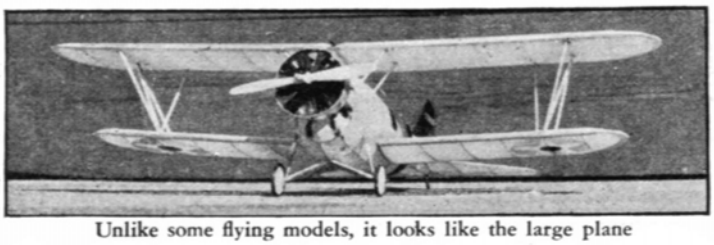
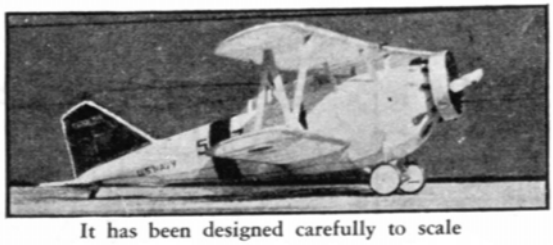
Building the Grumman Fighter



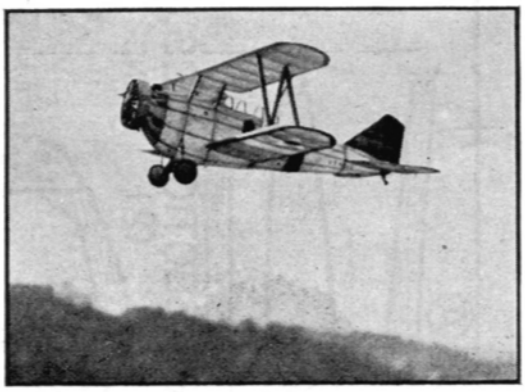
Unlike some flying models, it looks like the large plane



It has been designed carefully to scale

How You Can Construct a Remarkable Flying Scale Model of the Grumman Shipboard Fighter FF-1

