MODEL HYDROPLANE OR WATER SKIMMER.

A model hydroplane can be built in various forms and does not need any detailed description, because it can be constructed from appliances already dealt with, more or less. We offer several suggestions, however, which the designer may carry out to suit his taste, since this is a model which can well be constructed from scrap material.

The one shown in Plate XII, Fig. 5, is driven by compressed air, the two containers (pp. 206, 211) forming the twin floats or hulls. The two reservoirs are in air connection through the arched copper tubing seen at one end ; only one tap is used ; and the aerial propeller is four-bladed, being formed of two similar-pitch propellers joined at their bosses, each being one half let into that of the other.

The small engine is of the double-acting, cylindrical slide-valve type, mounted on a brass tube pillar, which is soldered to a stout piece of umbrella ribbing soldered to the two ends of the reservoirs and supported by a couple of thinner umbrella-rib struts.

The three tongue-like appendages are three small hydro-vanes, which are nearly totally immersed when the model is at rest on the water ; if and when the model is driven forward, at a sufficient speed, almost the whole weight is borne by these inclined vanes and not by the hulls, which scarcely touch the water, it being merely a question of power to make them clear it altogether. It was found necessary to fit a vertical fin underneath the front fin, and a fairly large rudder behind and midway between the two rear fins, in order to give the model a proper sense of direction, otherwise it " skimmed " about all over the place. The four-bladed propeller was only an experiment, a two-bladed one giving practically as good results. The following are the chief points of detail :—total weight, 13 oz. ; length of each reservoir, 26″ ; diameter, $1\frac{11}{16}$″ ; diameter of propeller, 10″ ; vanes, 2″ by 2″, with rounded-off ends, bent round and soldered to the umbrella-rib cross-pieces joining the two reservoirs together ; distance between inner sides of container, $4\frac{1}{2}$″. The angle of the front vane is adjustable by means of a steel wire, and wire and trainer connected with an arched wire extension of the leading edge of the vane, the wire and trainer

being attached to the highest part of the arched copper tube connecting the two reservoirs; from this same point, a wire is carried right back to the rear umbrella-rib crosspiece and attached to it at its centre. The rear hydrovanes were constructed of thicker sheet metal and are adjusted by bending. Care should be taken to see that both have the same angle.

A slightly modified form of the "fiddle" type hull of the Dounet-Leveque Flying-Boat is very suitable for this type of model (see Plate N, Fig. 10).

Instead of using an aerial propeller a marine one might be employed, provided a long inclined propeller shaft were used so that the engine worked clear of the water (Plate N, Fig. 9). But the objection to a marine propeller for this sort of model is that to act efficiently it should work well down in the water, and even if this were attained in the first instance, as the model began to hydroplane and rise out of the water, the propeller would rise also and the efficiency fall off.

SUGGESTED IMPROVEMENTS.

Instead of letting the reservoirs themselves form the actual floats, *i.e.*, instead of their outer surfaces actually being in contact with the water, it is better to fit them into long floats of similar construction to those used in the case of the last model, save that the bottoms of the floats would be better covered with the thinnest veneer wood and afterwards with Japanese silk. In the case of long, narrow floats it is essential they should possess one step (see Plate N, Fig. 9), or even more, and it is better to supply the highest portions of these with air by tin magnalium tubes let right through the float and round the reservoir from the top, although this latter refinement is one which probably few will be at the trouble of carrying out.

Instead of arranging the floats side by side, catamaran fashion, as in Plate XII, Fig. 5, they should preferably be arranged lengthwise, one behind the other. Place the engine and propeller in front and have, on each side of the long, central float—about 6″ out on either side—a similar float to the two rear floats used in the case of the model hydro-aeroplane; these can easily be carried on a couple of thin umbrella-rib cross-pieces. The hull containing the two

