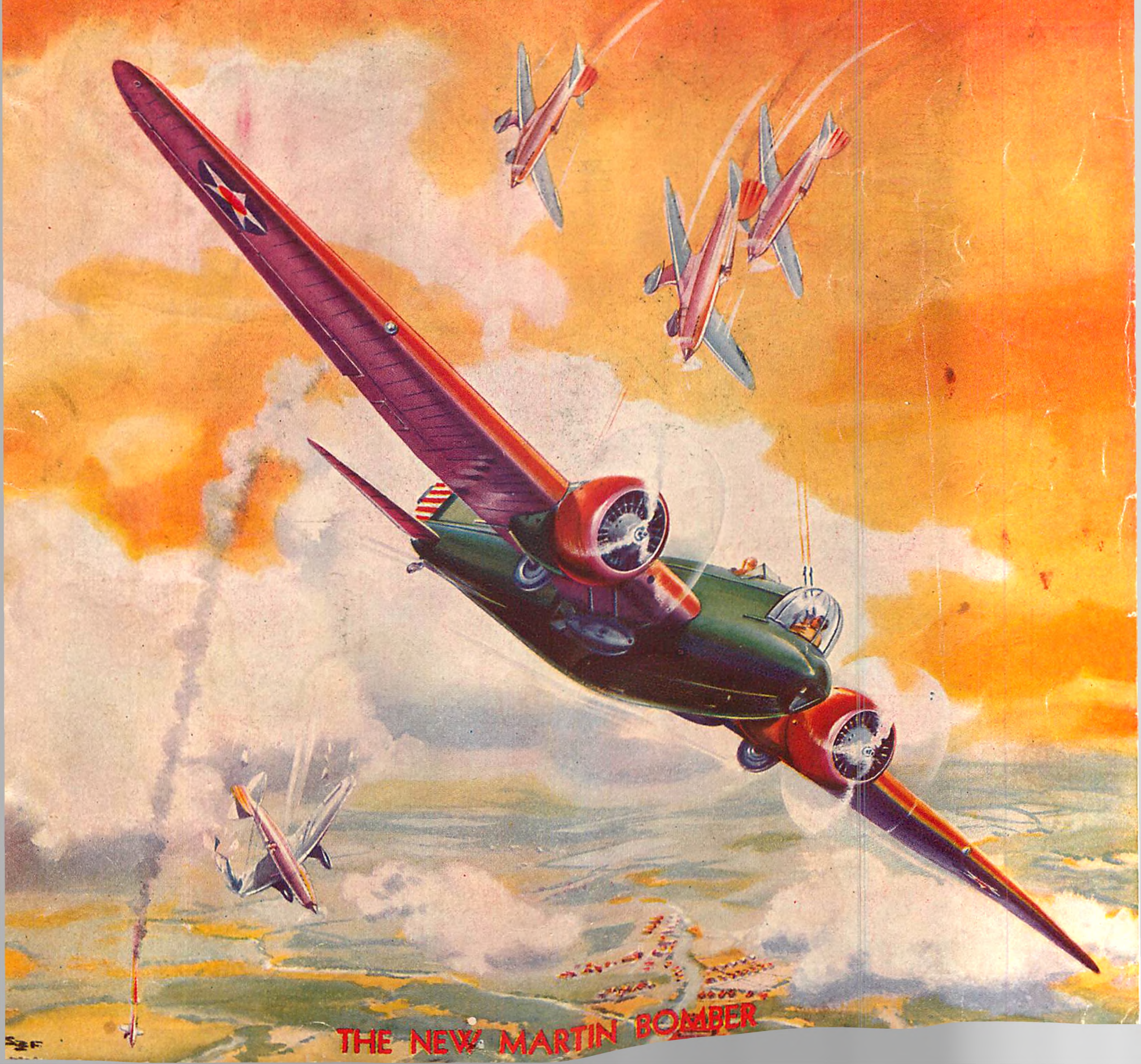
UNIVERSAL MODEL AIRPLANE NEWS

SEPT.

20¢

"THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO EXPERIMENTAL AVIATION"



THE NEW MARTIN BOMBER

WARNING

TO OUR MANY THOUSANDS OF CUSTOMERS AND FRIENDS

Conditions in the country are getting better, there is a brighter and happier feeling in the crowds. Inflation is working the markets of commodities higher and higher and as a result finished products are rising in proportion. **Everything is moving upward.** Model Airplanes and Airplane Materials cannot be the exception. **WE ARE GIVING YOU FAIR WARNING;**— this may be your last chance to buy at these lower prices. We earnestly advise you to STOCK UP. Prices may go up any day now but that will be our worry—Therefore, we warn you to Buy, Buy, **BUY ALL YOU CAN NOW AND SAVE MONEY!** Don't wait.

YOU BETTER STOCK UP BEFORE PRICES GO UP!

NOTE All Balsa shown here in 18″ lengths can also be had in 36″ lengths, if requested.

Balsa Wood

This balsa is clear, straight grained stock. It is strong, light, and free from defects. If hard or soft wood is desired, specify when ordering.

18″ Lengths

1/16 x 1/8 .... 24 for .05
1/16 x 1/4 .... 24 for .07
1/8 x 1/8 .... 24 for .05
1/8 x 3/16 .... 24 for .09
1/8 x 1/4 .... 24 for .12
3/16 x 3/16 .... 10 for .06
3/16 x 1/4 .... 10 for .07
1/4 x 1/4 .... 10 for .08
1/4 x 3/8 .... 6 for .08
1/4 x 1/2 .... 6 for .09
3/8 x 3/8 .... 6 for .09
3/8 x 1/2 .... 6 for .10
1/2 x 1/2 .... 4 for .10
1 x 1 .... 2 for .16

40″ Lengths

1/8 x 3/8 .... .03
1/8 x 1/2 .... .03
3/16 x 3/8 .... .03
3/16 x 1/2 .... .04

Sheets—18″ Lengths

1/32 x 2 .... 4 for .05
1/16 x 2 .... 4 for .06
1/8 x 2 .... 4 for .09
3/16 x 2 .... 2 for .08
1/4 x 2 .... 2 for .09

Plank Balsa

1 x 3 x 36 .... .25
1 x 6 x 36 .... .38
2 x 3 x 36 .... .42
2 x 6 x 36 .... .75
2 x 5 x 40 .... .75

Propeller Blocks

½ x ¾ x 5 .... 8 for .06
½ x ¾ x 6 .... 8 for .07
⅝ x 1 x 7 .... 8 for .09
⅝ x 1 x 8 .... 4 for .06
¾ x 1⅛ x 8 .... 4 for .08
¾ x 1⅛ x 10 .... 4 for .09
¾ x 1⅛ x 11 .... 2 for .07
⅞ x 1½ x 11 .... 2 for .08
⅝ x 1¼ x 12 .... 2 for .07
⅞ x 1½ x 12 .... 2 for .09
⅞ x 1½ x 14 .... 2 for .16

Dowels

Straight grained, true size birch dowels — highest quality grade.

