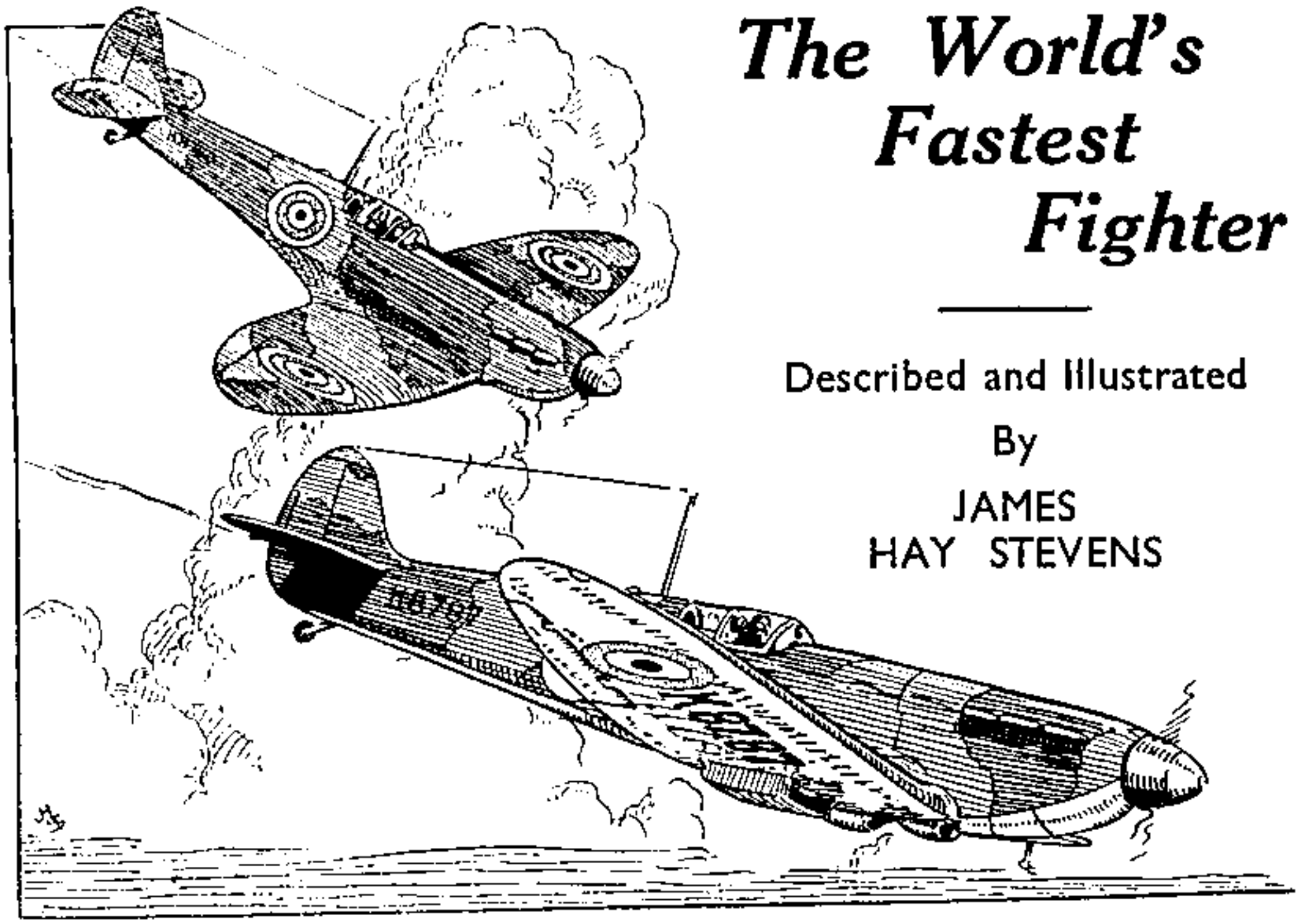

The World's Fastest Fighter

Described and Illustrated

By

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An Account of the Six-Miles-a-Minute Supermarine Spitfire, with Full Instructions for Building a Scale Model

ALTHOUGH the Supermarine Spitfire was first introduced to the public two years ago, at the 1936 Royal Air Force Display, it is still unchallenged as the fastest single-seater fighter in service in any air force in the world. True, modified versions of the Heinkel 112 and the Messerschmitt Bf 109 have successively broken the world's landplane speed record, but their makers do not yet appear to have claimed that their standard machines are faster than the Spitfire.

