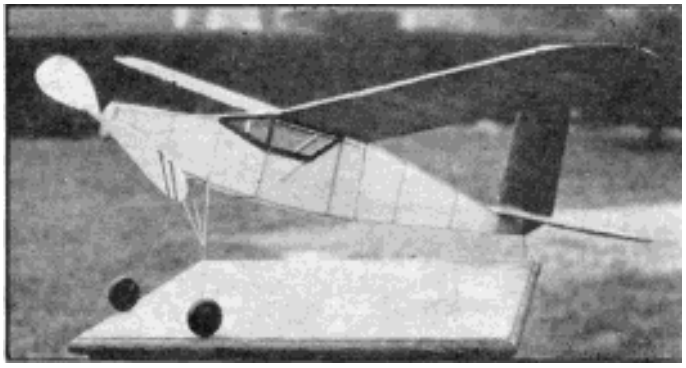
Build This World Record Fuselage Model

Here You Have Complete Instructions and Plans to Build a Plane of Sure-fire Performance that Established a World Record at the 1932 National Airplane Model Competition

By Gordon S. Light



The record holder. It has flown for 51 min. 42 see., reaching an altitude of 2000 feet.

For a model to be a good contest performer it must be capable not only of delivering good flights but must deliver them consistently. The contests of recent years have proved that the duration derived from unwinding rubber motors will not suffice. Therefore it is necessary to have a model that under satisfactory conditions will take advantage of every upward current and give a soaring performance.

It was the application of this idea that enabled me to design a type of model which frequently made flights of fourteen minutes. It was a plane of this type that won the Wakefield contest at Atlantic City with a flight of 25 minutes, 53 seconds in the Eliminations, and an excellent flight in the finals when it was clocked at 7 minutes, 57 seconds as it disappeared in the sky high over the airport.

The model is light in weight yet rugged in construction. The total weight is 1.8 ounces and the area 169 square inches. The loading per 100 square inches is 1.06 ounces. The large elevator and rudder aid greatly in insuring stability. The large propeller enables the model to gain sufficient altitude before the power is exhausted. The approximate area of the propeller is 25 square inches or 15 per cent of the wing area. Most models which are light and stable in the glide will soar indefinitely on a warm day if sufficient altitude is gained

It was surprising to me how few contest models had the demountable motor stick. A demountable stick facilitates winding and removes all danger to the fuselage from breaking rubber; it also permits capacity winding. Using a short motor stick the center of gravity is brought forward and the stability is improved.

The method of construction is conventional through out and the model is delightfully simple to build. The plans I have prepared are full-sized and many dimensions are omitted but can be secured by using a rule. The necessary materials are:

1 balsa propeller block 1-3/4 x 1-7/8 x 17.
12 pieces of 3/32 square balsa for wing, elevator, rudder, and fuselage.
1 balsa channel U-beam, 1/4 x 3/16 outside dimensions, with 1/32 walls.
1 piece balsa 1/32 x 3/16 for cap for motor stick.
1 punched clothing snap, 10 washers, two feet of medium wire and one foot of heavy wire.
1 balsa nosing, 5/8 x 1-3/4 x 3/8
Bamboo for landing gear and tail skid.
2 balsa wheels, 1-1/2 in diameter x 3/8 thickness.
18 main wing ribs cut a from 1/32 flat balsa, medium hard.
4 rudder ribs.
7 elevator ribs.
2 pieces balsa 1/16 x 1/16 x 36 for bent wing tips.
1 piece 3/32 x 1/4 x 36 for trailing edge of wing.
1 piece 1/16 x 5/32 x 36, trailing edge of rudder and elevator.
3 sheets Japanese tissue, and a small amount of cellophane
Banana oil, dope and ambroid.

Fuselage

Pin the fuselage longerons, 3/32 square, along the outline of the side of the fuselage, making sure the wood has been soaked in hot water and is pliable. Allow the longerons to dry thoroughly before ambroiding the braces in place. The wood will have to be broken at several places to follow the outline, but ambroid will make the joint strong. As soon as the wood has dried ambroid the vertical braces in position. Complete both sides and make sure they are identical.