1/8 x 18″ long .... 7 for .05
3/16 x 36″ long .... 6 for .05
1/4 x 36″ long .... 4 for .05

For a limited time
12″ lengths .... 12 for .05

Bamboo

Genuine, straight grained, no-knot TONKIN Bamboo. Strong and light. Splits easily. Doz.

1/16 x 1/4 x15″ .... .07
1/32 x 1/4 x 8″ .... .04
1/16 x 1/16 x 9″ .... .03

Japanese Tissue

A fine tissue for covering flying scale models. Strong, light, and takes dope well.

20 x 24 .... 3 for .05

Veri-Fine Tissue

One of the lightest tissues known. Excellent for endurance models, because of its extremely light weight.

20 x 15 .... .04

Colored Tissue

Just the thing for the new bright colored ships that are so popular nowadays. Red, Orange, Brown, Blue.

20 x 24 .... 2 for .05

Wood Veneer Paper

Very useful in scale and flying-scale models. Strong, yet light enough to fly.

20 x 30 .... .13

Celluloid Wheels

Experience has proven these wheels best for flying scale models. Pair

¾″ wheels .... .05
1″ wheels .... .07
1⅜″ wheels .... .09
1⅞″ wheels .... .13

Bushings

for wheels .... 4 for .02

Music Wire

Strong, springy wire sold in this new, convenient manner.

1 ft. lengths—straight
.014, .020, .028, .034
6 feet for .02

Dummy Motors

The very thing for adding that realistic touch to scale and flying scale models. Extremely light. Nine cylinders.

1½″ diam. .... .16
3″ diam. .... .28

Rubber Thread

Careful testing has proven this rubber to be the highest in energy content per unit of weight. This means more turns and less breakage.

.045 sq. .... 50 ft. for .12
3/32 flat .... 50 ft. for .13
1/8 flat .... 50 ft. for .13
3/16 flat .... 50 ft. for .16

ALUMINUM ITEMS

Drag Rings

Used on the real ships for cutting down wind resistance. Makes a beautiful addition to any radial motored model.

1½″ diam. .... .15
2″ diam. .... .17
2½″ diam. .... [illegible]
3″ diam. .... .25

N.A.C.A. Cowlings

No dummy motor needed when this cowling is used. Has a hole for thrust bearing in the nose.

1½″ diam. .... .15
2″ diam. .... .17
2¼″ diam. .... .23
3″ diam. .... .28

Aluminum Tubing

.010 wall thickness ft.

1/8 O.D. .... .05
3/16 O.D. .... .08
1/4 O.D. .... .11

Aluminum Leaf

Real sheet aluminum, yet almost as light as paper. Makes a beautiful covering job.

.0003 thick
3½″ wide .... 5 ft. for .05

Sheet Aluminum

12″ wide
.003, 12c ft.; .005, 12c ft.
.010, 16c ft.

Washers

For indoor, outdoor, and flying scale models.

Large size, ¼ O.D.
Dozen, 1½c; Per 100, 10c
Small size, ⅛ O.D.
Dozen, 1½c; Per 100, 15c

Clear Cement

The fastest drying, lightest and strongest cement on the market. Try some now. You'll be amazed at its marvelous properties.

1 oz. tubes .... .06
2 oz. tubes .... .08
4 oz. cans .... .20
1 pt. cans .... .60
1 gal. 4.50

Clear Dope

Just suited for the model user's requirements.

2 oz. cans .... .07
4 oz. cans .... .13
1 pt. cans .... .35
1 gal. 2.50

Acetone

For thinning out liquids.

2 oz. cans .... .07
4 oz. cans .... .13
1 pt. cans .... .35
1 gal. 2.50

Colored Dope

Highest qualitey pigmented dope. Do not confuse with inferior grades. Leaves a smooth, even color upon drying.

Blue, Red, Yellow, Orange, Silver, Black, Olive, Drab

2 oz. cans .... .09
4 oz. cans .... .17
1 pt. cans .... .60

Thrust Bearings

Light, strong bearings. Hole is truly centered.

Large size .035 hole
Each, .01½; Dozen, .15
Small size .025 hole
Each, .01½; Dozen, .15

Insignia

U.S. Army and Navy type Improves the appearance of models by 100%. Each sheet contains 4 stars in circles for the wings, and red, white and blue stripes for both sides of the rudder.

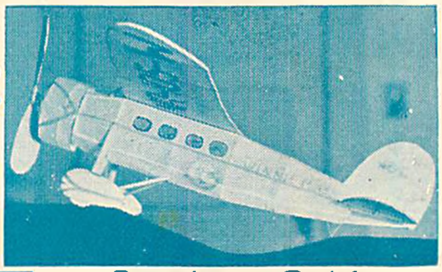
sheet
1″ diam. .... .02
1½″ diam. .... .03
2″ diam. .... .04
2½″ diam. .... .05

Two-in-One Kit

Contains the around-the-world "Winnie Mae" and the "Trans-atlantic Bellanca." Both 15″ wing spans. Kit contains full size plans, bulkheads, large tube of cement and all other materials needed to complete these two wonderful models. Get yours now.

75c

Add 10c for Postage

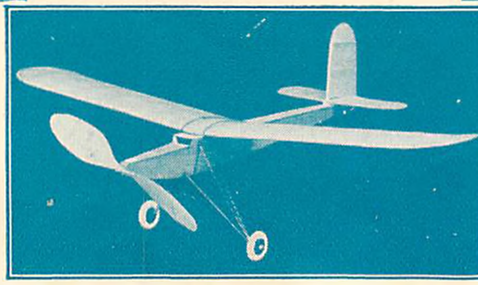


Outdoor Twin Pusher

A twin pusher that has actually flown 12 minutes, not once—but esveral times. This plane has several features' which can ot be found elsewhere. It has a 40-inch "A' frame that is a marvel for lightness and strength, a 36-inch high cambered, tapered wing, and two 12-inch, high pitch props, powered by 68 feet of ⅛ flat rubber. The kit contains complete plans and instructions, stamped ribs, and all other materials needed for the construction of the model. Price ....

75c

Add 10c for Postage



Outdoor Cabin Tractor

One of the snappiest flying models in its class, proper engineering and all balsa construction does it. This plane has a double surfaced, high lift wing, 30-inch span, all-balsa fuselage, extra strong, landing gear to withstand the shocks of outdoor flying, and a large, wide-bladed propeller to keep it up for long endurance flights. The Kit contains complete plans and instructions, stamped ribs, large tube cement, 1 oz. bottle clear dope, pair celluloid wheels, and all materials needed to complete the model. Price ....

75c

Add 10c for Postage

GIVEN FREE

A Beautiful

GLIDER KIT

Everything to Complete a Real Model Glider, with a purchase of $1 or more.

READ BEFORE ORDERING:— In Order for Prompt Delivery Please Comply with Instructions Below.