To those who can recall the lines of the seaplanes which gained the Schneider Trophy for Great Britain—the Supermarine S.5, S.6 and S.6B—the Spitfire will be seen to bear a very close family resemblance. In particular does the fighter resemble the S.6's which, with their twelve-cylinder vee-shaped water-cooled Rolls-Royce engines, had a very similar fuselage nose shape.

An all-metal, stressed-skin, multi-gun day-and-night fighter, the Spitfire is fitted with a 1,035 h.p. Merlin II liquid-cooled, supercharged engine. A detailed description is not yet permissible but some indication of the machine's performance is given by the huge pitch-angle of the blades of its wooden air-screw. Two unusual features, which make the machine easily recognisable in the air, are its elliptical wing plan and the separate, ducted oil-cooler and radiator situated beneath it.

When the prototype appeared it was finished in a delicate shade of French grey which showed off the machine's lines to far greater advantage than does the shadow-shading of to-day. Other alterations in the production machines now being supplied in quantity to R.A.F. squadrons are the addition of a wireless mast and aerial, the fitting of a quadrant mass balance to the rudder, the adding of "ejector" exhaust pipes, the removal of the small wheel fairing flaps from the undercarriage and the replacement of the tail-skid shoe by a small wheel.

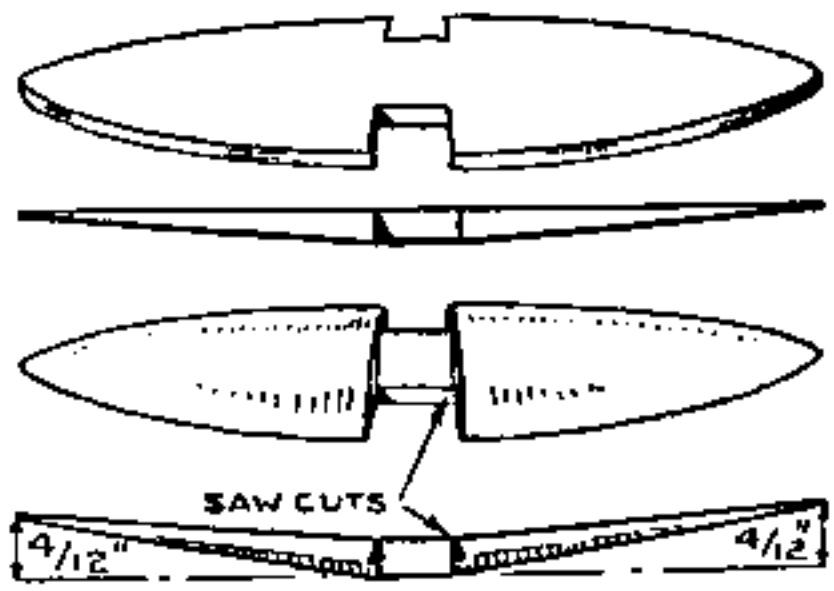

Fig. 2.—Stages in making the main plane, showing slots which give dihedral

wood. The fuselage block is now ready for shaping. The section throughout its length is an ellipse, or a slightly egg-shaped variant of one, with the top decking bulging slightly over the cylinder blocks.

The main plane should next be drawn in outline on the piece of $\frac{1}{16}$-in. thick wood. After drawing the outline and cutting out the plane with a fretsaw, one surface, which is destined to be the underside, has to be tapered from the centre-line to each tip—the thickness of the wood at the wing-tips should be about $\frac{1}{32}$ in. The next step is to camber first the top and then the bottom surfaces to the section shown in the G.A. Drawing with a small plane and glasspaper. The dotted line actually indicates the top surface of the main plane at the fuselage side. The shape of the rest of the wing is similar, but of ever-decreasing size, out to each tip. The dihedral angle of the main plane is obtained by slotting the upper surface in a fore-and-aft direction along the line of the fuselage sides, to a little over half its thickness (the cuts are made with a tenon saw and should be quite coarse as shown in Fig. 2).

