XXV.

A SELF-LAUNCHING MODEL AEROPLANE.

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This article deals not with a scale model—a small copy of some full-sized machine—but with one designed for actual flight; with one not specially intended to create records either of length or duration, but which, although small details must perforce be omitted, does along its main lines approximate to the "real thing."

Partly for this reason, and partly because it proves a far more interesting machine, we choose a model able to rise from the ground under its own power and make a good flight after rising, assuming the instructions which we give to have been carefully carried out. It is perhaps hardly necessary to add that such a machine can always be launched by hand when desired.

Before entering into special details we may note some broad principles which must be taken into account if success is to attend our efforts.

Important Points.—It is absolutely essential that the *weight be kept down* as much as possible. It is quite a mistake to suppose that weight necessarily means strength. On the contrary, it may actually be a cause of weakness if employed in the wrong place and in the wrong way. The heavier the machine, the more serious the damage done in the event of a bad landing. One of the best and easiest ways of ensuring lightness is to let the model be of very simple construction. Such a model is easier to build and more efficient when constructed than one of more complicated design. *Weigh* every part of your model as you construct it, and do not be content until all symmetrically arranged parts which should weigh the same not only *look* alike but do actually *balance one another*. (*Note.*—The writer always works out the various parts of his models in grammes, not ounces.) If a sufficiently strong propeller bearing weighing only half a gramme can be employed, so much the better, as you have more margin left for some other part of the model in which it would be inadvisable to cut down the weight to a very fine limit.

Details.—To pass now to details, we have four distinct parts to deal with :—

1. The *framework*, or fuselage.
2. The *supporting surfaces*, consisting of the main plane, or aerofoil, behind, and the elevator in front.
3. The *propellers*.
4. The *motor*, in this case two long skeins of rubber; long, because we wish to be able to give our motor many turns, from 700 to, say, 1,000 as a limit, so that the duration of flight may be considerable.

The Backbone.—For the backbone or central rod take a piece of pitch pine or satin walnut 52 inches long, $\frac{5}{8}$ inch deep, and $\frac{1}{2}$ inch broad, and plane it down carefully until it has a T-shaped section, as shown in Fig. 129, and the thickness is not anywhere more than $\frac{1}{8}$ inch. It is quite possible to reduce the thickness to even $\frac{1}{16}$ inch and still have a sufficient reserve of strength to withstand

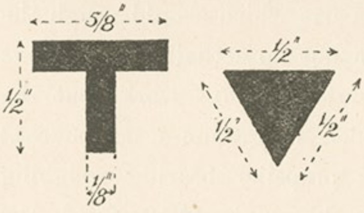

FIG. 129.—Sections of backbone for model aeroplane.

the pull of 28 strands of $\frac{1}{16}$-inch rubber wound up 1,000 times; but such a course is not advisable unless you are a skilful planer and have had some experience in model-making.

If you find the construction of the T-shaped rod too difficult, two courses are open—(1) to get a carpenter to do the job for you, or (2) to give the rod the triangular section shown in Fig. 129, each side of the equilateral triangle being half an inch long. The top of the T or the base

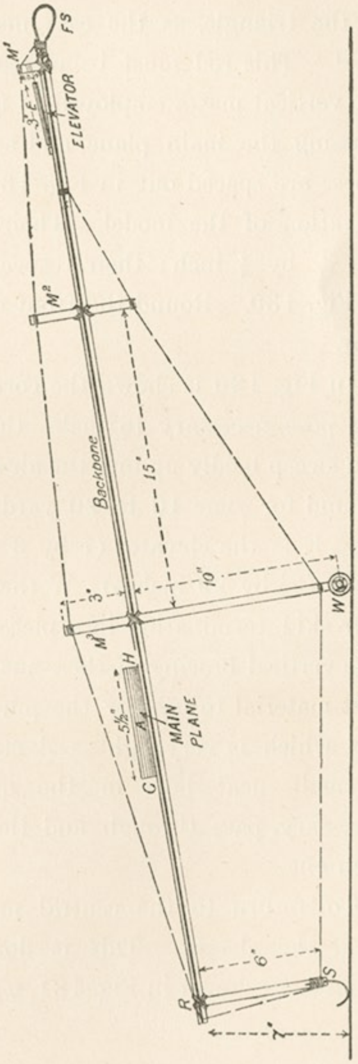

FIG. 130.—Side elevation of model aeroplane.

of the triangle, as the case may be, is used uppermost. This rod must be pierced in three places for the vertical masts employed in the bracing of the rod, trussing the main plane, and adjusting the elevator. These are spaced out in Fig. 130, which shows a side elevation of the model. Their sectional dimensions are $\frac{1}{16}$ by $\frac{1}{4}$ inch; their respective lengths are given in Fig. 130. Round the front edges and sharpen the rear.

In Fig. 130 is shown the correct attitude or standing pose necessary to make the model rise quickly and sweep boldly up into the air without skimming the ground for some 10 to 20 yards as so many models do. E is the elevator (7 by 3 inches); A the main plane ($5\frac{1}{2}$ by 29 inches); W the wheels; and R S the rear skid, terminating in a piece of hooked steel wire. The vertical bracing of these masts is indicated. The best material to use for the purpose is Japanese silk gut, which is very light and strong. To brace, drill a small, neat hole in the mast and rod where necessary, pass through, and tie. Do the same with each one.

