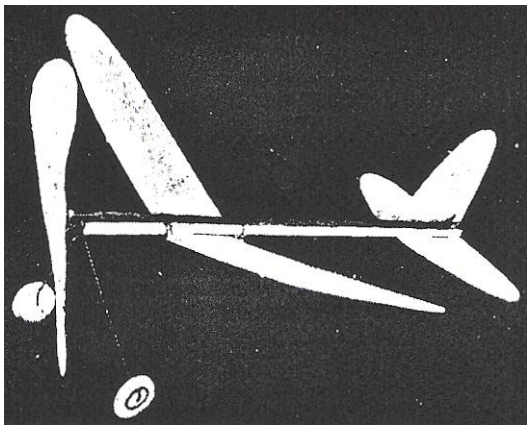
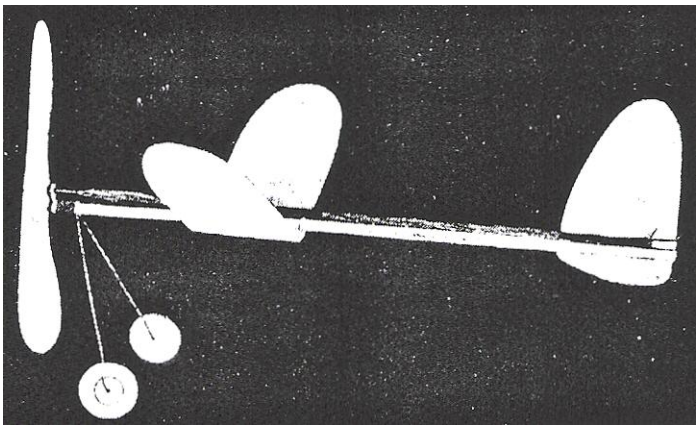


The finished model ready for a flight



The design of this model is perfect for stability

Fundamentals of Model Airplane Building

A Complete Course for Beginners Who Wish to Become Expert.
How to Build a Fine Flying Practice Model-Part No. 5

By EDWIN T. HAMILTON
Models Designed By Charles Hampson Grant

WE PRESENT here our fifth article on model airplane construction. This little model typifies the principles of design which your editor, Charles H. Grant, has been advocating in his popular series of articles "The Aerodynamic Design of the Model Plane." Freak tests with this model have proved beyond doubt the soundness of Mr. Grant's designing principles.

Possibly the most interesting test made with this model, and by far the most important one to the average model airplane builder, was the poor launching test. The model was released with its wings at a ninety-degree angle to the horizontal. While this would spell ruin to the flight of the majority of models, it immediately righted itself and flew perfectly upon being launched.

Many other severe tests were given it, both in the method of launching and the weather in which it was flown, but in all cases perfect flights resulted. Its performance and stability are exceptional. Out of some ten flights it averaged, when hand wound, 30 seconds duration covering an average distance of 450 feet. For the beginner who has not yet developed the technique of model plane flying, it will prove especially adaptable.

Here is a model guaranteed to be a "sure fire" flyer under all conditions. It will prove a splendid practice model for every beginner, whether he is building his first model, or for the expert wishing to test the aerodynamic designing principles upon which it has been created.

Motor Stick

The motor stick of this model consists of a single stick of balsa wood. When sandpapered smooth, it must measure 3/16" thick, 3/16" wide and 14" long, as shown in the plans under "Top View." Do this sanding with the aid of a block, as shown in the May issue under Fig. 5 on Page 9.

Elevator

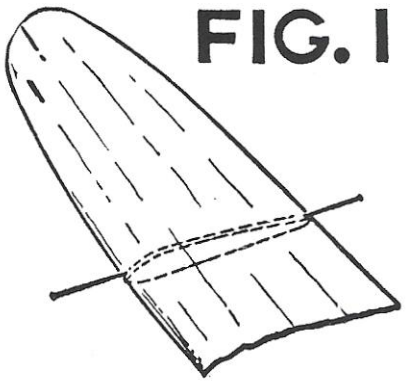
The elevator requires a piece of sheet balsa measuring 1/32" thick, 2-3/4" wide and 7-1/4" long. A graph plan of its form is shown at the bottom of the plan under "Elevator." Make a copy of this on paper ruled with 1/4" squares. (See the June issue, Page 8 for instructions in this work).