By LAWRENCE McCREADY

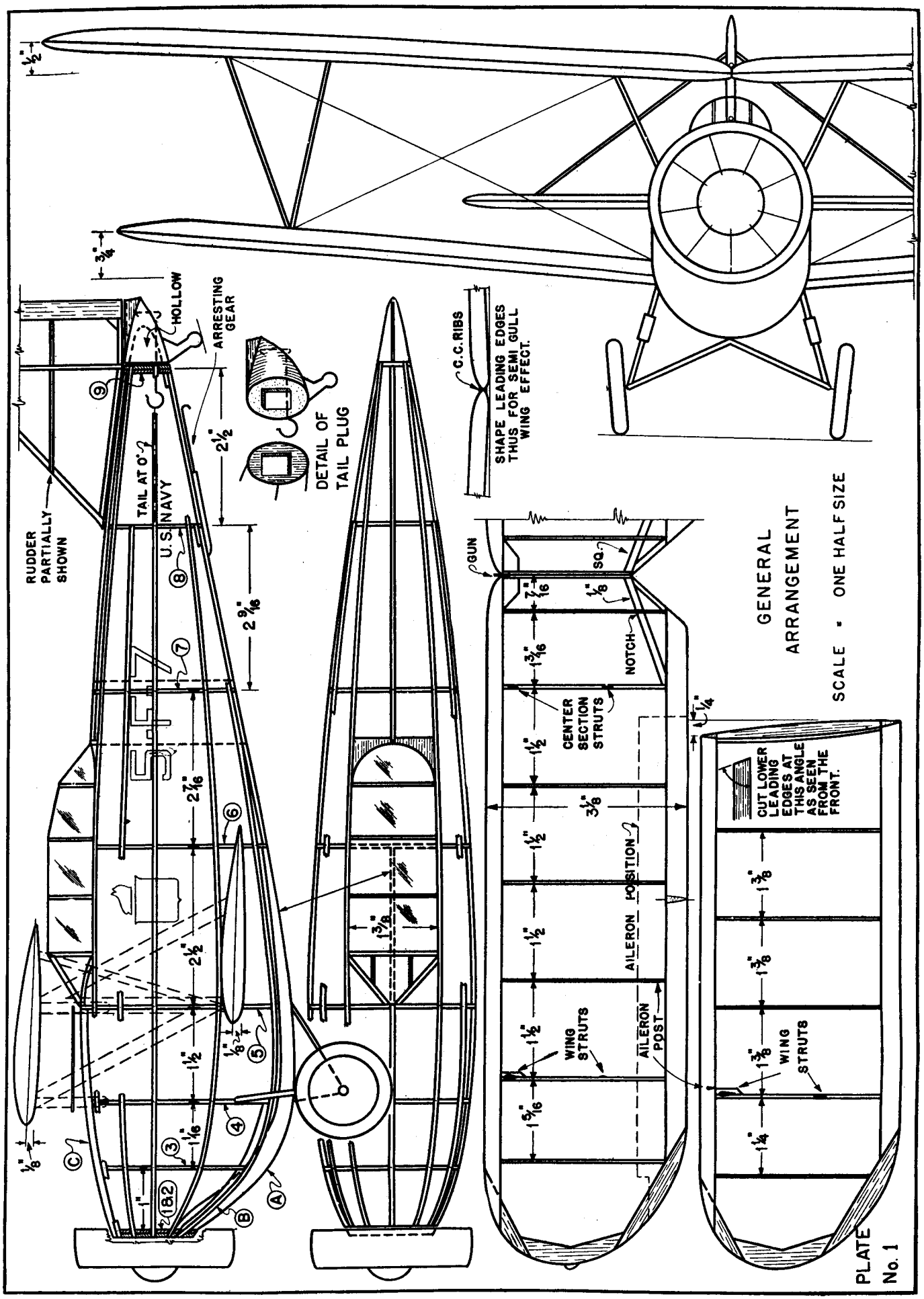


The little ship is an excellent flyer and very realistic in the air

BY building this flying scale Grumman fighter, you will have a model of one of the Navy's latest and best shipboard scouts. With a Wright Cyclone, these ships combine a high speed of 215 m.p.h. with extraordinary maneuverability. They are as rugged as they look and so is the model.

Fuselage

Begin your model with the fuselage. Transfer the patterns of the formers, given on drawing No. 3, to 1/16" thick medium balsa. Cut them out very accurately with a sharp, pointed razor blade. Glue a reinforcing strip to No. 5 as shown. Glue 1 and 2 together with the grains at right angles and bevel the edges off to the angle shown in their side view. Cut two of No. 9 and glue them together also with grains at right angles; this last former must be of hard balsa. Now notch all the formers for 1/16" sq. stringers—get the locations for these notches accurate. Cut out stringpieces A (1), B (2) and C (1), and mark the positions of the formers on them.


GENERAL ARRANGEMENT
SCALE - ONE HALF SIZE
PLATE No. 1
RUDDER PARTIALLY SHOWN
TAIL AT 0°
U.S. NAVY
HOLLOW
ARRESTING GEAR
DETAIL OF TAIL PLUG
C.C. RIBS
SHAPE LEADING EDGES THUS FOR SEMI GULL WING EFFECT.
GUN
SQ.
NOTCH
CENTER SECTION STRUTS
AILERON POSITION
WING STRUTS
AILERON POST
CUT LOWER LEADING EDGES AT THIS ANGLE AS SEEN FROM THE FRONT.
WING STRUTS
2½"
2 9/16"
2 7/16"
2½"
1½"
1 1/16"
1⅛"
1"
3¼"
½"
7/16"
1⅛"
1 3/16"
1½"
3⅛"
1½"
1½"
1½"
1 5/16"
1¼"
1⅜"
1⅜"
1⅜"
1⅜"
1⅜"
1¼"
⅛"
1⅜"

