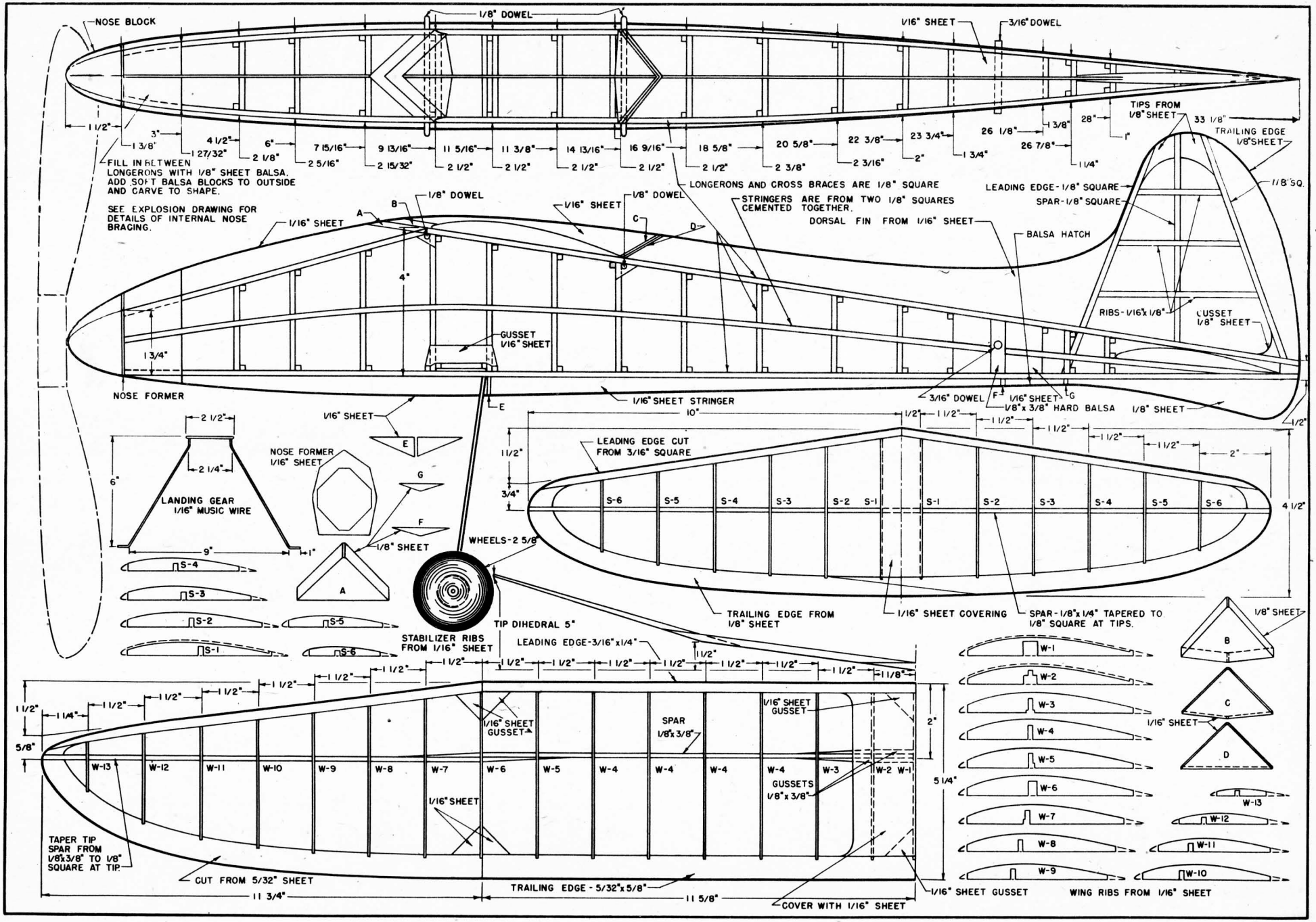
Getting the blades of a folding prop to lie flush against the fuselage sides has usually been a ticklish problem. Although the correct hinge angle can be determined by descriptive geometry, it is still quite a trick to build the hinge with the necessary accuracy. Obviously some sort of trial and error method was necessary to overcome this difficulty. The new commercial hinges of the type shown now make this possible. Here's how: position one side of the hinge. Run a straight wire through the grommet to act as a guide in placing the other side. Take a guess at the position of the other side and temporarily tack it in place. Cut through the hub and try the fit. Probably it will not be exact, but it is a simple matter to move the second hinge side about, until the blade folds flat and still assumes the correct working angle. When this position is found, bind and cement the hinge. Several coats of cement smoothed on the prop with a finger will provide a smooth protective finish.