1. Order under 25c not accepted—due to our very low prices. 2. Add 15c for packing and postage on orders up to $1.50; on orders for $1.51 and over add 10% for packing and postage charges. 3. Add 10c extra to above charges on Balsa plank orders less than $1.50 west of Mississippi and Canada. 4. Postage stamps, Canadian or Foreign Coin not accepted as payment. 5. Remit by check, postal or express money order. Make payment to MADISON MODEL AIRPLANES, Inc., 134 Livingstone Street, Brooklyn, N. Y. 6. Add 5c for insurance against breakage in transit.

Canadian Charges:—Add 25c for packing and postage on orders up to $1.50. On orders of $1.50 and over add 10% packing and postaeg. Postage stamps, Canadian or foreign coin not accepted as payment.

Dealers and Clubs—Write for Special Price List

3-in-1 KIT

Three R.O.G. Stick Models

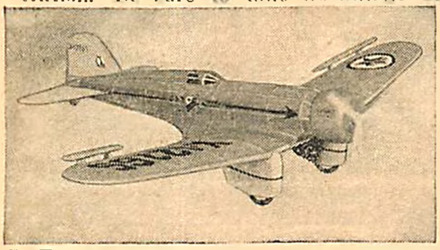
75c

MADISON MODEL AIRPLANES, Inc., 134 Livingston St., Brooklyn, N. Y.

Our Kits and Supplies Are Handled by Leading Department Stores—ASK FOR THEM

THE DEPRESSION IS OVER NOW!

Never again will kits and supplies sell as low as the prices listed below. After you have ordered your kits and supplies, put this advertisement away as a curiosity and look at it one year hence. Then you will wonder how it was possible to sell kits and supplies—good kits and supplies—at such ridiculously low prices. You will never again see such prices during the present generation. Be sure to take advantage of the offers listed here now.



NEW Capt. HAWKS' SKY CHIEF

NORTHROP "GAMMA"

Easy to build—Flies Great! 22" tapered wing, length 16½", weight 1 oz. Kit is complete, including finished cowling, wheels, and semifinished prop. Full-size plans and instructions.

1.00 Postpaid

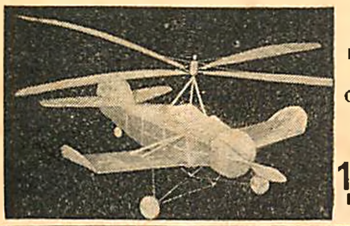
GEE-BEE SUPER-SPORTSTER

1.50 Postpaid

Guaranteed To Fly

20-In. Wingspan

COMPLETE



2 Ft. FLYING KELLETT AUTO-GIRO Guaranteed to Fly.

Complete Kit **1.25** Postpaid

2-FT. MONOCOUPE Complete Kit **1.00** Postpaid

2-FT. GEE-BEE SPORTSTER Complete Kit **1.00** Postpaid

26½-IN. STINSON AIRLINER Complete Kit **1.50** Postpaid

READY TO FLY

Assembled in 3 minutes. Rises off ground, flies 400 to 600 feet. Weight ⅛ oz., painted in three colors.

Complete ____ **25c** Postpaid

EVER-SO-EASY 10" SOLID MODELS

Boeing Pursuit, Wedell Williams, Curtiss Akron Fighter, Monocoupe—110, Pitcairn Autogiro, Berliner Joyce KF J2, complete with printed wings, tails, propellers, etc.; 5 bottles of colors and cement.

Postpaid ________ **35c**

3 for $1.00

Every Kit Contains:

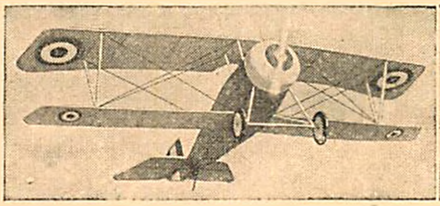
- Finished drilled propeller
- Finished drilled wheels
- Finished drilled nose plug
- Finished wire fittings
- All ribs, bulkheads, fairings, etc. printed on balsa.
- 2 sheets colored tissue
- Bottle banana oil
- Tube cement
- Washers
- Rubber motor
- All balsa strips cut to size
- Full size plans and explicit instructions.

20" WINGSPAN

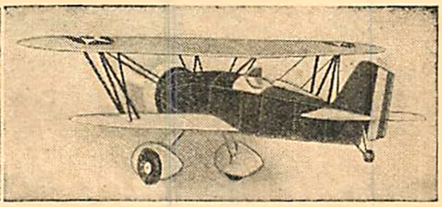
These Kits Were Made To Sell For $1.00

50c

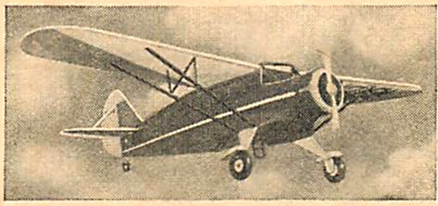
EACH POSTPAIID



NIEUPORT "SCOUT" 20" 50c Postpaid

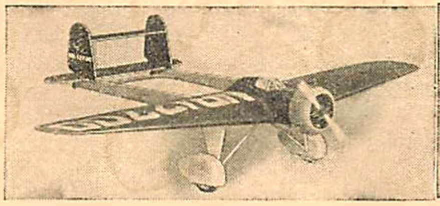


CURTISS "GOSHAWK" 20" 50c Postpaid

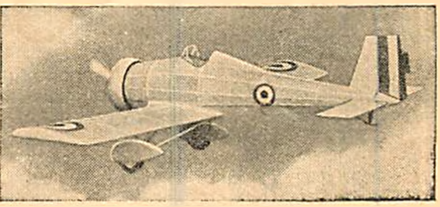


STINSON "RELIANT" 20" 50c Postpaid

BELLANCA "Pacemaker" 20" 50c Postpaid

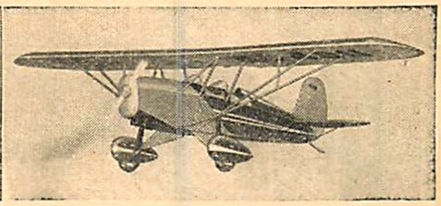


VANCE "Flying Wing" 20" 50c Postpaid



VICKERS "JOCKEY" 20" 50c Postpaid

WACO MODEL "A" 20" 50c Postpaid

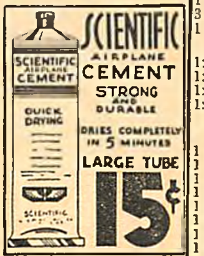


FAIRCHILD "22"—20" 50c Postpaid

Scientific "Hi-Grade" Supplies

NOTICE

Scientific Balsa strips are not ripped or knife cut. All Scientific balsa is cut on high-speed automatic circular saws assuring you of true-cut balsa sticks with all four sides smooth.