To return to the central mast, which must also form the chassis. This is double and opened out beneath as shown in Fig. 131, *y z* being a piece similar to the sides, which completes the triangle $x\,y\,z$ and gives the necessary rigidity.

Attach this piece by first binding to its extremities two strips of aluminium, or by preference very thin tinned iron, T^1 and T^2. Bend to shape and bind to $x\,y$, $x\,z$ as shown in Fig. 131.

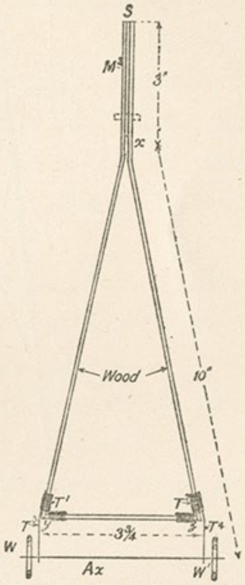

FIG. 131.—Front elevation of chassis.

The Wheels and Chassis.—W W are the two wheels on which the model runs. They are made of hollow brass curtain rings, 1 inch in diameter, such as can be bought at four a penny. For spokes, solder two strips of thin tinned iron to the rings, using as little solder as possible. (Fig. 132.) To connect these wheels with the chassis, first bind to the lower ends of $x\,y$, $x\,z$ two strips of thin tinned iron, T^3 and T^4, after drilling in them two holes of sufficient size to allow a piece of steel wire of "bonnet pin" gauge to pass

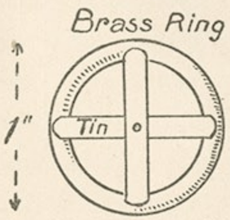

FIG. 132.—Wheel for model aeroplane chassis.

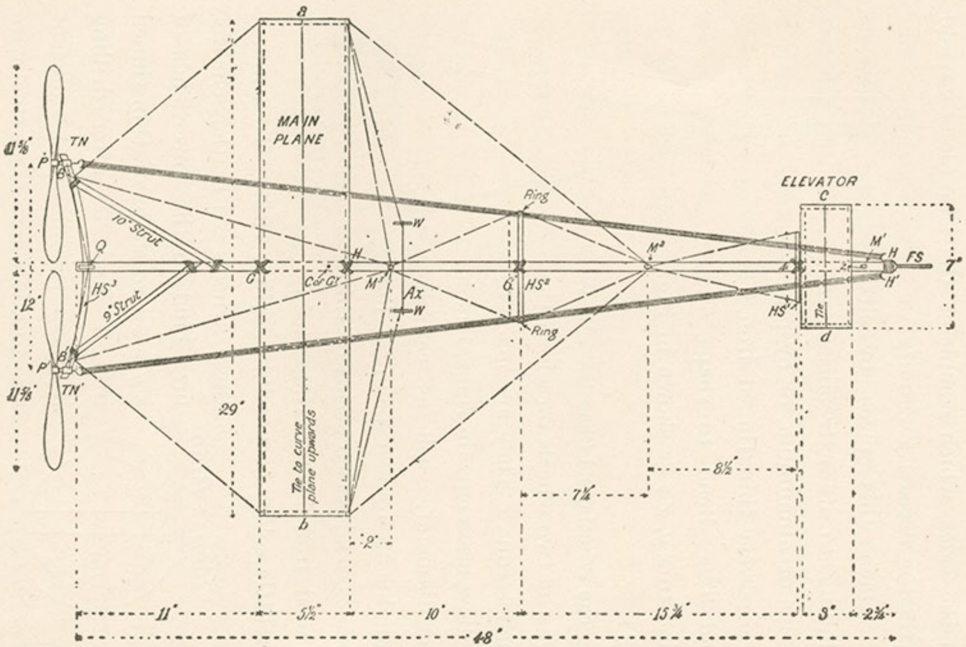

FIG. 133.—Plan of model aeroplane.

freely, but not loosely, through them. Soften the wire by making it red hot and allowing it to cool slowly, and solder one end of this wire (which must be quite straight and 5¼ inches long) to the centre of the cross pieces or spokes of one wheel. Pass the axle through the holes in the ends of xy, xz, and solder on the other wheel. Your chassis is then finished.

The rear skid (R S in Fig. 130) is attached to the central rod by gluing, and drilling a hole through both parts and inserting a *wooden* peg; or the upright may be mortised in. On no account use nail, tack, or screw. Attach the vertical masts and the horizontal ones about to be described by gluing and binding lightly with thread, or by neatly glued strips of the Hart's fabric used for the planes.

Horizontal Spars, etc.—To consider now the horizontal section or part plan of the model, from which, to avoid confusion, details of most vertical parts are omitted. Referring to Fig. 133, it will be seen that we have three horizontal masts or spars—HS^1, 4 inches; HS^2, 6 inches; and HS^3, slightly over 12 inches long. The last is well steamed, slightly curved and left to dry while confined in such a manner as to conform to the required shape. It should so remain