A BOMBER FROM FRANCE

By
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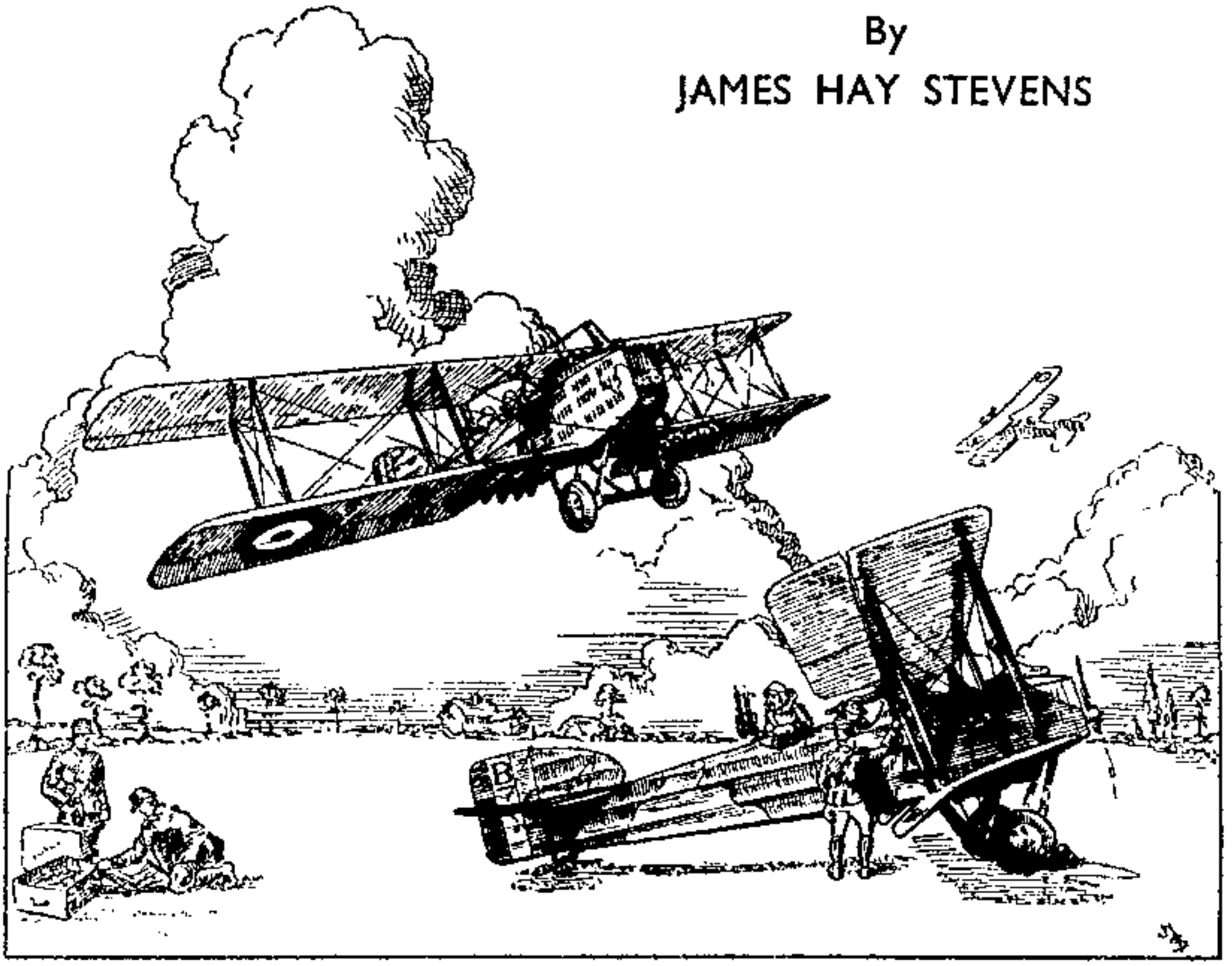

A Description of the Most Famous French Wartime Bomber, the Breguet 14, with Full Instructions for Building a Solid Scale Model

THE Breguet 14 of the French Air Service had much in common with our own Bristol Fighter. Somewhat heavier than the "Brisfit," it was used for similar duties—bombing, reconnaissance and fighting, and, like the Bristol, it had an extraordinarily long life. Produced during the war years, it was in regular use with the *Aviation Militaire* until about 1930, when it was finally withdrawn. Another curious coincidence lies in the fact that the two concerns, the Bréguet company in France and the Bristol company in England, producers of the longest-lived two-seaters, were collaborators in the years before the War.