The elevator is then cut to its proper form. Make all cuts just outside the lines so that its edges may be sandpapered smooth down to the lines. When completed, it should be 1/32" thick, 2-1/2" wide and 7" long, as shown in the top view of the plans under "Elevator."

Rudder

As shown in the graph plan, the rudder is the exact size and shape of one-half of the elevator. Divide the pattern of the elevator in half, as shown by the dotted line in the graph, trace it on 1/32" sheet balsa and cut out. Sandpaper its edges smooth and down to exact size. Test for exact form by placing it on one-half of the elevator and seeing that it is a perfect duplicate of the elevator half.

Wing



Obtain a piece of sheet balsa measuring at least 1/32" thick, 2-5/8" wide and 17-3/4" long. Study the top view of the wing in the plans under "Wing." This shows the wing as it looks after being bent around its two ribs, as shown under "Wing Section." The width of the wing after bending is 2-1/2", but the original width must be 1/16" wider to allow for its bend. In this manner, the wing must be cut and its edge sandpapered down to 2-9/16" wide.

The tips of the wing should he cut from a pattern made from the graph plan under "Wing Tip." Cut and sandpaper the wing to exact width, trace and cut one tip and finish this by sandpapering down to the pattern line. The length of the wing is then measured exactly 17-1/2", the second tip braced, cut out and sanded smooth.

Locate the exact center of the wing, draw a line from side-to-side at right angles to the sides, and then crease along this line on the upper surface of the wing. This permits it to be bent for the required dihedral without severing the halves.

Cut a dihedral block 1/8" thick, 5/8" wide and 2-1/2" long. This is shown in the plans under "Wing," "Top View" and "Side View." Shape the block in the form of a triangle, as shown in the front, or edge view of the wing, so that it can be fitted and cemented directly over the center creased line of the wing.

The wing is now given its required 2-5/8" dihedral at each wing tip. Place one side of the wing flat on the table and carefully raise its other half until the tip is 5-1/4" above the table surface. When in this position, test to see that the dihedral block fits the angle of the two halves formed at their center. Hold in position, coat with cement and press the dihedral block into the center groove formed by the two wing halves. Small model pins may be driven through the underside of the wing into the block until the cement has dried. They are then removed.

After the cement has thoroughly hardened, the wing ribs are cut and cemented into place. These are

carved from 1/8" thick, 5/16" wide or high, and 2-1/2" long balsa wood pieces. Note their exact form in the graph plan under "Wing Section." Two of these will be needed. Carve until exactly like the full-size pattern and finish smooth with sandpaper. They are now cemented in place on the underside of the wing. Locate their position from the plan under "Wing."

Each of these two ribs are attached 3-3/4" from the center line of the wing. Coat the top of one with cement, press it into place at the leading edge and force a model pin into it through the wing at the angle shown in Fig. 1. The wing is then carefully bent around the top curve of the rib and its trailing half held with a pin as shown. The second half of the wing is bent and the rib attached in the same manner. Note that these ribs extend slightly below the leading and trailing edges of the bent wing. Complete the wing by cutting a small elevation block. This is shown at the trailing edge of the wing in the plans under "Side View." It must be cut 3/32" thick 1/4" wide and 5/8" long. Cut this to size and sand all sides smooth. This elevation block is now cemented on top of the dihedral block at the trailing edge of the wing, as shown in the plans under "Side View."