The centre-section of the wing is next warmed by steaming and the correct angle obtained by gently bending each half between fingers and thumbs. The accuracy of the bends can be measured as each wing-tip should be $\frac{1}{12}$ in. above the lowest point on the centre-section. The outlines of the ailerons are marked on both surfaces with a ruler and bradawl; note that the division on the top is not exactly over that on the bottom, due to the Frise-type ailerons. The flap outlines are on the undersurface only.

The tail surfaces may be marked out on fibre, or pin-pricked directly from the G.A. Drawing. After cutting out with a fretsaw they are cambered to the section shown with a file and glasspaper and the outlines of the controls and trimming tabs scored with a ruler and bradawl.

A piece of fairly thick cellophane a good deal larger than required is heated in water (on no account should anything but hot water be used for this purpose) and formed tightly over the cabin section of the fuselage while the material is plastic. The cellophane should be held between the fingers and thumbs of each hand and pressed backwards and downwards on to the model (which must be firmly held meanwhile) until it conforms to the cabin shape. Once the material has cooled the surplus may be trimmed off with a sharp knife or razor-blade. When a satisfactory cover has been made—one or two efforts may be needed before a good one is turned out, so do not be discouraged if at first it is unsatisfactory—the unneeded wood can be cut off and the cockpit hollowed.

The air intake (underneath the fuselage), the radiator and the oil-cooler (both beneath the wing) are made from odd scraps of wood. The undercarriage legs are large pins and the tail-wheel fork is an ordinary sized pin. Both the main and tail wheels are best bought from a model shop. The exhaust pipes should be cut and shaped from two pieces of waste fibre.

Method of Assembly

TO start the work of assembly the main plane is firmly glued into the cut-out in the bottom of the fuselage. Care must be taken that this part is absolutely square both in plan and elevation. When the glue has set, file the undersurface of the centre-section to the slightly concave shape shown in the front view of the G.A. Drawing. Next, fair the wing roots to the fuselage with plastic wood, making very sure that the surface is rubbed down smoothly with fine glass-paper.

Glue the pieces of wood representing the radiator, oil-cooler and air intake in their respective positions.

All that may be said of the Spitfire's performance is that it is believed to be capable of a speed in the neighbourhood of 360 m.p.h. Such a speed is not extraordinary in these days; what is astonishing is the Spitfire's manœuvrability. Those who saw its loops and slow rolls, especially the climbing rolls after a high speed dive, at the 1936 S.B.A.C. Display, will only have the fear that the machine may manœuvre the "insides" out of all but the toughest pilots.

BUILDING THE SCALE MODEL

Details of Materials, Tools, and Constructional Methods

THE General Arrangement Drawings of the Supermarine Spitfire reproduced on the opposite page are drawn to a scale of $\frac{1}{72}$nd so as to be uniform with the other models in this series. If the reader should prefer a different scale he is advised to re-draw the side elevation to the full size of his proposed model. The other dimensions can be easily scaled off the printed drawing. To make this as easy as possible, it is wise to mark a piece of card from the scale on the drawing with the actual size of the model. Each inch on the drawing equals 6 ft. on the original aeroplane and on, say, a $\frac{1}{48}$th model it is equivalent to $1\frac{1}{2}$ inches. Mark the scale of feet from the drawing on to the edge of a card and at each 4-foot mark indicate that it is 1 inch on the new model. This is a simple example which does not really need the use of a measurer, but other scales undivisible by 12 (such as $\frac{1}{50}$th) are very awkward to convert mentally and the marked card becomes essential.

Materials and Tools

BELOW are given, in tabular form, the materials required for the construction of the model.