The two halves are joined by ambroiding four balsa pieces, 1-13/16 long, in position. That is where the wing is placed on the fuselage. By pinning these pieces in position until dry, the fuselage will hold the correct shape. Make sure the cross section is a perfect rectangle. The remainder of the braces are then glued in position. A bamboo nose ring is shaped to the figure shown on the drawing. This is glued to the four front ends of the longerons. Before gluing the nose ring, trace its outline on the balsa wood nose block which is carved as a nosing. Next the motor stick is prepared. If channeled wood is not available, solid wood of greater dimensions may he used. When the balsa top is ambroided a good method to follow is gluing a small portion at a time and wrapping a rubber hand about the part to keep it in position, then ambroid about two inches farther and wrap another rubber band about the part. Using this method the entire stick can be glued in a short time. I have found that the motor stick serves best when used with the cap on top. Attach to the stick the rear hook which its bent from heavy wire. The motor stick is secured in the fuselage by means of two wire clips which are bent from medium wire. One of these clips is ambroided to the bamboo nose ring and the other to the braces at the rear of the fuselage The balsa nosing is fitted to the stick by cutting a notch and ambroiding. Be sure that the nose block makes a perfect fit with the bamboo ring. At a distance of 1/4 inch above the top of the motor stick, ambroid a punched clothing snap on the nose. This serves as a propeller bearing

The landing gear is made entirely of bamboo. The end of the struts are pointed sharply and stuck into the fuselage and ambroided. The drawing will help clear up the landing gear construction The axles are from medium wire and washes are glued on each side of the wheels to prevent wear. The wheels are kept on the axles by bending the tips of each axle. The tread of the landing gear is about seven inches. This is not so important since the model hops off very quickly when wound. The tail skid is bent bamboo and is glued to the fuselage.

Wing

Eighteen ribs of the Clark-Y section are cut from 1/32 inch flat balsa for the main wing. The leading edge is 3/32 square balsa and fits into a notch cut in the font of each rib. The trailing edge is 3/32 x 1/4 sanded to a triangular shape to complete the shape of the wing. The main spars are 3/32 inch square balsa. The tips on the wing, like those on the elevator and rudder are bent from 1/16 inch square balsa. This is done by wrapping the wood, which has been thoroughly soaked, around a can of the correct diameter which is kept hot by gas burner. The two halves of the wing are constructed, then joined by means of four pieces of balsa just two inches long, the width of the fuselage. Two pieces are 3/32, the same size as the spars and the other two pieces are the same as the leading and trailing edges. Raise each tip 2 inches. Make sure the wing fits the fuselage firmly and ambroid four small hooks to the leading and trailing edges of the center section. These hooks are used to hold the wing to the fuselage by means of rubber bands. After the tips which you have bent are thoroughly dry, cut to size and butt-joint to the leading and trailing edges.

Empennage

The elevator and rudder are constructed in the same manner and all the necessary information is available from the drawing. One suggestion, however: the center rib of the elevator is cut back of the notch for the rear spar and the trailing edge is brought in to form a V which gives the necessary room for attaching the rudder.

Propeller

Probably the most important thing on any model is the propeller and since a propeller of 17 inches is used, it is necessary that it be of good design and construction. The propeller is carved from a balsa block 1-3/4 x 1-7/8 x 17. The side view and the full shape of the blades will make it clear how to shape the blank. At the tip of this blank the dimensions are 7/8 x 1-7/8, giving the propeller a pitch of about 1.5 the diameter or 25.5 inches. The approximate area is 25 square inches. This propeller seems a fair approach to the true pitch helical type. Carve the prop so the blades taper from 3/16 at the center to 1/32 at the tip.

Camber to the extent of 1/8 may be put into the blades but it is easier and almost as efficient to form the blades to the shape of a wind section. Prepare for a deluge of chips and shavings and do not hesitate to spend a great deal of time carving the propeller. Ambroid washers to prevent the shaft from wearing the propeller. Free-spinning propeller aids the flight a great deal because the resistance of the propeller is greatly reduced. In a long soaring flight a free-spinning propeller is most essential. This can be added by bending a hook in the end of the propeller shaft and adding a small spring. When the rubber is wound the energy will cause the hook to be pulled back so it catches the propeller and turns it. When it is unwound the spring will throw the hook clear of the propeller allowing it to spin freely with the wind. Be sure to ambroid a washer at the point where the hook pierces the propeller or shortly you will find yourself having two fine propeller blades but no hub.

Covering

The model is covered with Japanese tissue and doped. Colored paper or colored dope improves the appearance of the model. The cellophane is glued directly to the paper where no struts are available.