A notable feature of the Breguet 14 was that, at a time when wooden construction was practically universal, it was built mostly of metal. The Breguet company had been one of the first to experiment successfully with metal construction, and had produced an all-steel biplane in 1913.

The backward-staggered wings of unequal span and chord were a common arrangement on French biplanes of that time, and ailerons were fitted to the upper planes only. The flaps along the trailing-edges of the lower planes were a form of variable camber gear, and hinged to allow a downward movement only. Rubber cords were fitted which

tended to pull the flaps down, so that when the machine was at rest on the ground they drooped noticeably—as much as ten or fifteen degrees. In the air, the flaps took up a position to suit the loads on the aeroplane, somewhat after the manner of the flaps on the Westland Lysander described last month. The spars and compression members were made of aluminium. Ribs were of wood and the covering was of fabric. The little platform sticking out from the lower plane was part of the bomb-rack equipment. Interplane bracing wires were duplicated, and the gap between the two wires was filled by light wooden laths. Interplane struts were of aluminium.

Machine-guns and Bombs

THE fuselage of the Breguet 14 was built almost entirely of aluminium tubing. Light wooden formers and stringers served to give the fabric covering its correct contour. The engine was completely enclosed in an ugly aluminium cowling, which was plentifully slotted to allow the escape of the cooling air from the radiator. The pilot's cockpit had a well-raised seat and the occupant had to be protected from the slipstream by the massive deflector and windscreen shown in the drawings.

The observer had a trap in the bottom of his cockpit for bombing or photography, and celluloid panels, usually on each side of the fuselage, allowed a certain amount of light to enter his "office." He also had a full set of dual controls. The pilot was armed with a fixed machine-gun mounted externally on the port side of the fuselage, while his companion had either one or two machine-guns on a gun-ring mounted over his cockpit. Bombs were carried in racks beneath the lower planes, eight on each side in double rows of four if they were small bombs, or four abreast on each side if they were larger ones.

The engine was a 300 h.p. twelve-cylinder "vee" water-cooled Renault 12F. With this power-plant, the Breguet 14 had the following weights and performance. (The two sets of figures for the A.2 and the B.2 denote the reconnaissance and bomber versions respectively) :—

	A.2	B.2
Speed, sea level .	118 m.p.h.	115 m.p.h.
Climb to 16,400 ft.	21 min. 45 sec.	47 min. 30 sec.
Ceiling . .	20,000 ft.	18,900 ft.
Weight, empty .	—	2,480 lbs.
Bomb load .	—	660 lbs.

The Breguet 14's undercarriage was very robust. The struts were heavy gauge aluminium streamlined tubes, and the axle was sprung by rubber cords which tied it to the cross-bar at the bottom of the fixed struts. The axle was faired by a broad aerofoil section fairing. Noteworthy, too, were the unusually fat tyres on the wheels, at a time when aeroplanes usually had very thin tyres. The tail unit was made from welded steel tubes with a fabric covering.

Altogether, the Breguet 14 was an interesting, if unlovely, aeroplane, and the fact that it was so long used in France as a jack-of-all-trades speaks well for the soundness of its design and the strength of its construction.

HOW TO BUILD THE SCALE MODEL

Materials, Tools and Methods of Construction and Assembly

REPRODUCED to a scale of $\frac{1}{72}$nd on page 545 are three-view general arrangement drawings of the Breguet 14. By scaling these drawings, the modeller can make his own drawings for a model to any other scale he may prefer. A great advantage of the $\frac{1}{72}$nd scale, apart from its uniformity with the other twenty models in this series, is that there is a complete range of accessories—guns, wheels, airscrews, etc.—available for use with it.

Materials and Tools

APPROXIMATE over-all dimensions of the materials for a $\frac{1}{72}$nd scale model are as follows :—

A block of whitewood $4\frac{1}{2} \times \frac{7}{8} \times \frac{1}{2}$ in. for the fuselage ; for the main planes, a sheet of wood $8 \times 3 \times \frac{1}{16}$ in. ; the tail unit and axle fairing require a piece of fibre $4 \times 2 \times \frac{1}{16}$ in., and the interplane and undercarriage struts will need some 2 ft. of 20-gauge brass wire. If it is intended to fit bracing wires, a coil of fine florist's wire will also be needed. Certain shop-bought accessories such as wheels, guns and airscrew will be found very useful.