Scientific Balsa
36" lengths

1/16x1/16,	10 for 5c
1/16x1/8,	7 for 5c
1/16x3/16,	6 for 7c
1/16x1/4,	6 for 7c
3/32x3/32,	6 for 5c
1/8 x1/8,	6 for 5c
1/8 x3/16.	6 for 8c
1/8 x1/4,	6 for 10c
1/8 x3/8,	5 for 10c
3/16x3/16,	5 for 10c
3/16x1/4,	5 for 10c
1/4 x1/4,	6 for 15c
1/4 x1,	3 for 15c
3/8 x3/8,	5 for 15c
1/2 x1/2,	3 for 20c

36" Planks

1x1½,	.20	2x3,	.45
1x2,	.25	2x6,	.75
1x3,	.30	3x3,	.90
1x6,	.50	3x6,	1.50

Sheet Balsa
36" lengths

1/32 x 2	4c
1/32 x 3	7c
1/16 x 2	5c
1/16 x 3	8c
1/8 x 2	6c
1/8 x 3	10c
1/4 x 2	10c
1/4 x 3	15c
1/64 x 2 x 18",	2 for 5c

Propeller Blocks

⅜ x ½ x 5	1c
½ x ¾ x 5,	3 for 4c
½ x ⅝ x 6,	3 for 5c
⅝ x ¾ x 7½	3c
⅝ x 1 x 8,	2 for 5c
⅞ x 1½ x 11	7c
1 x 1⅜ x 12	9c

Dowels
⅛" x 36" ___ 2 for 5c

Reed
1/32", 1/16", 3/32" 1/8". 6 ft. ______5c

Banana Oil or Acetone
Large 2 oz. can, 10c
Per pt. ________ 60c

Scientific Cement
1 oz. bottle ______10c
Large 2 oz. can 16c
4 oz. bottle ______25c
5 oz. can ________30c

Scale Model Tissue
2 for 5c; doz. 25c

Camel Hair Brushes
Each ____________ 5c

Jap Silk Tisue
Large sheet ______8c
2 for 15c

Colored Jap Tissue
Red, blue, yellow, orange, brown, green, 5c. 6 for 25c.

Jap Fine Tissue
5c; 6 for 25c

Wood Veneer Paper
Sheet 20" x 30", 2 for 25c

Thrust Bearings
Large or small, each ________2c

Pinhole Washers
Per doz.
⅛" or ¼" _____1½c

Bushings
Per doz. __________4c

Music Wire
(Not Coiled)
.010", .014", .017", .020", .024", .028", and .034", 3 ft. 1c
.037", and .040" 3 ft. for 2c

Hoosier Compressed Air Motor
Complete kit _____90c

Balsa Wood Wheels
pr.
1" diam. Balloon, 4c
1⅛" diam. Thin, 4c
1⅜" diam. Thin, 6c
1¼" diam. Bal., 6c
1½" diam. Bal., 6c

Celluloid Wheels
In all colors.
¾" diam. __pr. 6c
1" diam. __pr. 8c
1⅜" diam. __pr. 11c
1⅞" diam. __pr. 16c

Propeller Shafts or Rear Hooks
4 for ____________5c

Featherweight Alum. Cowlings
Closed and open face
1½" diam. ______18c
2" diam. ______20c
2½" diam. ______28c
3" diam. ______30c
3½" diam. ______40c

Alum. Drag Rings
1½" diam. ______18c
2" diam. ______20c
2½" diam. ______25c
3" diam. ______27c
3½" diam. ______35c

Featherweight Aluminum Wheels
per pr.
1" diam. ______10c
1½" diam. ______15c

Scientific Rubber
1/16" sq., 1/16" flat, 3/32" flat, 1/8" flat, 3/16" flat, 3 ft. 1c

Celluloid Pants
Takes 1⅜ or 1"⅞ wheels. Per pr.__39c
Small pants for ¾" or 1" wheels.

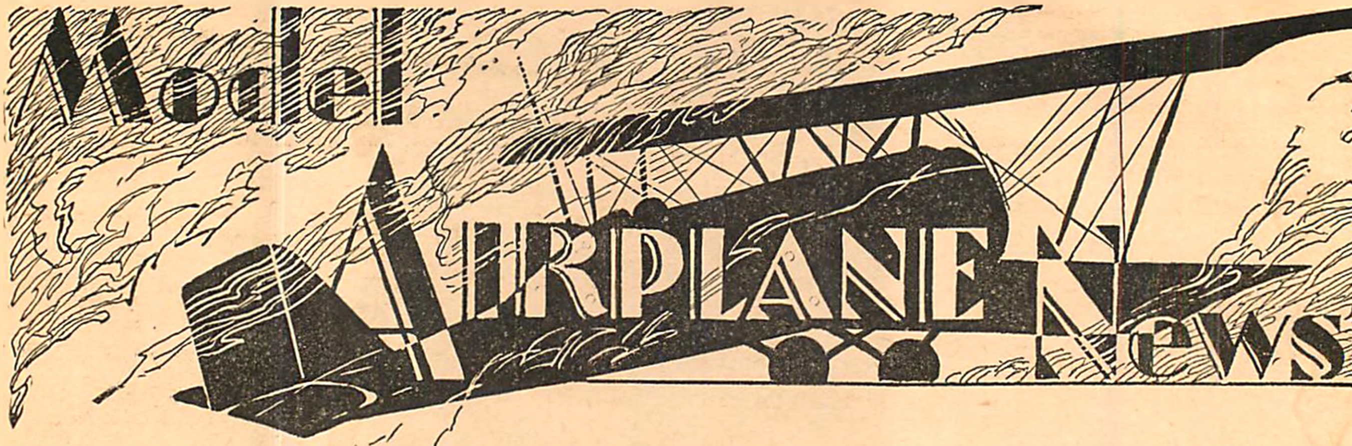
See our Exhibit at the Air Show (Booth 56) Chicago World's Fair

HOW TO ORDER: Add 15c to all supply orders up to $1.50. Over $1.50 add 10%. No order sent C.O.D.

Scientific Model Airplane Co.

277 HALSEY ST., Newark, N. J. Dept. N-9

UNIVERSAL



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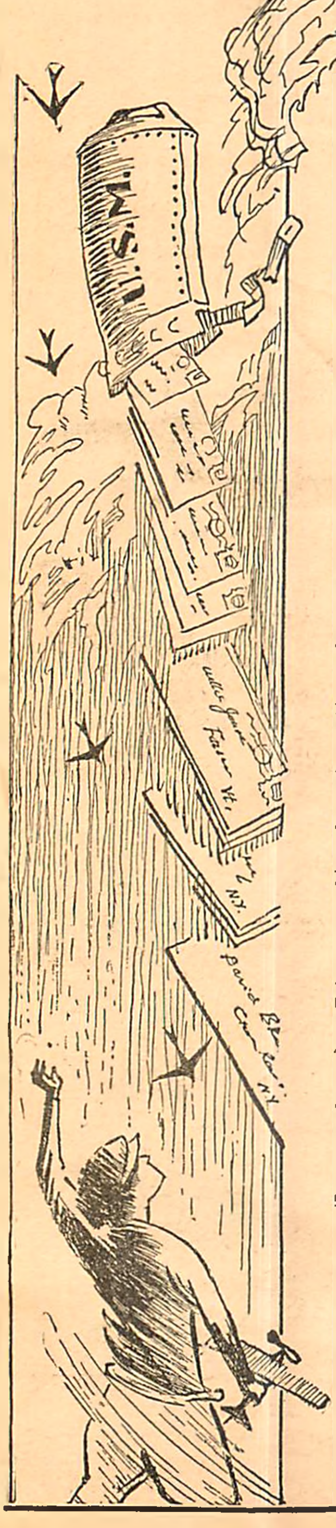

Edited by Charles Hampson Grant

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SEPTEMBER — 1933

In Our Next Issue

A complete story of the Problem's of Balbo's Flight across the Atlantic and how they were overcome. Also plans and instructions to build a solid scale model of the history-making ship, Balbo's Savoia Machetti S-55X.