Silkspan is used to cover the ship. Two cross-grained layers are applied to the fuselage for extra handling strength and resistance to torsion. Another purpose is served by this second layer of paper. On a fuselage of this type where the covering is supported only by lengthwise members the covering would ordinarily shatter along its length in a collision. The second layer prevents this. By applying the paper wet, smooth fillets can be formed over the dorsal fin and wing cove. The paper also acts as a hinge for the rear motor hatch.

There is nothing peculiar about flight adjustments except that the fixed wing position demands that the Center of Gravity be in the position

(Continued on page 65)


1/16" SHEET BALSA COVERING
INDENT ALL RIBS INTO TRAILING EDGES OF WING AND STABILIZER 1/16" DEEP
ALL RIBS FROM 1/16" SHEET BALSA
TIP TRAILING EDGE CUT FROM 5/32" SHEET
1/16" SHEET GUSSETS
TRAILING EDGE FROM 1/8" SHEET BALSA
TRAILING EDGE 5/32" x 5/8"
TIPS - 1/8" SHEET
SPARS AND LEADING EDGE - 1/8" SQUARE
TIPS - 1/8" SHEET
SPAR - 1/8" x 1/4"
TAPER SPAR TO 1/8" SQUARE AT TIPS
DORSAL FIN 1/16" SHEET
RUDDER - 1/8" SHEET
1/16" SHEET
PROPELLOR IS CARVED FROM A BALSA BLOCK 1 5/8" x 2" x 17"
RIBS - 1/16" x 1/8"
WING SPAR - 1/8" x 3/8"
LEADING EDGE CUT FROM 3/16" SQ.
1/16" SHEET COVERING OVER CENTER SECTION
SUB RUDDER 1/8" SHEET
1/8" SHEET FORMERS
THREADED THRUST BEARING TO FIT THROUGH NOSE BLOCK
BOBBIN
1/16" SHEET FORMER
JASCO FOLDING HINGE
1/8" DOWEL
1/16" SHEET STRINGER
BIND WITH THREAD
EYELETS
PROP SHAFT
LARGE FACE BUSHING
WINDING HOOK
LEADING EDGE - 3/16" x 1/4"
SOFT BALSA FILL IN
SIDE STRINGER IS MADE BY CEMENTING TWO 1/8" SQUARES TOGETHER
SOFT BALSA INTERNAL BRACE
WASHER
LONGERONS AND BRACES 1/8" SQUARE
SPRING
BOTTOM STRINGER - 1/16" SHEET
1/16" SHEET GUSSET
1/16" MUSIC WIRE
2" PLYWOOD DISC
1/8" SHEET BALSA DISC 2" DIAMETER
NOSE FORMER
NOSE BLOCK
EYELET TO FORCE FIT INTO LARGE FACE BUSHING FORMS EXCELLENT FIT OVER WIRE
PLACE WHEEL ON AXLE AND SOLDER WASHER TO HOLD WHEEL IN PLACE
TWO LAMINATED SHEETS IN NOSE FORMER
1/8" SHEET
SOFT BALSA FILL IN