As a guide to the most essential tools, the following list should prove useful : a $\frac{1}{4}$-in. chisel ; small plane ; penknife ; oilstone ; fretsaw ; small half-round file ; $\frac{1}{16}$-in. bradawl ; archimedean drill ; small long-nosed pliers ; tube of cellulose glue ; a penny ruler measuring in $\frac{1}{10}$ths, $\frac{1}{12}$ths and $\frac{1}{16}$ths of an inch ; and also a soldering iron, flux and solder.

Method of Construction

READ these instructions, thoroughly understand them, collect tools and materials and then set to work as follows :—

If the $\frac{1}{12}$nd scale is to be used, start by tracing the side elevation from the G.A. Drawing. Then lay the tracing upon the side of the fuselage block, pin-prick the outline, remove the tracing and line-in the outline with a pencil. Cut away the surplus wood with saw and chisel. Draw centre-lines down the top and bottom surfaces of the block

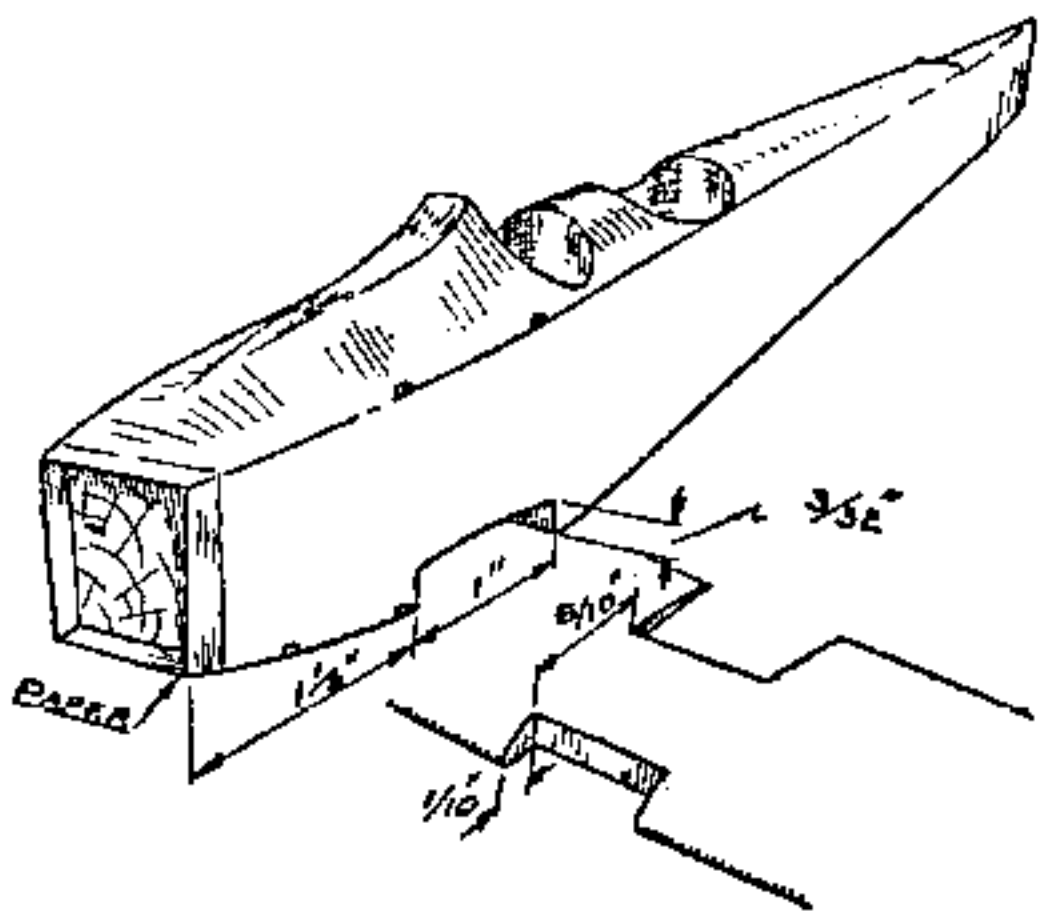

Fig. 1.—The fuselage shape, showing cut-out for wing and paper radiator cowling

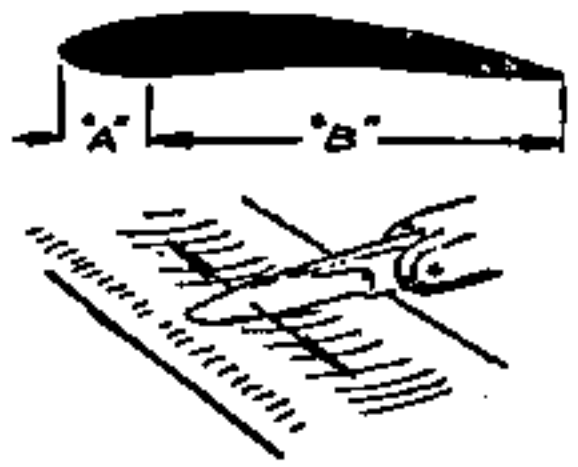

Fig. 2. — Showing how to shape the wings to obtain the convex undersurface

and then draw the plan of the fuselage. Again remove the surplus wood. Make a cut-out in the bottom of the fuselage to take the lower plane—the dimensions for this are given in Fig. 1. The fuselage is now ready for final shaping ; the top is quite well radiused, while there is slight rounding of the bottom, aft of the wings. The surface of the wood should be made dead smooth with fine glass-paper. The cooling