Propeller

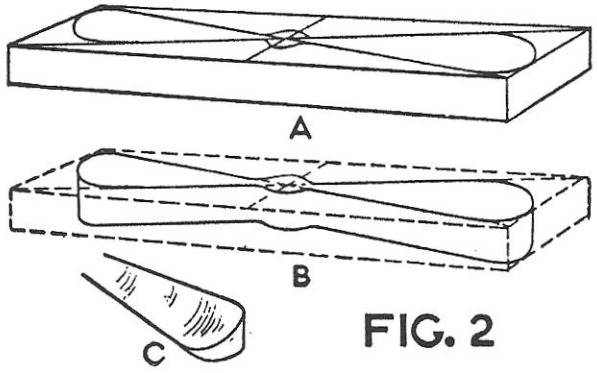
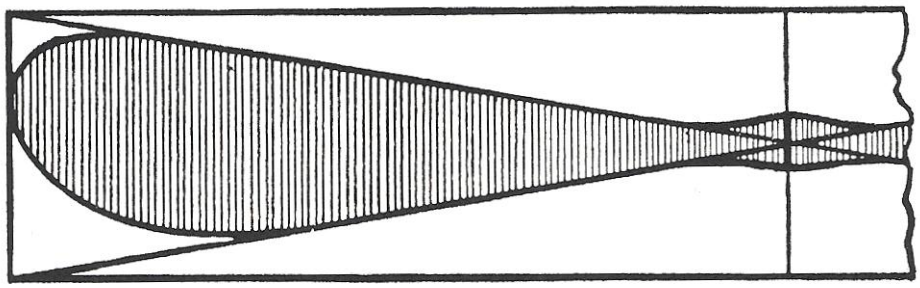


FIG. 2

The propeller is carved from a blank cut from a 11/16" thick, 1-3/8" wide and 8" long balsa propeller block, The propeller given last month was carved direct from the block but this one has its blank cut out first and the carving done from this blank.



PROPELLER PATTERN

The form shown for this model is known as a "U. S. Navy" type propeller. It is the most popular type of propeller for such models. Study the full-size pattern of the propeller. Draw two diagonal lines across your block and then draw within these lines the form of the blades, as shown, The block is now ready to be cut out. The steps of this work are shown in Fig. 2, Your block will look like the one shown at "A" when the blade design has been drawn on it.

This block is then cut along the blade outlines, which makes the block into what is known as a "blank." At each end, the blank is marked with a curve to indicate the cuts to be made when carving. The blank cut out is shown at "B," while "C" shows the end marked. From this point on, the propeller is carved, exactly as was the one described in the August article. Finish by sandpapering both blades perfectly smooth and cutting the hub

down to 1/4" thick.

Metal Fittings

All metal fittings with the exception of the propeller bearing, are bent from No. 14 piano wire, as discussed in the August Issue. We require four such fittings. The usual combination rear-hook and tail-skid is bent from one length, as shown at the top of the plans. One wing clip is required, as well as a propeller shaft. As these are practically duplicates of those given last month, no further instruction on bending them to form will be given. The landing gear is also similar to the one shown last month. It is bent from a single length of wire, as shown in the plans under "Landing Gear." Complete the list of necessary metal parts by purchasing a light propeller bearing.

Wheels

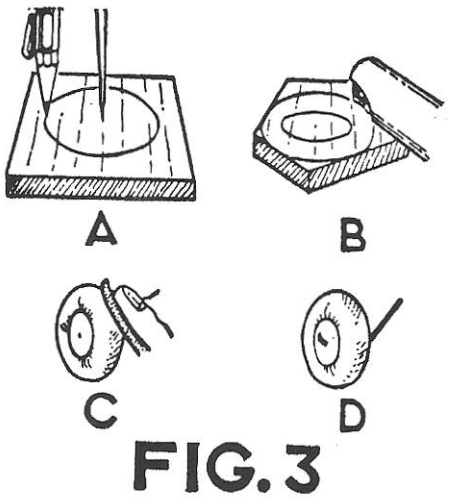


FIG. 3

The two wheels are of the solid balsa, carved type. Two pieces of balsa measuring 1/4" thick and 1" square will he needed for them. Set a compass at 1/2" and scribe a 1" diameter circle, as shown in Fig. 3, "A." This is then cut out with the cutter, as shown at "B." The circle is sandpapered into the form of a wheel with No. 00 sandpaper as shown at "C." Complete the second wheel in the same manner. A center axle hole is now made through each by forcing a common pin through the center of them. Make sure that this hole is slightly larger than the wire landing gear, so as to permit it to turn easily when in place.