Assembly

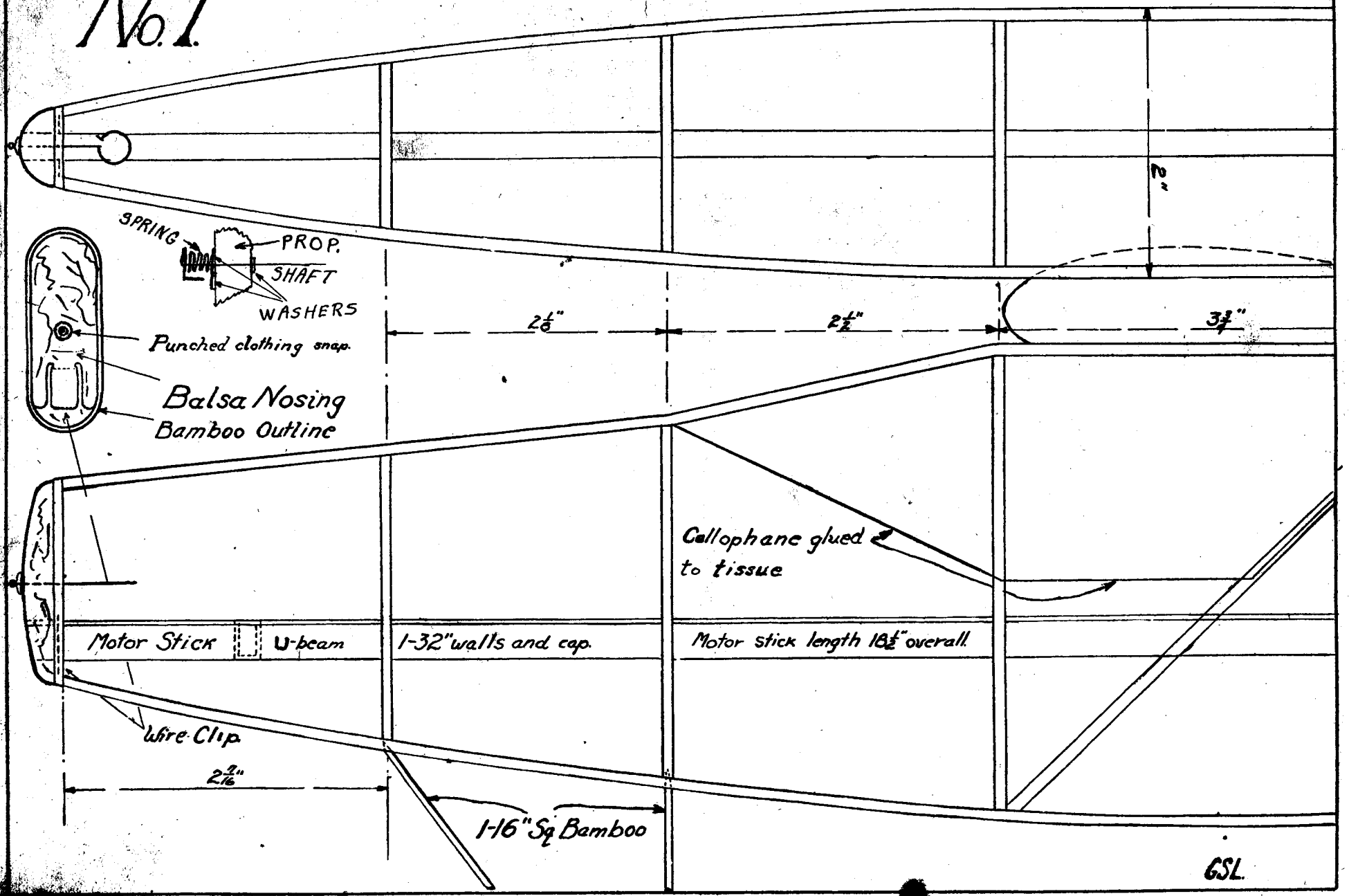
Ambroid rudder in position, allowing for the thickness of the elevator between the fuselage and the first rudder rib. It is best to give the model slight right rudder because the performance will be improved by a right circle. The elevator is ambroided in position. Make sure it will be perpendicular to the rudder and in line with the wing. The elevator is given one degree negative incidence. This means placing a block of 1/8 inch balsa between the rear spar and the fuselage. The wing is placed on the body in the position illustrated and secured by rubber bands. It is well to raise the leading edge of the wing, giving the wing positive two degrees incidence. Use 8-10 strands of 3/8 inch flat lubricated rubber.