slots in the cowling are made very carefully with a penknife. At this stage, it is as well to make the holes for the undercarriage and centre-section struts. The nose of the cowling, where it projects round the radiator, is made from a piece of thin paper, as is shown in Fig. 1.

The outlines of the upper and lower planes are next drawn on the piece of thin wood. Cut-outs are made in the centre-section of the lower plane to correspond with those in the fuselage—the dimensions are given in Fig. 1. Cut the two planes out and camber them. Fig. 2 shows the section of the wings with their concave undersurfaces. When cambering, first of all shape the convex lower surface of the leading-edge, then make the hollow part with a penknife as shown in the figure. Camber the top surface of the wing with a file and glasspaper. Make the holes for the wing struts.

Trace the outlines of the tail unit sections, and pin-prick them on to the fibre sheet. Cut them out and camber them to the respective sections shown in the G.A. Drawing. The outlines of all controls, rudder, elevator, ailerons, and of the camber flaps on the lower planes, are made by scoring a line with a bradawl and ruler.

The tail-skid, interplane struts and centre-section struts are all made from appropriate lengths of 20 s.w.g. wire.

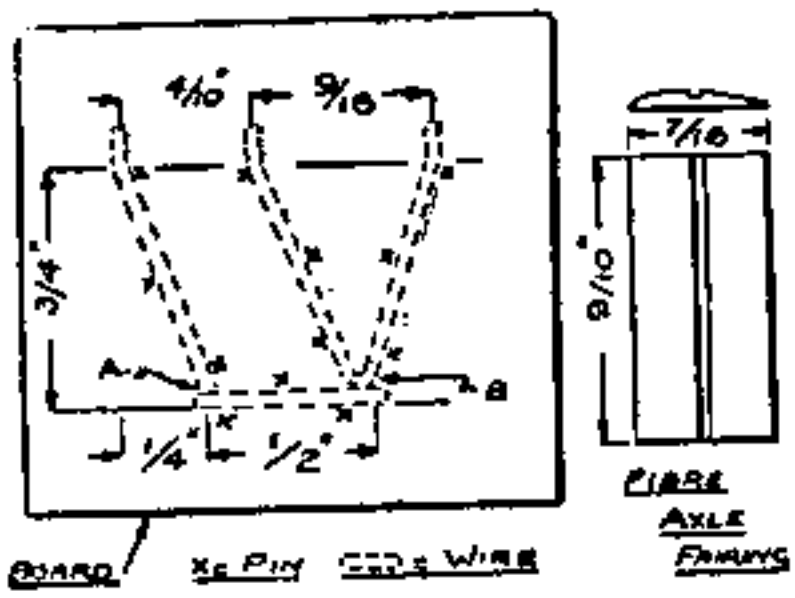

Fig. 3.—A diagrammatic sketch of the undercarriage jig and of the axle fairing

The exhaust pipe should be made from an odd piece of wood left over from the wings. These parts are simple to make, and the methods are obvious.