Assembly

All parts having been completed, the model is now ready for assembly. Cement the elevator to the underside of the motor stick. Center the elevator with its trailing edge at right angles to the stick and cement in place, as shown in the plans under "Top View." Follow this by cementing the combination rear-book and tail-skid around the end of the stick and over the underside of the elevator, as shown in the plans under "Side View."

The rudder is cemented to the left side of the stick on top of the elevator, when looking straight at the model from the front. See that its leading and trailing edges are flush with those of the elevator.

Cement the propeller bearing to the top center of the motor stick at its leading end with the bent lip of the landing gear cemented directly under it. When both are in place, silk thread is wound around them and then coated with cement for additional strength. The wheels are slipped over the turned up axles of the landing gear and their ends turned up to prevent the wheels from rolling off.

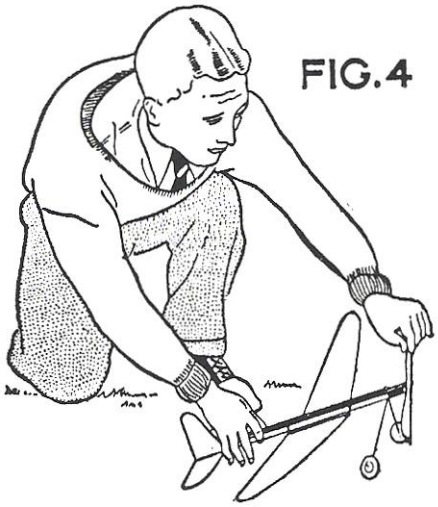
Attach the propeller shaft, as described last month, and then slip its hook through the hole of the propeller hearing. Place the wing clip around the underside of the motor stick just in front of the wing position. Place the wing with its elevation block toward the rear on the underside of the motor stick, as shown in the side

view of the plans. The wing is held in place with a single rubber band, Hook one loop over one of the hooks of the wing clip. Bring the two strands of the rubber band under the wing, up and over the stick, back under the wing and hook the other loop over the second hook of the clip.

Note the position of the center of grayitv, as shown in the plans under "Wing" and "Side View" and designated by the letters "C.G." Balance the model at this point under the stick and move the wing backward and forward until perfectly balanced at this point.