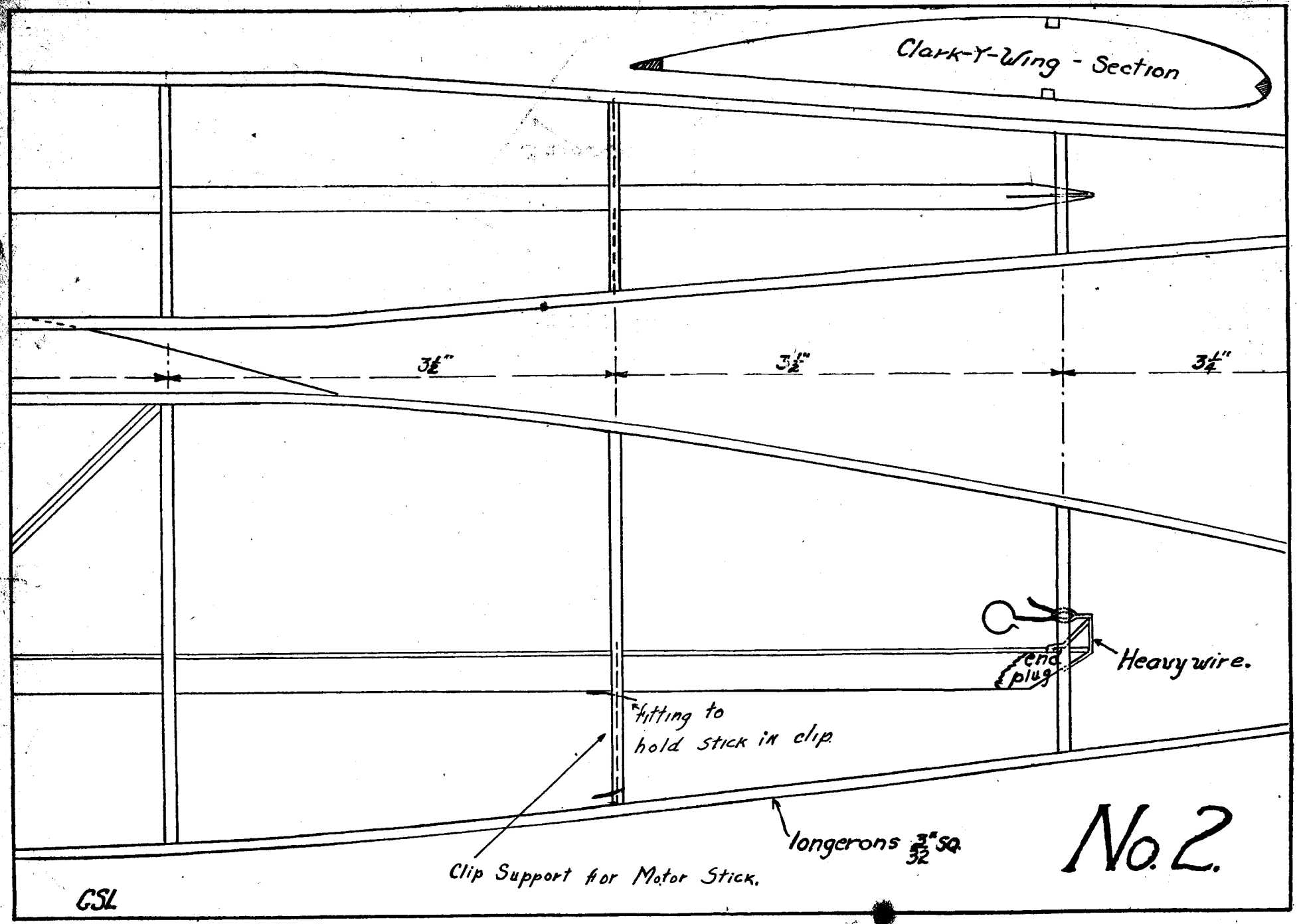
Flying

Glide, adjusting the wing until a long, smooth glide is obtained. Check up on the angle of the elevator and the wing. By increasing the number of degrees negative of the elevator, the tendency to climb will be improved. When testing, strive to secure a floating flight, that is, when the model always seems to be beginning a stall. When fully wound the added thrust will provide a fine angle of climb and the glide will be good. It is possible with slack rubber well lubricated, to wind 1200 turns. On a clear, hot day flights of hours are possible if you have means of following the model in two directions - vertically and horizontally. Usually the model disappears in the sky above. I have lost five of this type model in this way. To date my best flight is 51 minutes, 42 seconds.