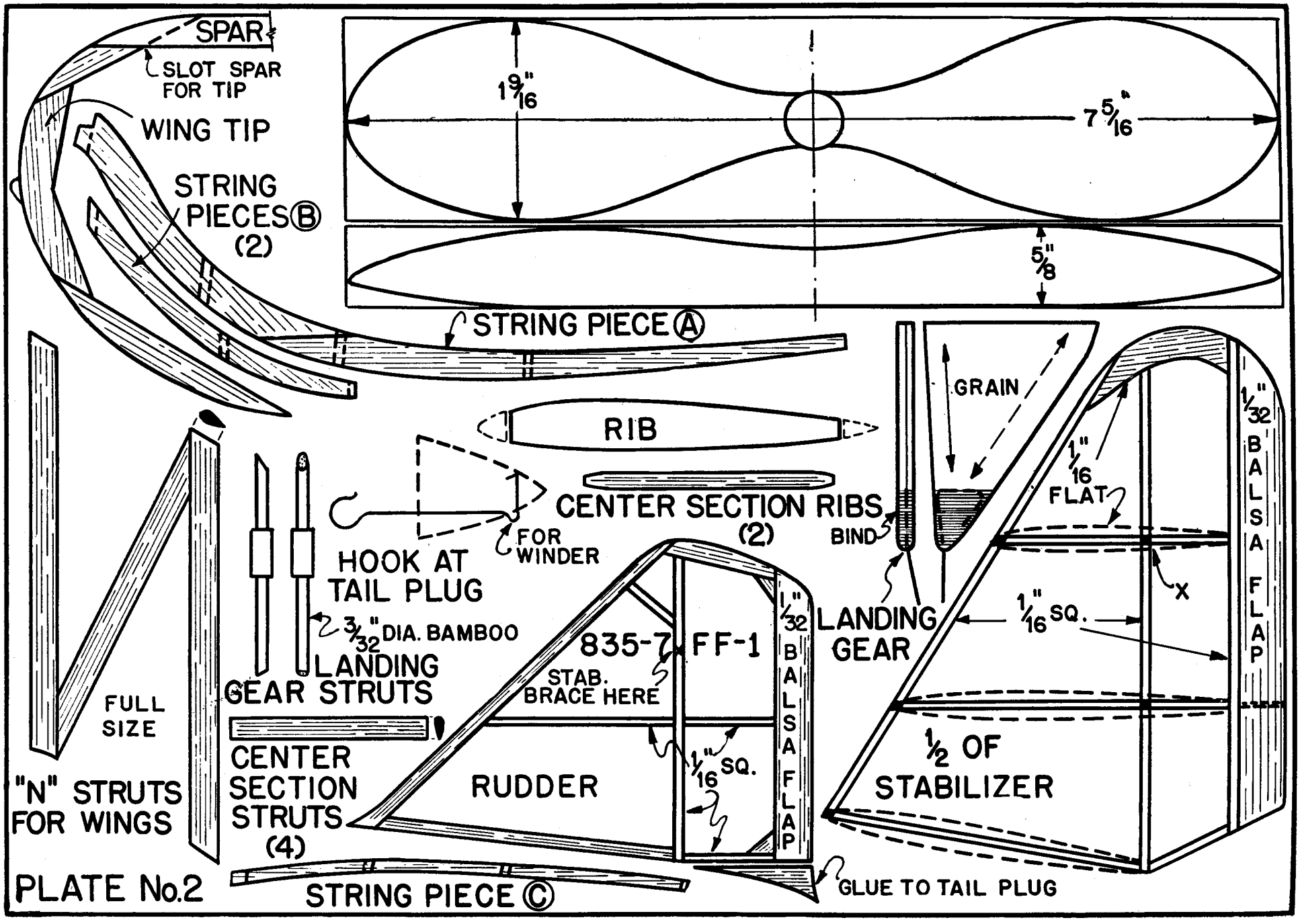