Main plane .	Piece of fretwood (whitewood, birch or satin-walnut) $6\frac{1}{8} \times 1\frac{1}{8} \times \frac{3}{16}$ in.
Fuselage . .	Block of whitewood $4\frac{1}{8} \times \frac{7}{8} \times \frac{1}{2}$ in.
Tail unit . .	Sheet of fibre $3 \times 2 \times \frac{1}{16}$ in.—such as is used by garages for making washers.
Undercarriage and wireless mast .	Pins.
Airscrew . .	Waste wood from main plane or a shop-bought cast model.
Exhausts, air intake and radiators . .	Odd pieces of wood and fibre.
Wheels . .	Shop-bought cast models.

A small square (about 2 × 2 in.) of heavy cellophane if a hollow, glazed cabin is to be made.

Wood is obtainable from a joiner's or "home furniture builder's" shop, the fibre from a service garage and the cast wheels and airscrew from a toy or model dealer.

The most useful tools for a model such as this are: $\frac{1}{4}$ in. chisel; small plane; penknife; oilstone; small half-round file; $\frac{1}{16}$ in. bradawl; archimedean drill; fretsaw; small long-nosed pliers; plastic wood; tube of cellulose glue and penny ruler measuring in $\frac{1}{10}$ths, $\frac{1}{12}$ths and $\frac{1}{16}$ths inch.

Method of Construction

MODELLING is started by tracing the side elevation from the G.A. Drawing. When making this tracing mark the size and shape of the main plane cut-out (shown in Fig. 1) and only draw in the rear of the fuselage beneath and in front of the tail plane. Lay the tracing on the fuselage block, pin-prick the main features of the outline, and, after removing the tracing, line them in with a pencil. Cut away the surplus wood with plane and chisel. Draw a centre-line down both top and bottom surfaces of the block and, on the top surface only, draw the outline of the plan of the fuselage. Again cut away the surplus

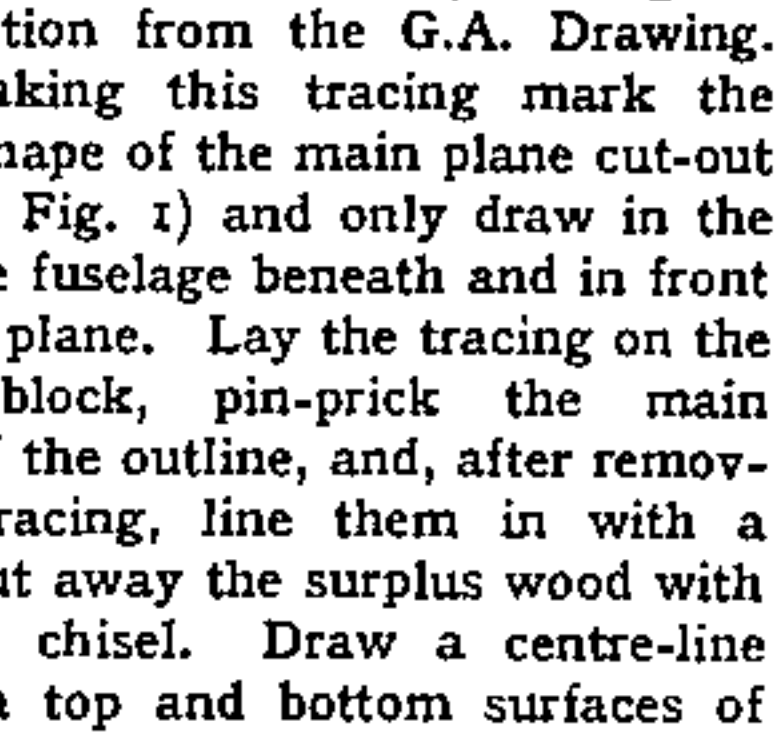

Fig. 1.—Fuselage block with details of main and tail plane cut-outs

It is now convenient to fit the undercarriage. The outlines of the wheel recesses are shown dotted, and these may be cut out. Unless the modeller has a brace and bit he is advised to do the hollowing of the wheel recesses with a penknife—this takes a little time and patience but is not difficult. The wheels are sunk in more deeply than the struts, rather less than $\frac{5}{32}$ in. and $\frac{1}{16}$ in. respectively, according to the sizes of pin and wheel used. The strut pin may either be bent over at the top or neatly soldered to a cross wire for a hinge ; this is then sunk into a slot in the wing made at right angles to the strut slot and "cemented" in place with plastic wood. When the plastic wood has set the shrinkage which takes place should be sufficient to allow the leg to be moved up and down—if it is too stiff it can be worked up and down until it is easier, or, if it is too free it can be stiffened with a little glue. If correctly made the strut should close into the hole and come down to its proper position for the model to stand on its own "feet." Once the undercarriage legs have been adjusted fairing plates should be cut from thin, stiffish paper and neatly glued to them. Details of the undercarriage are shown in Fig. 3.

