A 1 in. TO-THE-FOOT THE AIRSPEED "ENVOY"

Mr. Towner with his model. Span is 54 in., length 34½ in., and weight 9½ oz.

THIS particular prototype was chosen because of its adaptability to a simple twin-engined layout by arranging for the rubber motors to work through the centre section ribs and thus eliminate any complicated gear or crank drive. The flexible drive in the cowlings to convert the angular drive to a parallel drive consists of a light spring which is in flexion during the whole of the motor run.

A further object in keeping the rubber motors confined to the centre section only is to keep the weight off the tail and thus saves adding weight to the nose to obtain trim. The actual model balanced correctly on completion. Naturally, only smallish motors can be incorporated, but by using long motors, any subsequent bunching does not affect the trim. As a matter of fact, 35 sec. motor run is definitely obtainable, and with a wing loading of 6·8 oz. per square foot a satisfactory performance is assured.

Although both airscrews turn in the same direction, torque is not troublesome, and any turning tendency which should be only slight is easily corrected by either putting more turns on the left-hand motor or adding a further loop of rubber. The cowls, too, can be slightly offset.

The construction is straightforward and the final line-up should be correct if the instructions are carried out.

Commence by building the main wing beam of good hard balsa. Build this on the drawing in the usual way, and then add the front portions of the centre section ribs. These six ribs are all made in two halves. Add the leading edge and well brace, thus forming a very strong box girder.

The rear portions of the ribs can now be cemented into place, connected together with the trailing edge and cross members.

The fuselage is straightforward; build the two main frames on the flat and connect top and bottom spacers as usual. Well brace where the centre section fits. The whole centre section is detachable for fitting and inspecting the motors. The attachment is quite simple.

Two aluminium spiggots on the centre section trailing edge are first offered up and rest on the top of the bottom spacer of former G.

The rest of the centre section is now brought up into place and a dowel, hard balsa, is inserted through the aluminium side plates and paper tubes in the fuselage. Note that the rear ends of ribs A extend beyond spacer G and form a register to prevent side play. The rear hook is made up out of aluminium and is a press fit on the centre section trailing edge.

The landing gear consists of a transverse $\frac{1}{16}$ in. g steel wire in one piece from axle to axle, with a further $\frac{1}{16}$ in. g steel wire well soldered to it forming a rear strut. This assembly is well bound and cemented to the leading edge and main wing beam respectively. The actual spring is imparted by this assembly, and gives an up and down movement only. A further leg is hinged immediately behind the wheel, and slides in a flexible bush (expanding curtain rod) attached to the leading edge. This leg takes no load.

The cowlings are built up of 1 in. thick balsa, all joints being staggered and carved to shape. They are, of course, detachable, and first plug into the three-ply rings on the front end of the nacelles.

Noté that downthrust is incorporated. The airscrews were commercial 9 in. props known as pawlonia, a hard, light wood, and work well. The boss and spinner being added.

The wing construction is unusual, but very strong. A main spar is made the full depth of the wing and slotted at the rib positions.

The ribs have the centres cut out and are also slotted to accommodate the spar. The spar is now inserted through the ribs horizontally, and then turned through an angle of 90 deg., when the spar and ribs all lock together.

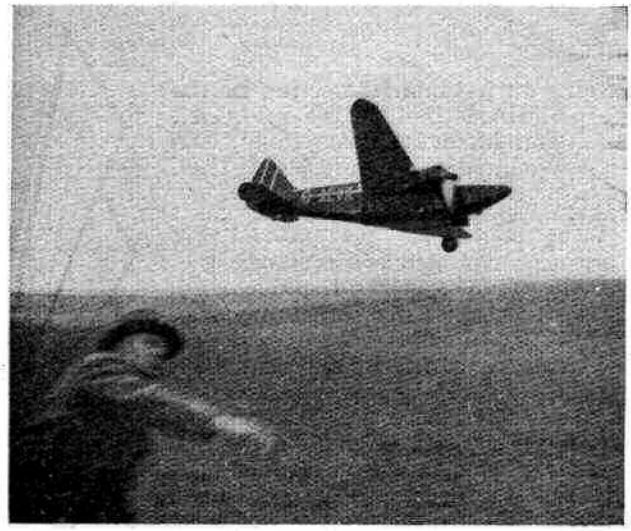
I have found on the usual type of slotted spar and slotted ribs that the cement on contraction tends to warp the main spar either up or down, but the method used on the Envoy overcomes this difficulty by having an opposing and counteracting force at each joint. No ailerons or controls of any kind are fitted as these, instead of helping to trim a model, are generally deranged after every flight, and cause more crack-ups than any other cause when they are fitted.