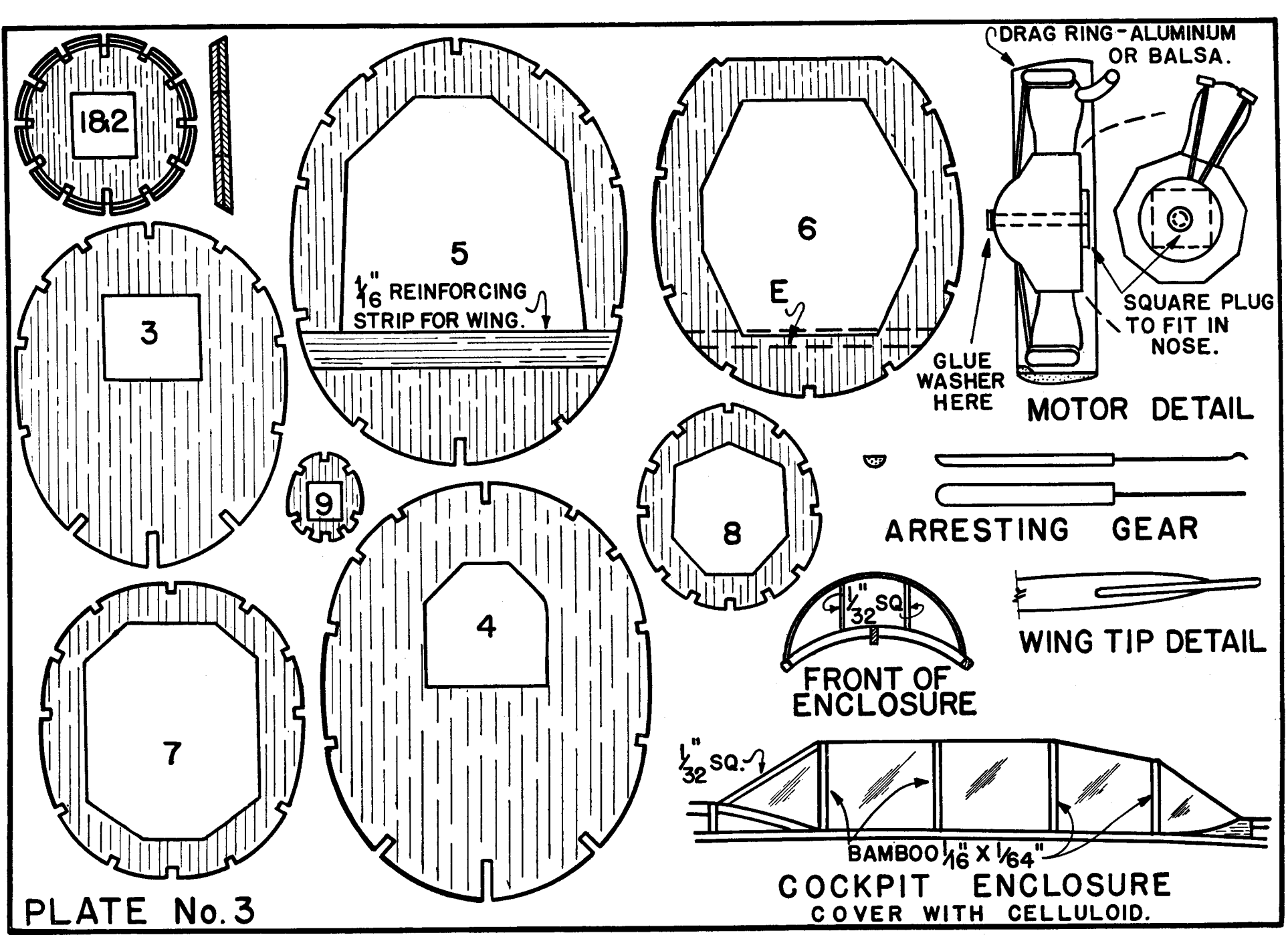