Glue the sections of the tail unit to the fuselage, allow them to set firmly and fair them carefully with plastic wood. Pin the tail wheel in place.

Glue the fibre exhaust pipes to the fuselage and pin the airscrew to its nose. When the cockpit interior has been finished off with grey-green paint the cockpit cover may be glued in place. Small details, such as the rudder mass balance and the pitot head, can be made from florists' wire and carefully secured with glue. The wireless mast is a beheaded pin.

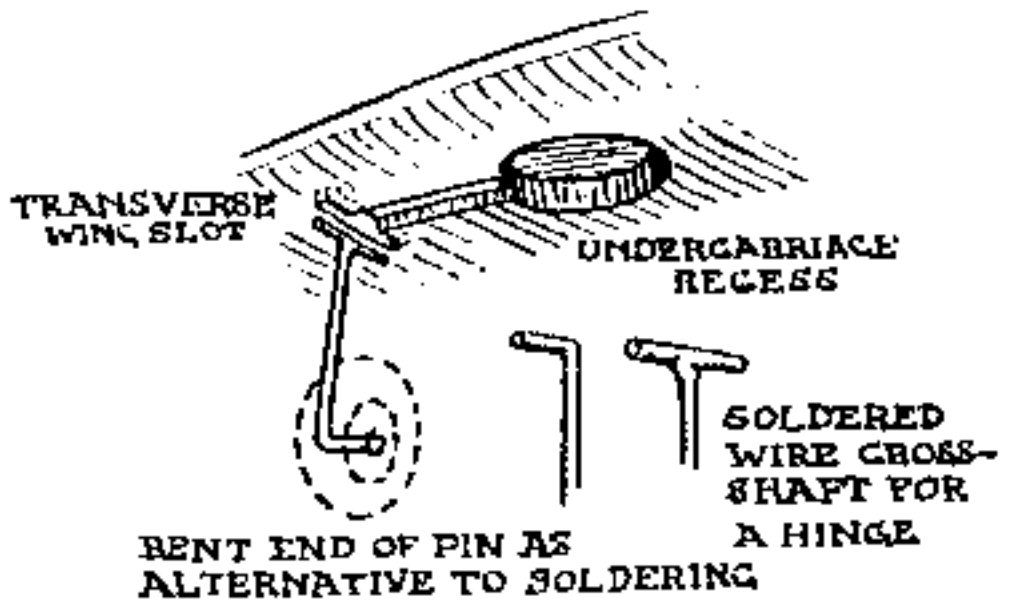

Fig. 3.—Showing detail construction of the retractable undercarriage, with pin strut and cross-shaft hinge

Painting and Colour Scheme

THE production Spitfire is shadow-shaded in milk-chocolate and dark green with a silver belly. The cockades on the sides of the fuselage and top of the wing have yellow outer rings, those on the underside of the wing are plain red, white and blue. The heading sketch has been prepared with the idea of giving a key to the colouring ; the darker shading shows the green, the lighter represents the brown. There are two schemes in use, the one being the "mirror-image" of the other so that the two machines drawn facing the same way are different and actually each represents the hidden side of the other. The spinners are usually painted in flight colours.

The best materials are a small pot of silver paint for the undersurface and poster colours for the shading. The dull finish of these paints closely resembles that on the actual machine. The rings are most easily represented by applying shop-bought transfers. A mapping pen and indian ink will solve the problem of the serial number on the fuselage and beneath each half of the plane—the number on the left side has the tops of the figures towards the trailing edge ; that on the right, the tops to the leading edge.