The undercarriage is rather more complicated in the manner of its construction. The first stage is to make a soldering jig for the undercarriage struts. This jig is a block of wood with pins in it, and is shown in Fig. 3. The sizes of the struts are given in this sketch, and their positions are indicated by dotted lines. The front leg and the cross-shaft at the bottom of each unit are made from single wires, while the vee-strut at the rear is made from a "vee" of wire. The wires are cut to length, assembled in the jig, and neatly soldered to joints A and B. The axle is made from a straight piece of wire. The axle fairing is also shown in Fig. 3. and is cut from fibre—note the $\frac{1}{32}$nd in. groove in which the axle has to rest.

Guns, airscrew and wheels may be purchased from most model- or toy-stores. The gun-ring can be made from a piece of 20 s.w.g. wire bent in a circle and the ends soldered, or, if one can be procured, the internal copper washer from an old sparking plug. The latter will be found to be very close to size and, being of copper, it is easy to solder the movable wire arm to it.

Method of Assembly

GLUE the lower plane in place beneath the fuselage, taking great care that it is set squarely both in plan and elevation. Glue a small piece of wood across the gap in the fuselage line beneath the plane and, when the glue has set hard, cut it neatly down to size and then glass-paper it. Fit the interplane and centre-section struts to the holes in the lower plane and fuselage respectively. Give the top plane its dihedral by bending between finger and thumb after heating in the steam from a kettle. Assemble the top plane on to its struts and adjust it for gap, alignment and the correct back stagger of $\frac{1}{8}$ in. Having adjusted the strut lengths as required, remove the plane and struts; re-assemble with glue and put the job aside to set.

Adjust the undercarriage struts for track, height and alignment, and glue them firmly into their holes in the fuselage. The axle is tied to the cross-bars of the undercarriage with two short lengths of florist's wire. The fairing is then put in place beneath the axle, with the latter resting in the groove in the fairing. The ends of the fairing are then glued to the cross-bars of the undercarriage and the attachment of the wheels, which are kept in place by burring the ends of the axle with pliers, completes this unit.

Now glue the rudder and tail-plane units to the rear of the fuselage. Then glue the exhaust pipe on top of the nose, fit the tail-skid, and attach the airscrew and guns to complete the main part of the model.

Bracing wires are made from fine florist's wire, cut dead to length, all kinks smoothed out, and the ends secured with minute spots of glue. As the wires on this model are rather difficult to follow from the drawings, here is a description of those in the interplane bracing :—

Flying Wires.—From the bottom of the undercarriage vee-strut to the tops of the inner interplane struts. From the top of the front undercarriage strut to the top of the rear inner interplane strut. From a point on the bottom of the fuselage beneath the gunner's cockpit to the top of the front inner interplane strut. From the bottoms of the front and rear inner interplane struts to the tops of the outer front and rear struts respectively.

Landing Wires.—From the *bottom* of the

front centre-section strut to the bottom of the rear inner interplane strut, and from the *bottom* of the rear centre-section strut to the bottom of the front interplane strut.

From the tops of the front and rear inner interplane struts to the bottoms of the outer front and rear ones respectively.

Incidence bracing is normal. The undercarriage is cross-braced from the bottoms of the vee-struts to tops of the front struts of the opposing vees. Tail bracing wires are apparent in the G.A. Drawing.

The "bloaters" for the control cables should be made from short lengths of thin wire pushed into the wing or tail unit, as the case may be. The cables are made from florist's wire attached in a similar manner to the bracing wires. It needs very careful work and a steady hand when glueing them to the ends of the "bloaters." A good amateur wireless expert should be able to solder them, but this method is not recommended to the novice with the soldering iron.

Painting and Colour Scheme

PAINTING requires a No. 5 sable, or camel's hair brush and some small 3d. pots of enamel—red, white, blue and yellow. The cockades may be bought, either as transfers or else printed on gummed paper, from most model- or toy-stores.

French aeroplanes during the War were usually camouflaged green and buff, with cream undersurfaces. Cockades (red, white and blue, but reverse order to R.A.F. ones) were painted on the wings only. The rudder had red, white and blue stripes.

The green is mixed from equal parts of blue and yellow ; the buff, from white and yellow with a dash of red. French aeroplanes used, and still use, a very light blue for their markings—about two parts of royal blue to one of white. Apply all paints evenly and thinly ; allow each coat plenty of time to dry, and the result should be worthy of the model.

(NEXT MONTH: The Gloster Gamecock Fighter)

The Breguet 14

by Jim Alley