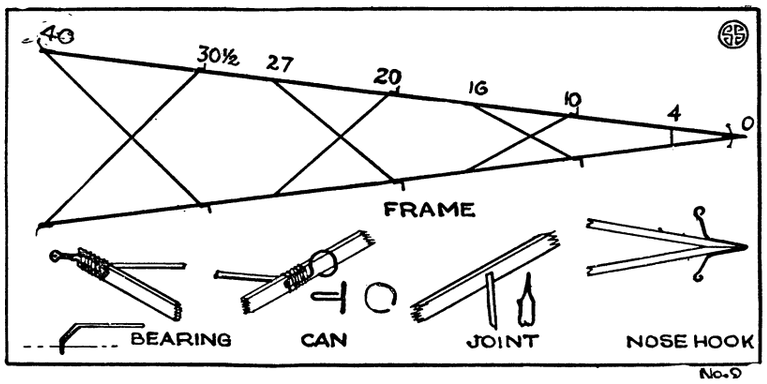
Building and Flying Model Airplanes



This is the sixth of a series of articles by Paul Edward Garber, telling how to make model airplanes. This article begins the description of a second and improved type of plane. Mr. Garber is in charge of aeronautics as the Smithsonian Institution.

By Paul Edward Garber

An Improved Scientific Model

The first five articles of this series told how to build a type of model which was designed primarily for ease in construction, although it also embodies good flying qualities. Having completed that model, the SS-1, and thus learned the elements of model aircraft construction, the model maker will be anxious to make a model with greater capabilities.

In making this second model, which we will call the "SS-2," greater care will be necessary in cutting and fitting the parts, and each completed unit must embody the utmost strength and yet be as light as possible. Practically every unit in this new model will be made to improved standards, involving the latest discoveries and inventions of the successful model flyer.

The wood to be used is known as balsa wood. This has only been available to model flyers in recent years, and immediately upon its adoption, model records leaped to previously unattainable marks. Balsa wood grows in Central America, where it derives its name from the Spanish word for "raft," as logs of this material are used for that purpose. Physically it is lighter than cork, and about half as strong as spruce. Its strength may be increased by coating it with banana oil after finished to size. It is obtained from model supply houses, a number of which are advertised in boys' magazines and aircraft periodicals.

The wire used for the fittings is known as piano wire. It is very hard and stiff, and ideal for model aircraft. In cutting it a good pair of hardened cutters must be used, and in bending it a good grip must be obtained. The propellers on this model are more efficient than those on the SS-1, and must be carved carefully, and balanced accurately. They also are made of balsa.

The fabric used will be light paper, preferably that known as Japanese silk tissue, which is extremely light but quite tough. It is important when covering the model surfaces, to keep every surface taut and smooth, retaining the proper shape and section of the wing, in order to derive every aerodynamical advantage.

If properly constructed of specified materials, the SS-2 will fly over half a mile and stay up as long as two minutes or even longer. The writer has often seen models of this type execute such flights, and knows that wonderful results will reward earnest efforts.

Constructing Frame of SS-2

It is essential that the frame of model airplane SS-2 be made true and strong. To accomplish this make a full size drawing of the plan view shown in the drawing, and use this to lay out the parts upon and mark their length and joints. The figures at the top indicate the number of inches each object is distant from the nose. If this method is not followed the resulting model will be very probably untrue, and not fit for flight. This model is made with a very slight margin of strength so every feature must be exact to prevent failure. Having completed the full-size drawing, procure the following material:

2 strips balsa wood 5/16" x 3/32" x 40".

1 piece bamboo pole, at least 14 inches long.

2 nails, or light brads, No. 15-1, ¼" long.

2½ inches No. 15 piano wire.

13½ inches No. 10 piano wire.

Thread, Ambroid.

Sandpaper the long balsa strips smooth and slightly round their edges. Cut the end of each to a wedge as shown in the detail drawing, and fasten them together with Ambroid. Form No. 15 wire into a nose hook of the type shown. The included angle of the nose hook should pinch very slightly onto the nose of the frame, after which it is bound and Ambroided in place. From the bamboo split six lengths, and trim these to a section of 3/32 inch x 1/32 inch. Lay these over the full size drawing and cut them to the proper length of the braces, making the front brace from a scrap of the shorter X-braces. When all are cut to length, sharpen the ends of each brace to a chisel-like point, as shown in the detail drawing, and beginning at the nose, work backward, putting each brace in place by carefully pushing it into the middle of the longerons at the proper point, and Ambroiding it in place. When all are in place take up the frame and sight along its sides to determine if it be true and flat sided. If not make it so by further inserting or slightly withdrawing the braces. This is a ticklish job but must be done right. When all is true, Ambroid any points which seem loose and bind and Ambroid the center crossing point of each X-brace.

Take the two nails and, by laying the heads on a piece of iron, and beating with a hammer, make a shovel-like end. In the center of this drill a hole with a No. 50 drill, which is slightly smaller than 1/16 inch. Slightly flatten the shank, and bend it twice as shown in the detail drawing. File or cut the point off square, and bind each nail bearing to the open end of frame as shown. Use Ambroid here. From the No. 10 wire cut six pieces, each 2¼ inches long, and form these into cans, or rubber loops, of the shape shown. Bind and Ambroid these in position. As seen one is placed in front of each X-brace. All of the open ends of the loops should be on one side of the frame.

When all joints are dry, trim off any projecting ends of braces which protrude through the sides, and give the frame a coat of banana oil which will strengthen it. If this application raises any roughness, sandpaper the frame lightly. When completed hang it up or lay it away carefully.

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