Scanned from UNIVERSAL MODEL AIRPLANE NEWS
Date unknown

No. 1.

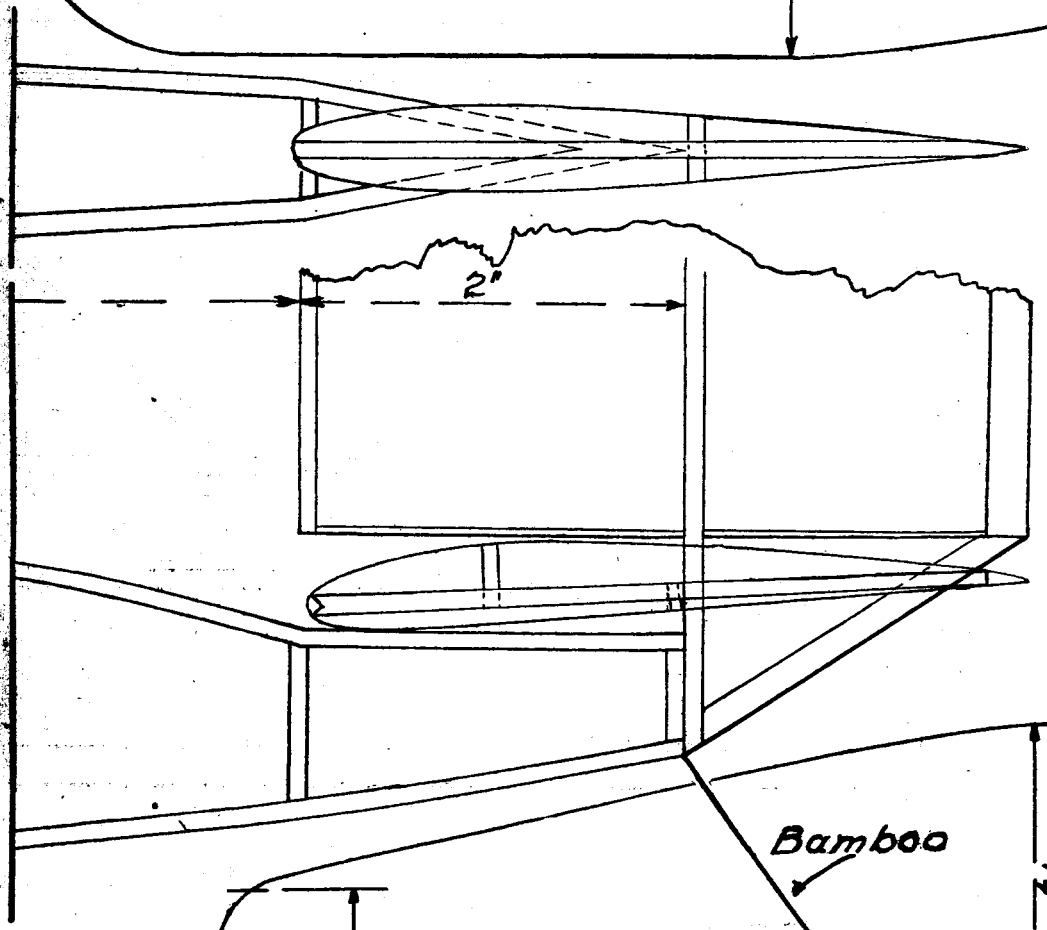

SPRING
PROP.
SHAFT
WASHERS
Punched clothing snap.
Balsa Nosing
Bamboo Outline
2½"
2½"
3½"
Cellophane glued to tissue
Motor Stick
U-beam
1-32" walls and cap.
Motor stick length 18½" overall
Wire Clip
2 9/16"
1-16" Sq Bamboo
GSL.