In Building a Flying Scale Aeronca, Charles Efinger has presented plans and instructions for one of the finest models you have ever built.

High Lights of Model Types is continued by Jack Clark to show you the many forms in which a model airplane may be built, together with many useful suggestions.

In The Development of the Fokker Fighters, Part 2, by Robert C. Hare, you learn some many hitherto unknown facts concerning these remarkable war-time ships.

The name of the winner of the final cover Maneuver Contest. Also detail and outline three view drawings, as well as the Aerodynamic Design of the Model Plane, a War Ace story by F. Conde Ott, and interesting short items.

Order your copy of UNIVERSAL MODEL AIRPLANE NEWS from your newsdealer now, or send $1.65 for your year's subscription to this office, 125 West 45th Street, New York City. Canadian subscriptions $2.00 per year, all other countries, $2.50.

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JUST OUT . . . two new Models ! !

Your Choice of 10 Different 12 and 15 inch

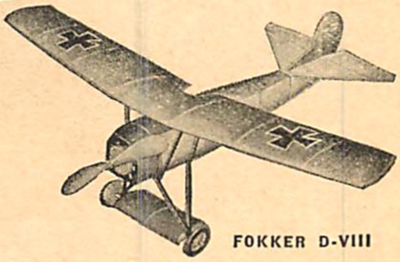
FLYING MODELS 25c EACH

(No Orders for Less Than 2 Kits)
(West of Denver, 5c Extra for Postage)
Stamps Not Accepted

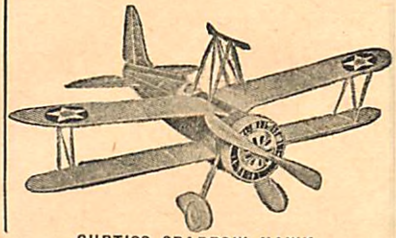
Every Model is a full-fuselage ship, with constructed body, built-up cambered wings having high-lift ribs, shock-proof landing gear, carved balsa prop, stamped motor plate and other special fittings. Every one of them is guaranteed to fly when built correctly. The performance you will get with these ships will surprise and please you. Their appearance is wonderful; thousands of builders have ordered Kits just by seeing how easily others build them, and how they fly.

Kits are complete and contain everything needed to build each Model. Plans are printed on big sheet of heavy paper showing top, front and side views of entire Model in full size, also many details and clear instructions for building. The most perfect and complete Kits ever offered for a quarter. Carefully finished parts and first quality materials enable you to do a better job quicker and easier. Send your order now—for two or more of these fine Models, and we will send them postpaid.

Build a **Squadron** of these Wonderful Flyers!



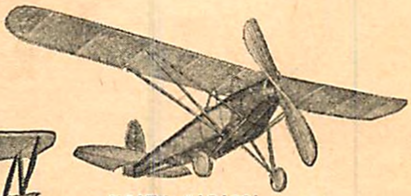
FOKKER D-VIII



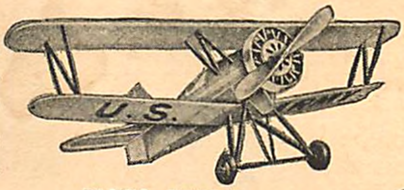
CURTISS SPARROW HAWK

Send Your Order Now; We Guarantee Satisfaction.

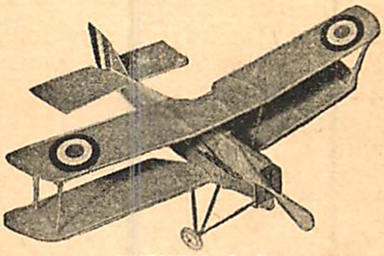
MONOCOUPE



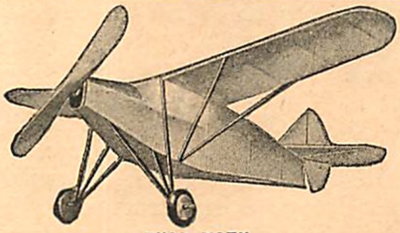
HEATH PARASOL



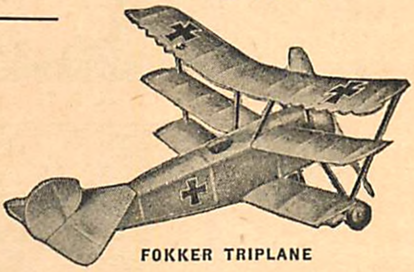
BOEING FIGHTER



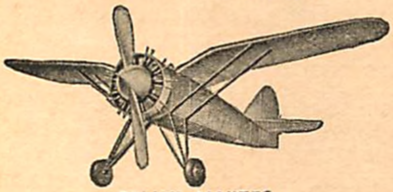
BRITISH S. E. 5



PUSS MOTH



FOKKER TRIPLANE



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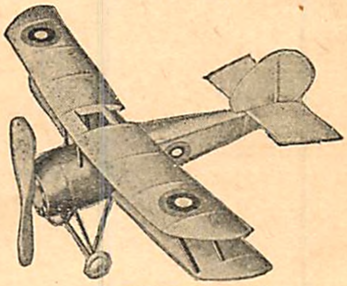

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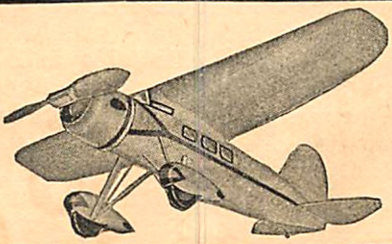

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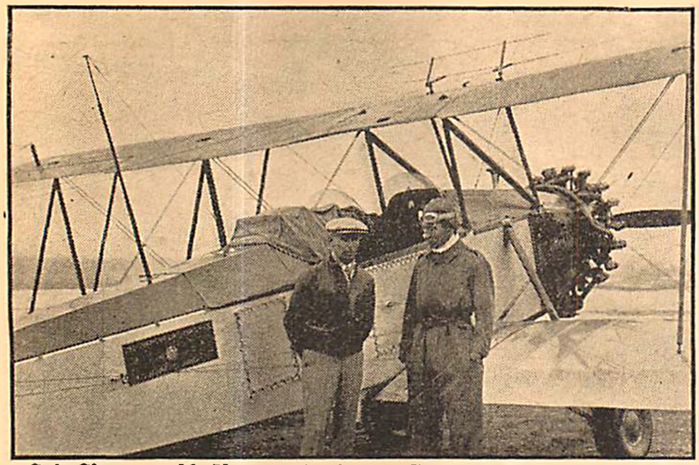
Flying Blind

Aviation's Answer to the Challenge of Bad Weather Conditions

By H. LATANE LEWIS II



Col. Clarence M. Young, Assistant Secy. of Commerce, right, and James Kinney, Aeronautics Branch Test pilot, beside the airplane which was flown blind from College Park, Md., to Newark Airport.