SPAR
SLOT SPAR FOR TIP
WING TIP
STRING PIECES Ⓑ (2)
1 9/16"
7 5/16"
5/8"
STRING PIECE Ⓐ
RIB
CENTER SECTION RIBS (2)
FOR WINDER
HOOK AT TAIL PLUG
3/32" DIA. BAMBOO LANDING GEAR STRUTS
FULL SIZE
"N" STRUTS FOR WINGS
CENTER SECTION STRUTS (4)
835-7
FF-1
STAB. BRACE HERE
1/32" BALSA FLAP
1/16" SQ.
RUDDER
STRING PIECE Ⓒ
GRAIN
BIND
LANDING GEAR
1/16" FLAT
X
1/16" SQ.
1/32" BALSA FLAP
½ OF STABILIZER
GLUE TO TAIL PLUG

PLATE No.2


1&2
3
5
1/16" REINFORCING STRIP FOR WING.
6
E
DRAG RING - ALUMINUM OR BALSA.
SQUARE PLUG TO FIT IN NOSE.
GLUE WASHER HERE
MOTOR DETAIL
9
8
ARRESTING GEAR
4
7
1/32" SQ.
FRONT OF ENCLOSURE
WING TIP DETAIL
1/32" SQ.
BAMBOO 1/16" X 1/64"
COCKPIT ENCLOSURE
COVER WITH CELLULOID.
PLATE No. 3

Start the assembly of the fuselage by marking with soft pencil the positions of all the formers on the two side stringers which follow the center line on the plan. Glue the formers, starting with the largest ones and working toward the ends, to these side stringers. Work slowly and accurately here. Then glue in the large bottom stringpiece A and follow it with pieces B and C. Watch the alignment here. Now put in the top and bottom rear stringers and let the whole job dry hard before you go any further.

Now glue the rest of the stringers in slowly and well. Sand the whole fuselage over lightly to remove all the sharp edges and joints. This will give you a better covering job. Glue a soft balsa block lightly to the rear of the fuselage and shape it up as shown for the tail plug. Remove it, hollow it out, sand it and install the square plug and rear hook.

Engine and Drag Ring

Make the engine now. This model has a very realistic engine, which is easy to make. Cut the crankcase from fairly hard balsa and shape it up. Cut 9 cylinders from soft balsa, shape them uniformly and bevel each for the valve rocker box caps which are cut from 1/16" sheet wood. Glue the cylinders to the crankcase with plenty of glue, then cut and fit the 18 pushrods which are 1/32" bamboo. Glue a washer to the front and make a hole through the case for the shaft. Then glue a square plug to the rear. A 2 1/2" drag ring 5/8" wide, either homemade or manufactured, is used. Glue it on after the whole motor has been painted a dull black. The ring may be made of either aluminum or balsa; both are shown in cross section on the plans. If you use a balsa ring, make it by bending an 8 1/2x1/2x1/16 piece of balsa around a tin can. Have the grain run along the width of the piece. Trim and sand the job up after everything is dry and glue it to the motor.

Pilots' Enclosure

Make this now. Bend thin bamboo strips for the formers to the given cross sections and glue them to the stringers. Put in the rest of the framing and cover it with thin celluloid. Don't use cellophane—use an old negative which has been soaked in hot water and scraped clean on both sides with a razor blade.

Tail Surfaces

The elevators and stabilizer are framed in 1/16" sq. and the ribs are 1/16" flat, cut as shown. Cut the tips of 1/16" flat to the pattern and assemble the two halves. We use novel "flaps" on the trailing edges of the tail surfaces on this model for control, and they are made of 1/32" soft sheet balsa. The rudder is made almost entirely of 1/16" sq. balsa with a flap like those on the elevators.