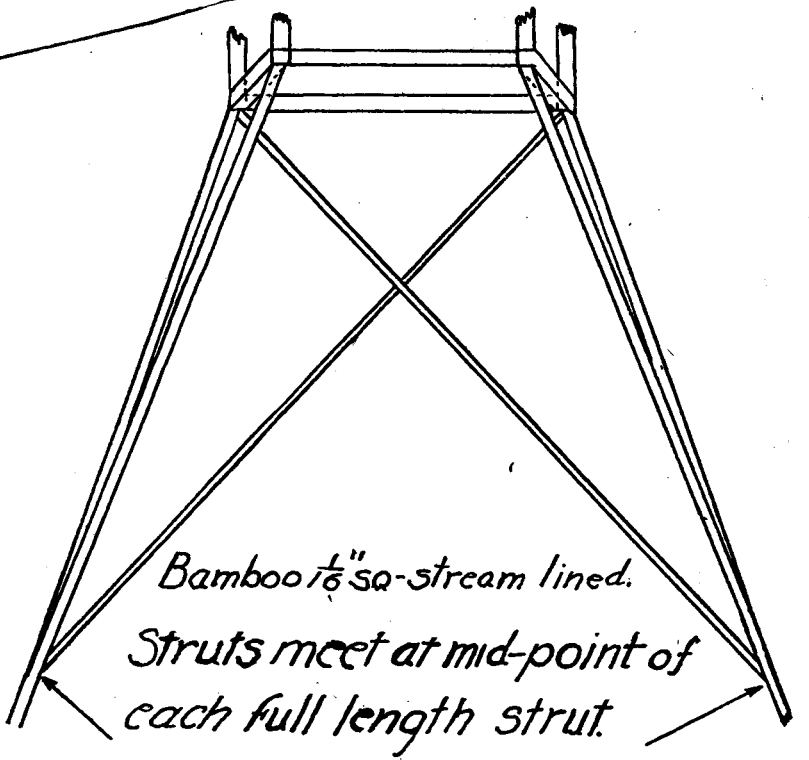

Clark-Y-Wing - Section
3½"
3½"
3¼"
end plug
Heavy wire.
fitting to hold stick in clip.
longerons 3/32" SQ.
Clip Support for Motor Stick.
No. 2.
GSL

Full size propeller blade layou.

Propeller block $1\frac{3}{4}$" x $1\frac{3}{8}$ x 17"

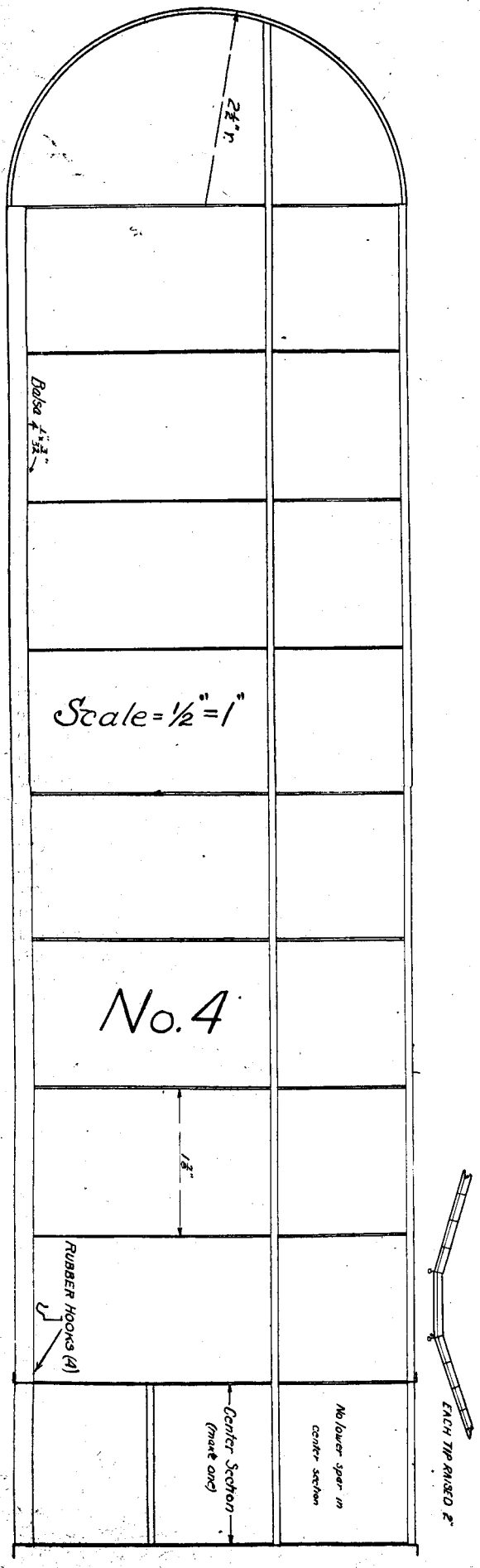
Pitch $12\frac{1}{2}$ x Diam = $25\frac{1}{2}$".