A BLANKET of fog enshrouded Newark Airport one rainy morning last March. It was "zero-zero" in aviation slang—no visibility, no ceiling—the flyer's Nemesis. Transport planes stretched shadowy wings in dark hangars. Pilots lounged idly in the administration building for the weather was too thick for flying. No ship could come through and land in that soup and still remain in one piece. All operations along the Atlantic Coast had been cancelled.

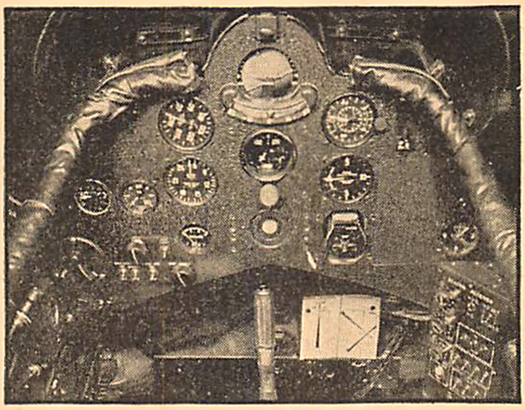
Suddenly, there came the distant hum of an airplane motor. Gradually, it grew louder. Somewhere up there in the murk a plane was approaching the airport. Attendants ran outside and waited, ready to rescue the pilot when the plane finally crashed.

Then the radio engineer got a call. Hurriedly tuning in, he heard the voice of Jim Kinney, Department of Commerce blind flying test pilot, coming over the radio-telephone as clearly as if he had been in the next room. Jim told the engineer that he was going to attempt a landing and asked him to turn on the blind landing radio system which had been installed by the Aeronautics Branch a short time previously for experimentation.

Immediately the equipment was put into operation and Jim was informed that everything was functioning properly. The ground crew stood by and waited anxiously, for while landings had been made from a hooded cockpit, no one had ever successfully made a landing under actual blind weather conditions.

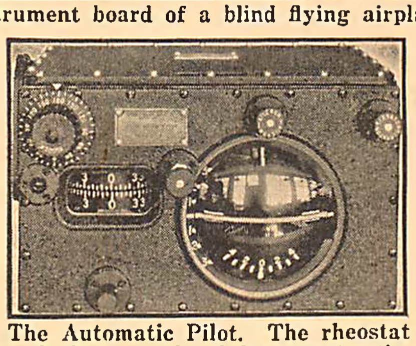
Least perturbed of all was Jim Kinney. Riding comfortably in his cockpit a mile above a rain-soaked earth, he was confident of the system he had helped to perfect. For two hundred miles up from College Park, Maryland, he had ridden the radio beam without once catching a glimpse of a landmark on the ground. The long monotonous hum in the earphones, interrupted occasionally by station identification, had told him that he was on course and headed for the airport.

The hum was getting louder and louder as its source was approached. Suddenly, it ceased altogether as abruptly as if the antenna had carried away. It was the "cone of silence" or zone in which all signals fade out, which is the unmistakable indication to the pilot that he is immediately over the transmitter. Kinney now knew his exact location with reference to the field and began a wide circle to the left, at the same time tuning in his receiving set to the frequency of the runway localizing beacon. Immediately, a thin, white vertical pointer on his instrument panel quivered into life, which would indicate whether the plane was headed directly for the runway or not. Behind it was a reference line. The pointer was a little to the left of the line, telling Kinney that he was a little to the left of the runway. He ruddered slightly to the right to get on the proper course.



Instrument board of a blind flying airplane.

AS he came nearer, he threw a switch which placed the landing beam receiving set in operation. This was tuned to the beam transmitter, which marked an invisible curved path down through the sky. This pointer, extending horizontally across the face of the dial, would indicate the proper gliding angle for the plane to come into the field so as to clear all obstructions. If the pointer appeared above the reference line, it meant that the plane was approaching too high. Likewise, if the pointer dropped below the line, he was coming in at too steep an angle.



The Automatic Pilot. The rheostat and dial at the left operate the rudder and indicate the course. The dial at the right indicates elevator and aileron action.

The runway pointer and the landing beam pointer were mounted in the same case. By so operating the controls as to keep the pointers crossed at right angles, like the cross hairs of a gun sight, Kinney kept the plane on the proper path for landing.

Another instrument, an approximate distance indicator, showed the distance in feet of the plane away from the transmitter. This device was actuated by the strength of the signals received.

The dial of the blind landing instrument with needle pointers at three different positions. (Dept. of Com. Diagram.)

Suddenly, there was a sharp "beep" in the earphones. This was a marker beacon, similar to the airway beacon, which marked the boundary of the field and warned Kinney that it was time to throttle down his engine for contact with the ground.

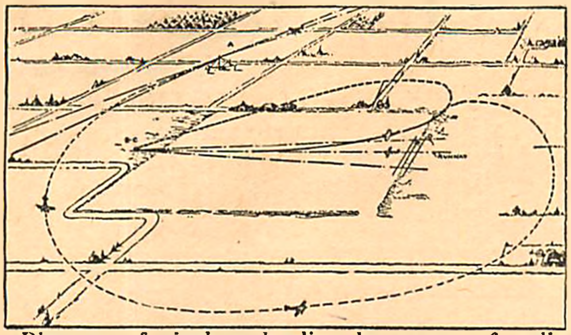
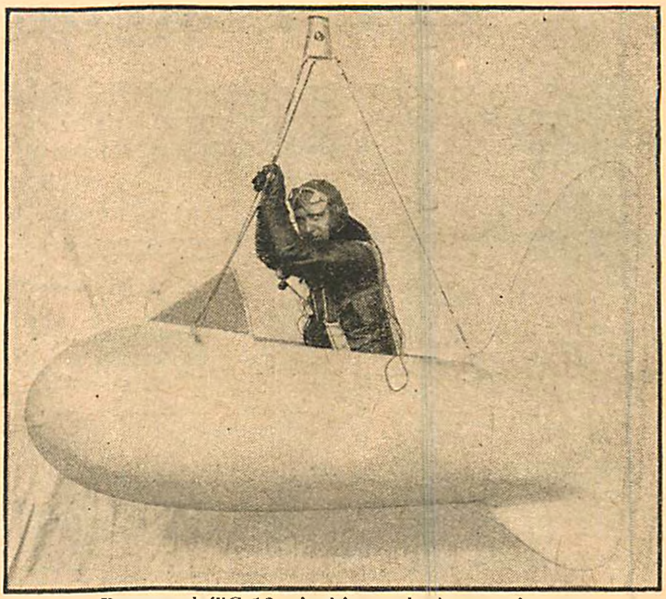


Diagram of airplane landing by means of radio system for blind landing. A indicates location of main radio range beacon; B and C, the runway localizing beacon and landing beam; and D the marker beacon.