NOSE BLOCK
1/8" DOWEL
1/16" SHEET
3/16" DOWEL
TIPS FROM 1/8" SHEET
33 1/8"
TRAILING EDGE 1/8" SHEET
1 1/2"
3"
1 3/8"
4 1/2"
1 27/32"
6"
2 1/8"
7 15/16"
2 5/16"
9 13/16"
2 15/32"
11 5/16"
2 1/2"
11 3/8"
2 1/2"
14 13/16"
2 1/2"
16 9/16"
2 1/2"
18 5/8"
2 1/2"
20 5/8"
2 3/8"
22 3/8"
2 3/16"
23 3/4"
2"
26 1/8"
1 3/4"
26 7/8"
1 3/8"
28"
1"
1 1/4"
FILL IN BETWEEN LONGERONS WITH 1/8" SHEET BALSA. ADD SOFT BALSA BLOCKS TO OUTSIDE AND CARVE TO SHAPE.
SEE EXPLOSION DRAWING FOR DETAILS OF INTERNAL NOSE BRACING.
LONGERONS AND CROSS BRACES ARE 1/8" SQUARE
STRINGERS ARE FROM TWO 1/8" SQUARES CEMENTED TOGETHER.
LEADING EDGE-1/8" SQUARE
SPAR-1/8" SQUARE
1/8" SQ.
DORSAL FIN FROM 1/16" SHEET
BALSA HATCH
1/16" SHEET
1/8" DOWEL
1/16" SHEET
1/8" DOWEL
A
B
C
D
4"
RIBS-1/16"x 1/8"
GUSSET 1/8" SHEET
GUSSET 1/16" SHEET
1 3/4"
NOSE FORMER
1/16" SHEET STRINGER
E
3/16" DOWEL
F
1/16" SHEET
G
1/8"x 3/8" HARD BALSA
1/8" SHEET
1/2"
2 1/2"
2 1/4"
6"
LANDING GEAR 1/16" MUSIC WIRE
9"
1"
1/16" SHEET
NOSE FORMER 1/16" SHEET
E
G
F
1/8" SHEET
A
10"
1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
2"
11/2"
3/4"
LEADING EDGE CUT FROM 3/16" SQUARE
S-6
S-5
S-4
S-3
S-2
S-1
S-1
S-2
S-3
S-4
S-5
S-6
4 1/2"
S-4
S-3
S-2
S-5
S-1
S-6
WHEELS-2 5/8"
TIP DIHEDRAL 5°
STABILIZER RIBS FROM 1/16" SHEET
TRAILING EDGE FROM 1/8" SHEET
1/16" SHEET COVERING
SPAR-1/8"x 1/4" TAPERED TO 1/8" SQUARE AT TIPS.
1/8" SHEET
LEADING EDGE-3/16"x 1/4"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/4"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/2"
1 1/8"
5/8"
1/16" SHEET GUSSET
SPAR 1/8"x 3/8"
1/16" SHEET GUSSET
2"
5 1/4"
W-13
W-12
W-11
W-10
W-9
W-8
W-7
W-6
W-5
W-4
W-4
W-4
W-3
W-2
W-1
GUSSETS 1/8"x 3/8"
1/16" SHEET
W-1
W-2
W-3
W-4
W-5
W-6
W-7
W-8
W-9
B
C
D
1/16" SHEET
W-13
W-12
W-11
W-10
TAPER TIP SPAR FROM 1/8"x 3/8" TO 1/8" SQUARE AT TIP.
CUT FROM 5/32" SHEET
TRAILING EDGE - 5/32"x 5/8"
11 3/4"
11 5/8"
COVER WITH 1/16" SHEET
1/16" SHEET GUSSET
WING RIBS FROM 1/16" SHEET

eight); these will be your rib stations J, H, G, F, E, D, C.