Most detachable cantilever wings in the past have suffered from either too firm a fixing which rips out on a bad landing, or too loose so that the wings flutter in flight.

Shear pins overcome this difficulty, but if in the customary position are difficult to prize out when shorn off hard against the rib face. It was to overcome this difficulty that the vertical shear pin method was evolved.

SCALE FLYING MODEL

***Designed and Built*——————by H. J. TOWNER**



Mr. Towner hand launches his model. With a motor run of 35 seconds, flights of between 200 and 300 yards can be obtained.

On a pin shearing a new one is inserted which pushes the old one out and clear of the model altogether. The pin itself is hard balsa, but not too hard, $\frac{1}{8}$ in. square, the hole in the aluminium " U " piece forming the circular section as the pin is pushed through.

The celluloid wind-shield is braced with $\frac{1}{16}$ in. square cane, steamed to shape, and the panes fitted individually, care being taken to use a hard-setting, waterproof glue, not cellulose cement, so that any surplus does not affect the celluloid.

The whole job is finished in a good quality light tissue, pasted on and over the sheet balsa as well. If put on well and in small pieces instead of trying to cover the whole job at once, no wrinkles should appear, and only one coat of dope is necessary. Too much tension distorts the whole thing and spoils the appearance by giving too much prominence to ribs, longerons, etc. Colour with a thin cellulose finish. Red above waist line, blue beneath silver wings and red nacelles. The rudder and fin is blue, with a red centre strip and thin white stripes either side. A white tapering line divides the two colours of the fuselage and completes G—AEXX of " The King's Flight."

LIST OF MATERIALS FOR THE ENVOY.

$\frac{1}{8}$ in. × $\frac{1}{8}$ in. × 3 ft. balsa	8 lengths	fuselage.
$\frac{1}{8}$ in. × $\frac{1}{8}$ in. × 3 ft. hard balsa	8 ,,	centre section.
$\frac{1}{16}$ in. × $\frac{1}{16}$ in. × 3 ft. balsa	12 ,,	stringers. etc.
$\frac{1}{16}$ in. × 3 in. × 3 ft. ,,	3 ,,	ribs LE and TE, etc.
$\frac{1}{32}$ in. × 3 in. × 3 ft. ,,	4 ,,	covering
$\frac{1}{8}$ in. × 3 in. × 3 ft. ,,		tail ribs, etc.
1 in. × 1½ in. × 2 ft. ,,	1 length	spar rib rods,
$\frac{1}{4}$ in. × 3 in. × 8 in. ,,		etc.
$\frac{1}{8}$ in. × 3 in. × 12 in. 3-ply	1 ,,	cowls.
1 mm. × 3 in. × 3 in. ,,	Cowl centres.	
16-gauge plated piano wire	4 feet.	
18- ,, ,, ,, ,,	18 in. long.	
26- ,, ,, ,, ,,	1 coil for flex drive.	
2 Brass-screwed bushes and nuts, 18-gauge hole.		
Aluminium 22-gauge sheet, 6 in. square.		
,, 26- ,, ,, 2 ,, ,,		tail wheel forks.
2 Plastic electric light adaptor tops, small, for crankcases.		
2 2¼ in. dia. airwheels (Trexlar).		
1 ⅜ in. dia. celluloid tail wheel.		

Expanding curtain rod, 6 in.

Hardwood for nose-block; $\frac{1}{8}$ in. dia. birch dowel, 3 in. long; celluloid; 16 brass screws, $\frac{1}{4}$ in. long; cup washers; $\frac{1}{16}$ in. square cane; 2 pawlonia hardwood, 9 in. dia., R.H. props. Tissue, dope, cement, and cellulose enamel.