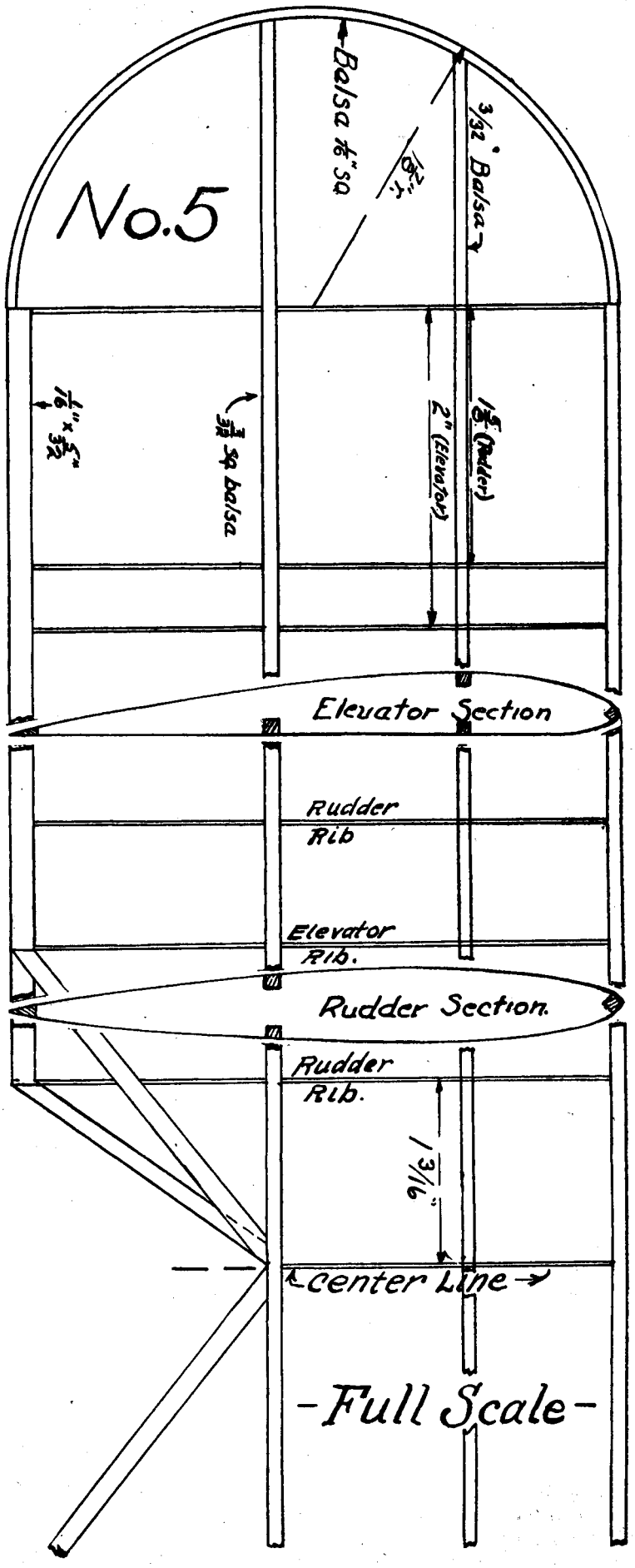




Side view of prop. blank. (½ blank)

No. 3


2½" r.
Balsa 1/16" x 3/32"
Scale = ½" = 1"
No. 4
1⅜"
RUBBER HOOKS (4)
Center Section (mark one)
No lower spar in center section
EACH TIP RAISED 2"


No. 5
Balsa 1/16" sq
3/32" Balsa
1/16" x 3/32"
3/32 sq balsa
2" (Elevator)
1⅝" (Rudder)
Elevator Section
Rudder Rib
Elevator Rib.
Rudder Section.
Rudder Rib.
1 3/16"
Center Line
-Full Scale-