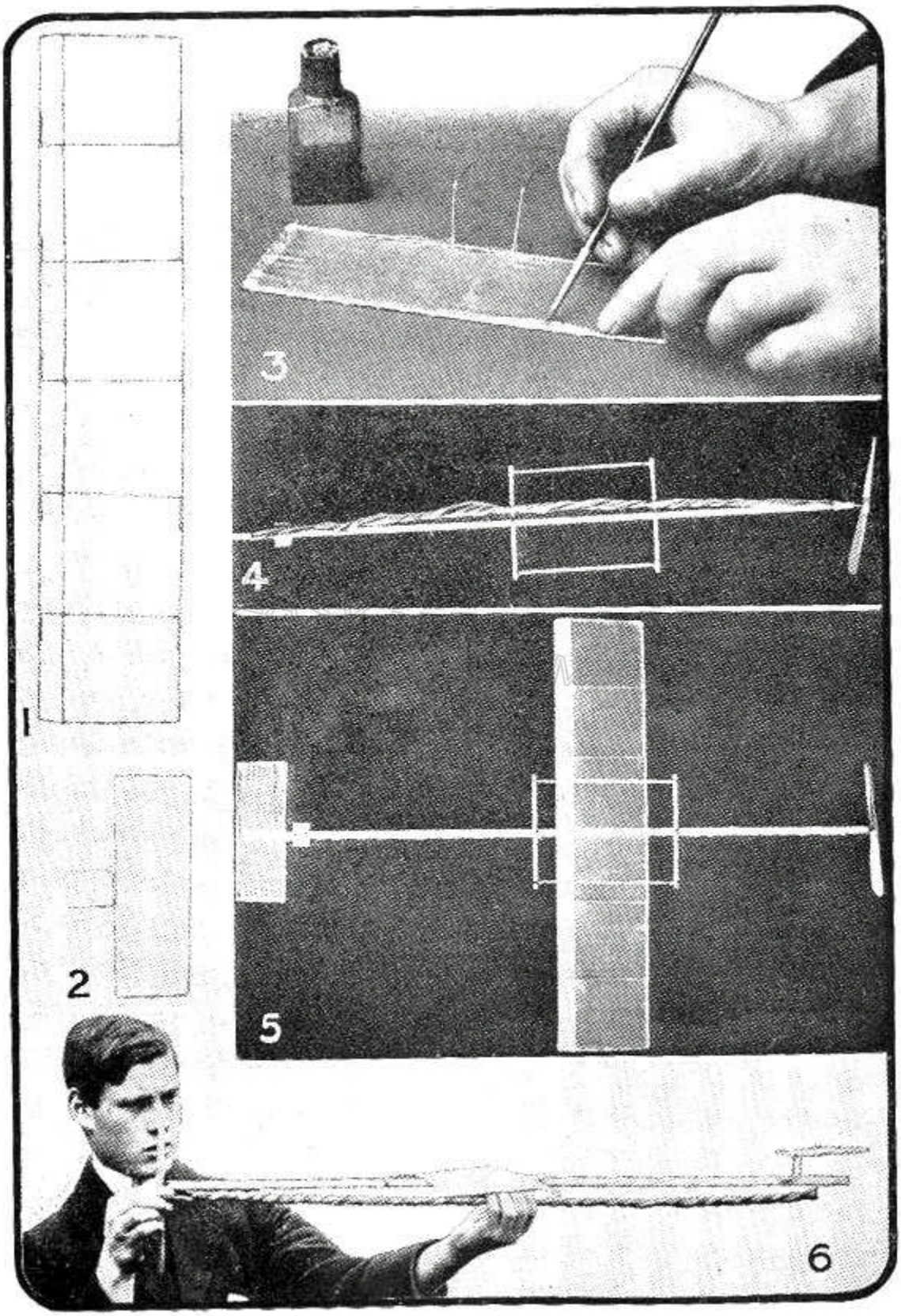
floats should, as before, be of rectangular section or, at any rate, flat-bottomed, with a pronounced step a little ahead of the centre of gravity of the entire model. Finally, if we wish to make a still better-designed model, we shall give the reservoir a cone shape, with dome-headed nose, not less than 3″ in diameter, and tapering to the rear to $1\frac{1}{16}$″, and use with this two similar engines rotating two similar propellers, but of opposite pitch. Such an arrangement overcomes all propeller torque and the balancing side floats can be smaller; the tapering stern and consequent concentration of the weight well forward render it much easier for the model truly to hydroplane on its more forward surface with its rear well clear of the water. In either case the balancing floats should be placed well forward, somewhat ahead of the propeller, which in its turn should be in front of the nose of the main float and as low down as possible (an inch clearance of the water by the tips should be ample). A rudder of fair length but no great depth must be provided in the rear; in the cases where the rear part of the float leaves the water, this shallow rudder must be placed well down below the tail of the hull.

A MODEL AEROPLANE.

The model illustrated in Plate XIII differs from that used in the seaplane, but the method of construction is much the same. The materials required include about six feet of thin stiff wire, a little linen, a 6″ propeller (which may be purchased for a few pence as it is difficult to make), an indiarubber winder, a small piece of tin, a hook, and the main bar, which should be of strong wood about two and a half feet long and three quarters of an inch in thickness.

The wire should be bent and soldered, as shown in Figs. 1 and 2 Plate XIII, in order to make the planes, and then covered with linen, and varnished or gummed. The length of the main plane should be about the same as the centre spar. The small strut of the main plane should be bent to an angle of about 45°. The small plane should have two pins, as shown in Figs. 3 and 6, and these are inserted into a tin rut (which can be seen in Fig. 5) in order to raise it about

Plate XIII. A MODEL AEROPLANE.



1 and 2. Wire framework. 3. Covering with gum. 4. The wooden frame. 5. With wings in position. 6. Position for flight.

an inch and a half above the centre plane. The two thin wooden bars that run across the centre of the main stay may be dovetailed on to it, or glued into a bore made through it, and the ends connected by pieces of good rubber. The main plane is then inserted over the bar and beneath the rubber, which allows the wind to deflect the plane. The rubber winder should be fixed to the underpart of the fore end of the centre bar and loosely on to the hook at the other end. This hook is then run through the bar and fastened to the propeller, which may thus be used as a winder.