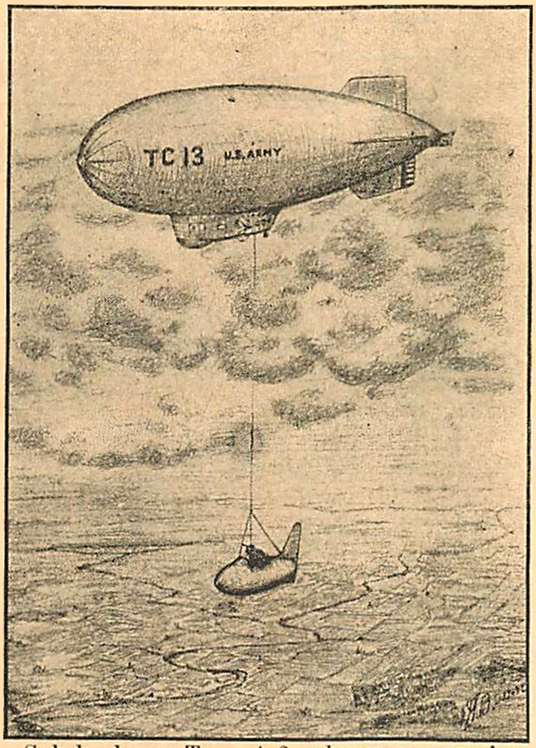
Proposed TC-13 airship and observation car by J. F. Bolgiano.

He cut the gun and eased back on the control stick. The diminishing whistle of the wind on the struts and wires told him that he was losing flying speed. Pulling the stick back hard, he felt a slight jolt and heard the rumble of the landing gear. He was down!

This remarkable new system of the Department of Commerce had made it possible for Kinney to bring the ship in and "set it down like a basket of eggs," although he could see nothing outside his cockpit. He skimmed over roof-tops and high tension lines and other obstructions without ever seeing them. The landing beam guided him down like a giant hand and showed him when to level off. He did not see the ground until he felt it touch his landing gear.

Thus, without fuss or bother, or previous preparation, was made the first cross-country flight absolutely blind from beginning to end. It demonstrated what in future years will probably be common practice on the airlines.

The equipment employed is the last word in radio development. The landing beam transmitter operates on the ultra-high frequency of 100,000 kilocycles. Twelve half-wave horizontal antennae are used, so grouped as to direct the beam vertically up into the sky and at the same time to spread it out horizontally. The result is a fan-shaped beam, providing guidance for the airman within a sector of forty degrees.



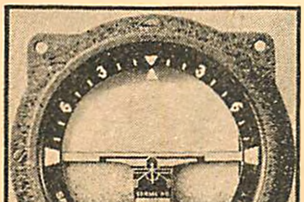
Subcloud car, Type A-2—observer preparing to leave car.

The runway localizing beacon, which marks the position of the runway, is similar to the ordinary radio range beacons in use along the airways. It employs a loop antenna which may be swung so as to change the beam to take care of different wind directions. The runway marker is simply a small range beacon with its beam located at right angles to the runway to act as a boundary for the pilot to cross.

FOG has always been aviation's greatest enemy. When the weather thickens up and the pilot cannot see the horizon, his senses play all sorts of tricks on him. He may be on his back, or diving, or climbing straight up into a stall, without realizing it. It is a peculiar fact that a man loses all sense of balance when he cannot fix his eyes on some stationary object. In flying a plane, the horizon furnishes this fixed reference point. A pilot keeps his ship in level flight by lining up the nose with the horizon—that point in the distance when land and sky seem to meet.

Old time pilots used to claim that they could "fly by the seat of their pants." That is, they could tell what position their ship was in by the shifting of their weight. However, this has definitely been proved to be impossible, for a man cannot distinguish between the pull of gravity and other forces, such as centrifugal force or the force from a sudden change of direction.

Even birds experience the same difficulty. At Brooks Field, Texas, not long ago, homing pigeons were blindfolded and taken up to an altitude of 1,000 feet, where they were released. They came fluttering and spinning down to the ground, utterly helpless. As soon as the blindfolds were removed, they resumed normal flight.



The Artificial Horizon. The position of the miniature plane indicates level flight.

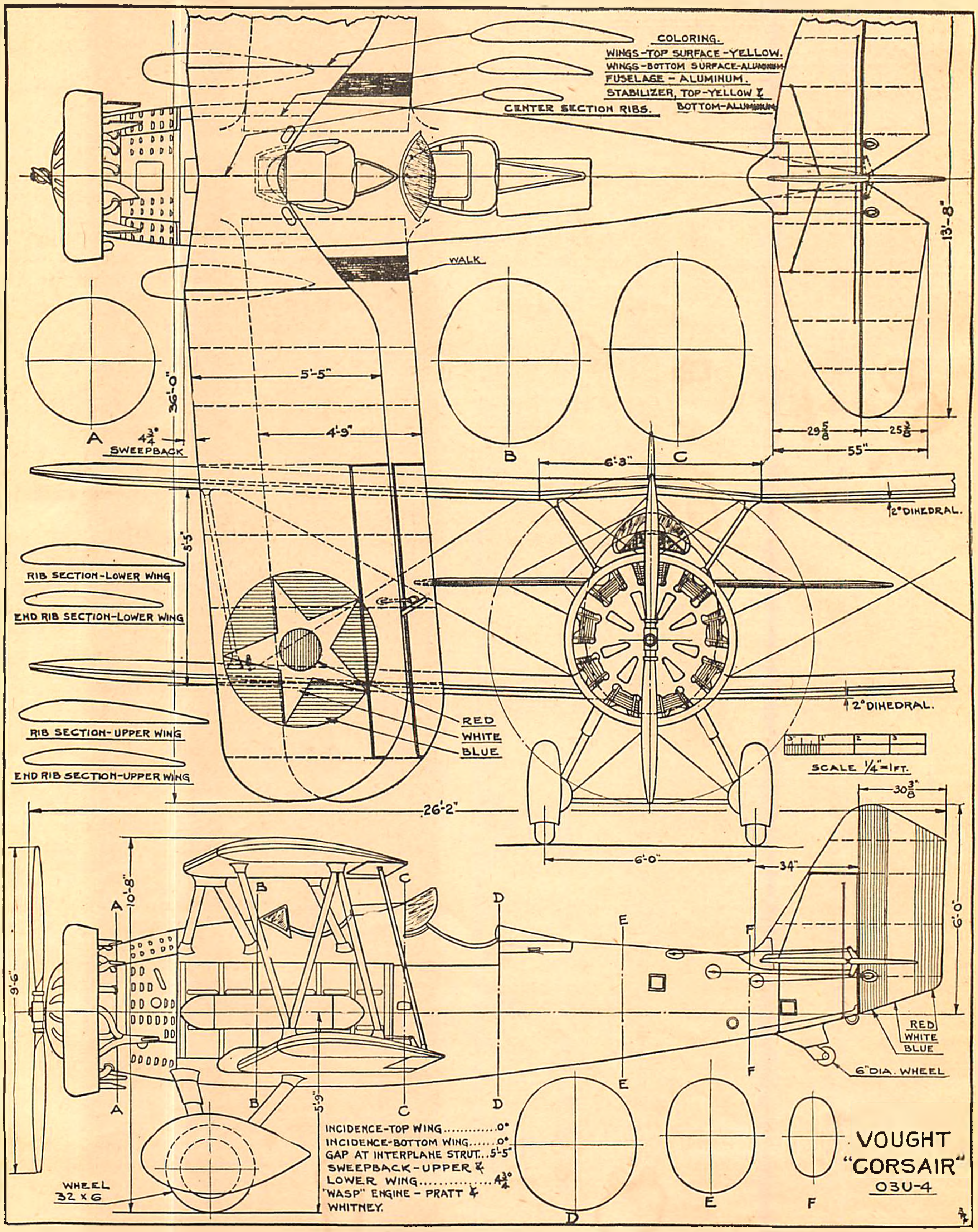
To overcome this deficiency, two instruments have been developed which do not become confused under any conditions. They are both operated by wind-driven gyroscopes—small, perfectly balanced flywheels of metal, spinning rapidly, not unlike the tops with which most small boys are familiar. Once the gyroscope is set in motion, it will always retain its original position. The instruments are known as the Artificial Horizon and the Automatic Pilot.