Wing

The wings are simple to make and they are very strong. Cut 28 ribs of 1/32" balsa and 10 of 1/16" hard balsa with the aid of an aluminum pattern. Glue two of these hard, thick ribs to the fuselage sides to form stubs at the angle given on the drawings. Get the incidence just right. The wing section is the M-6 and is very fine for models. Select clear, medium balsa for your leading edges, which are 1/4" sq. Cut the edges to the correct length and shape them to the given cross section with razor, plane and sandpaper. Slot the ends for the wing tips, then shape the ends off to a rounded taper. The inner ends of the lower spars are beveled at an angle which is shown on No. 1 plainly.

Trailing edges are of 1/8x3/8 balsa cut to a modified triangular section. Mark both leading and trailing edges carefully for rib positions and assemble the wing frames. Make sure you have the heavy ribs where the struts are attached. Note the semi-gull-wing effect of the upper wing and the two special inner center-section ribs there. Cut the wing tip pieces from the patterns, glue them up and then fit them to the wings. Put in the upper center-section framing, paying heed to the 1/8" sq. diagonals. These are important for they take the loads when the wings strike an obstacle and tend to fold back.

Note how the inner ribs of the lower wings are fitted at an angle. This is done so they will fit closely to the fuselage, and if your fuselage is a bit "out" here, you will have to rearrange this to suit your model. When everything has dried hard, you should trim up all the joints and sand everything smoothly so you will get a better covering job.

Landing Gear

The gear on this model does not retract as does the large one, but the model is very realistic just the same. Make up the two "legs" of cross-grained balsa sheet— hard balsa—and glue them together with the axle sandwiched in between. Shape the legs to a general streamline shape, and then bind the tip by, the axle with thread.

Dope and sand the pieces now. The shock struts are clearly shown in the plans and are made of round bamboo with round dummy "oleo" shock units glued on.

Propeller

This is carved from a medium balsa block, 7 5/16" x 1 9/16"x 5/8". Mark the given outlines on the block with the utmost care, and cut the block down to them before you start to carve. This is very important for this propeller has been designed to have the correct blade area and true pitch. Don't change it at all, please. Carve the blades now carefully, giving them a moderate camber. Dope the prop after balancing it and put in the shaft. Don't forget that the hook must be bent after the motor is on the shaft, and don't forget to put in a few washers, too.

Covering

To cover the fuselage properly, use many small pieces of tissue. Work slowly and do a smooth job here. Dope it with water and then gray dope. Cover the rudder with red tissue but dope neither it nor the stabilizer, or they will warp. The stabilizer is yellow on top and white below. Use colored tissue. The upper surface of the upper wing is done in yellow tissue, but all the rest of the wings is done in white tissue. Dope the wings lightly and put on Navy insignia.

Assembly

Glue the rudder on squarely, then the stabilizer halves. Set these at zero incidence. Next fit the landing gear on, scraping the tissues away from the balsa where joints are made. This is also done where any gluing is done to papered balsa. Fit thin celluloid wheels of 1 1/2" diam. Glue the lower wings to the two stub ribs care-fully and block up the ", for dihedral. Glue the halves of the top wing together, then mount the wing to the fuselage, using the center section struts and some false framing to get things just right. The incidence is most important here. Have the leading edge raised just 1/8" above the trailing edge. Raise the tips 1/2" for dihedral.

Now put in the N struts which are built up beforehand from the plans. Glue them

in with plenty of cement. You can let the motor fit in with the square plug or you can glue it on lightly. String 3 loops of 1/8" flat rubber between the hooks, snap the tail plug in and the model is almost done. Fit aileron posts, the tailskid, and the "arresting gear" it you are going to fly your model from a carrier's deck!

Paint a red band 1 inch wide around the fuselage just behind the enclosure. Paint the large black squadron numerals on the sides, the black emblem, and the U.S. Navy lettering just under the tail. Touch up here and there, and there you are!

Get your model to balance on the leading edge of the lower wings and then try a bit of gentle gliding. Control 'er with your flaps, bending them with your fingers after breathing on them. When you get a nice smooth glide, try power. You can have a lot of fun flying this little model and then, too, it is so showy that you have almost an exhibition model. Good luck!

Model Airplane News, April 1935