Transposing the distance across these rib stations to a layout showing dimensions A and B, it is quite easy to measure the diagonals JJ, HH, etc., as shown in Figure 3. These diagonal lengths are the rib sizes for a prop as shown in Figure 6.

A more accurate method to determine the rib lengths is to use the encircled formula for X.

For those who wish to build the props shown in Figures 7, 8 and 9 it is necessary to make a layout as per Figure 4 where the dotted lines show the added area, and the correct rib sizes.

Construction of the prop is very simple. First cut and sand two spars to size, cut a piece of balsa slightly larger than required for the center rib A, push the wire hook or a needle through the center of this center rib from one end to the other, afterwards sanding it round to the size required, then mark off the rib spacings along the length of the spars, and cut the necessary ribs from a sheet of C or quarter grain balsa wood.

ASSEMBLY: Push the wire hook through the center of the trailing edge spar, through the center rib, and then through the center of the leading edge spar.

Cut two of the ribs to the length XC and offset the leading and trailing edge spars enough to glue in the XC ribs, one on each end, then glue in all the other ribs, which should be cut to the proper lengths beforehand.

Glue securely the center rib to the two main spars, and, after cutting two strips long enough to form the tips, glue them to the ends of the spars.

If you plan to add area with superstructure, the tip and superstructure should be one continuous strip.

If your prop has been properly made, the spars, when looking down them from the tips, should be perfectly straight; if they are not, then some of your ribs are not of the proper length.

Bend the wire hook, or prop shaft as it is more commonly termed, to the proper shape, and glue securely to the leading and trailing edge spars.

Cover each blade on the convex side with a medium weight microfilm, and your microfilm prop is finished.

This procedure sounds rather complicated. But if it is followed step by step as shown, you will be surprised when you can make one of these props within two to three hours, and have a prop that will perform as well if not better than the best wood prop you could carve. Also, having filed away the data, you can duplicate exactly any of these props you had previously built.

All of the present day indoor records can be cracked by this new prop.

KINGPIN
(Continued from page 21)

shown. Just a few words of warning: a quarter pound of rubber will store a tremendous amount of energy. So work up to full power gradually. Make each adjustment as if it were the last one. Don't fly with permanently "temporary" adjustments. They don't last.

Kingpin will give you plenty of exercise. It will certainly enable you to show the die-hard gas boys that it takes a "man" to wind a Wakefield.

PREVIEWS
(Continued from page 57)

evolution. By now it has all the bugs ironed out of it, making it the ideal job for radio work.

AIRMAIL
(Continued from page 53)

Editor, FLYING MODELS:

What's the pitch? A real, 100% flying model book and not a moving picture. Yoicks, and a good hulloa! Can the big stuff and give us more small planes that an invalid like myself can build and fly around a hospital room. Also more fiction. How about reviving more of the old characters? Phineas is good, but serious fiction is also enjoyable. Keep up the columns like Aero Quiz, Flying Aces Club News, Wisecrack-Ups, Slipstream Magee and With the Model Builders Everywhere.

Yours truly,
John Washinbal,
Duck Point, Mo.

Editor, FLYING MODELS:

Phineas is back again! Fergoshsakes! Phineas for President! But, seriously, I think this is the biggest news I've had for a long time. I used to read Phineas back when Joe Archibald started him in the old Flying Aces. Now I'm a father, myself, with a five-year-old kid. Well, it won't be long before he'll be reading the adventures of the wackiest wombat on wings. Thanks a million.

Sincerely,
George Wendt,
Philadelphia, Pa.

Editor, FLYING MODELS:

Frankly, I think your first issue was pretty good. But keep stuff like "Angle of Attack" out of the magazine. Too technical. We kids aren't interested in the technical side of aviation. Actually most of us don't give a hang *why* planes fly. We just like to build 'em. I think more solids are desirable for that reason. And, when I say solids, I mean World War One solids. Modern stuff is too simple.

Yours truly,
Stanley Haverhill,
New York, N. Y.