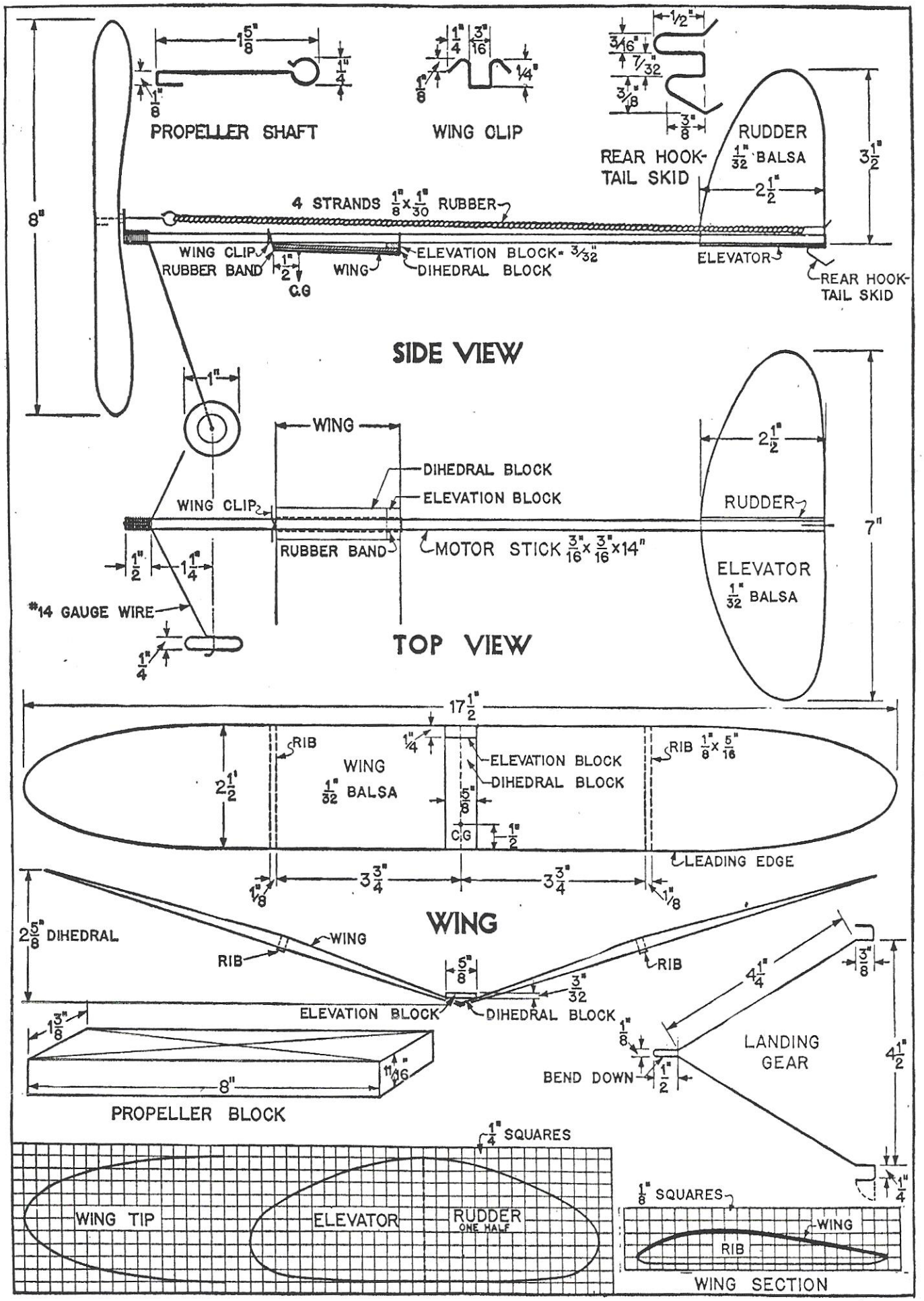
Four strands of 1/8" x 1/30" flat rubber are used for motive power. Measure the distance between the hook of the propeller shaft and the rear hook. Multiply this distance by four, add 1/2" to this total and cut a single strand this length. Tie the ends together and loop it twice between the two hooks.

Flying



This model will take off the ground without any assistance from the launcher with one row of knots wound up into the rubber motor. No pushing is necessary. Simply place it on the ground and release it. The proper way to hold the model for launching is shown in Fig. 4. Fully wound, it will jump immediately into the air, 275 turns may be put into the motor wound by hand. When stretched and wound with a winder, it may be wound to 550 turns.

Scanned From September, 1934
Universal Model Airplane News


PROPELLER SHAFT
WING CLIP
REAR HOOK-TAIL SKID
RUDDER
1/32 BALSA
4 STRANDS 1/8 x 1/30 RUBBER
8"
WING CLIP
RUBBER BAND
C.G
WING
ELEVATION BLOCK
DIHEDRAL BLOCK
ELEVATOR
REAR HOOK-TAIL SKID
SIDE VIEW
WING
DIHEDRAL BLOCK
ELEVATION BLOCK
WING CLIP
RUDDER
RUBBER BAND
MOTOR STICK 3/16 x 3/16 x 14"
7"
ELEVATOR
1/32 BALSA
*14 GAUGE WIRE
TOP VIEW
17 1/2"
RIB
WING
1/32 BALSA
ELEVATION BLOCK
DIHEDRAL BLOCK
RIB 1/8 x 5/16
C.G
LEADING EDGE
WING
2 5/8" DIHEDRAL
WING
RIB
RIB
ELEVATION BLOCK
DIHEDRAL BLOCK
LANDING GEAR
BEND DOWN
PROPELLER BLOCK
8"
1/4 SQUARES
WING TIP
ELEVATOR
RUDDER
ONE HALF
1/8 SQUARES
WING
RIB
WING SECTION