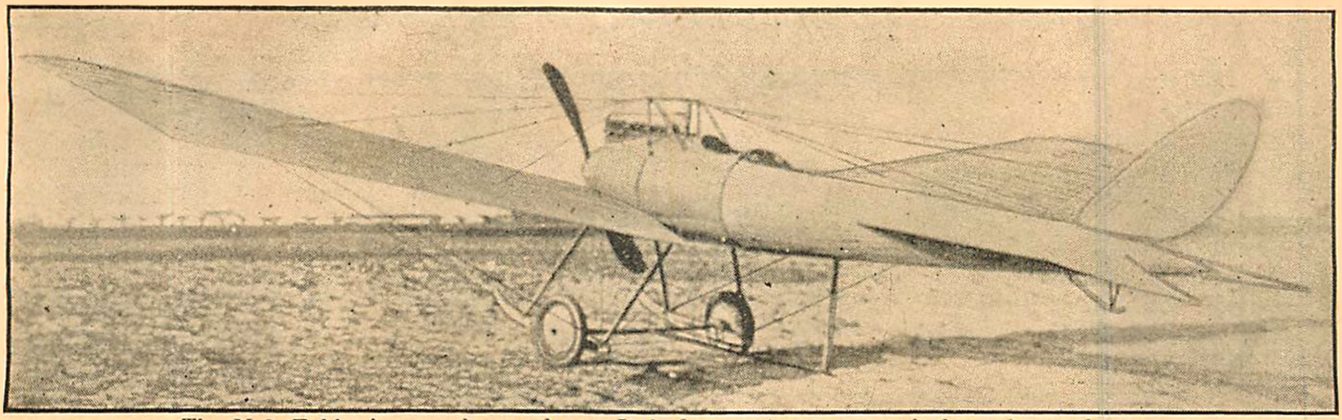
An Artificial Horizon, or Gyro-Horizon as it is technically called, has a miniature airplane suspended before a dial, on the top half of which is painted a blue sky. The lower portion is painted to

(*Continued on page* 38)

The Vought Corsair O3U-4

Here is one of the trusty standbys of the U. S. Navy which it has used for many years. The service rendered by these ships in Nicaragua was invaluable. The Wasp engine develops 450 h.p. Super charged it will develop 600 h.p. With 450 h.p., the ship has a high speed of 150 m.p.h. and about 170 m.p.h. with 600 h.p., with full military load. This model is one of the latest navy observation types of Corsair. It is noted for its sturdiness and ability to give all-round service under all conditions.





The M-2, Fokker's second war-plane. It had a semi-monocoque body and no ailerons.

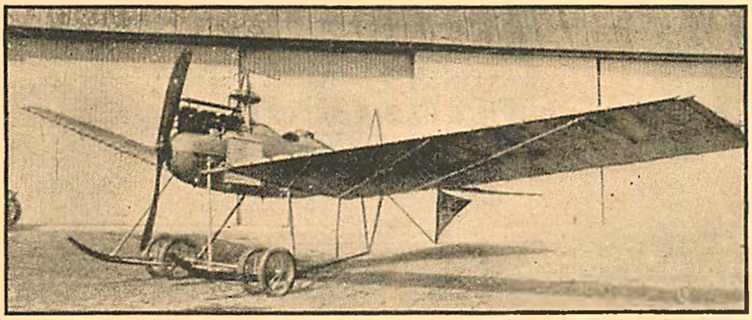
The Development of the Fokker Fighters

A Complete Resume of the Important Features of the Fokker Warplanes Including Many Facts That Have Never Been Published In America

By ROBERT C. HARE

IN THIS series, "THE FOKKER FIGHTERS," you will see nearly fifty different types of Fokker aeroplanes, all built during the War, the pictures of which have never before been published in America. To this time only three types of Fokker warplanes have been at all discussed, the DR-1, the D-7 and the D-8. Besides these types there were more than forty others including training planes, low-wing monoplanes, mid-wing monoplanes and parasol types.

The description of the first plane in this series, the type M-1, takes us back to the days of bamboo, wire and undercarriage skids. The M-1 appears to have been a fairly good sized ship. The wings were built with generous amounts of dihedral, making the ship exceedingly stable under all conditions. The ends of the ribs projected out beyond the leading edge, while the spar ends projected past the tip ribs. These wings had no ailerons in them, since the Fokker types of this period were of the inherently stable type. In fact the first Fokker of this type did not need a rudder.



The M-1, Fokker's first war-plane. It had the bamboo and wire type of construction.

The body was of the shell type, well streamlined and seating two people. A 6 cylinder vertical engine in the nose provided the power and swung a large propeller. Two radiators were slung on either side of the fuselage where the wing was left uncovered in order to provide view downward. The four wheels of the undercarriage were arranged in groups of two, each group fitted with a large ash skid. Wires ran from these skids to the wings in order to brace the latter.

Outriggers held the tail assembly firm. The rudder was divided in the middle, one half above and one half below the stabilizer. The whole structure was braced with lengths of wire.

AFTER certain refinements in design and construction, Fokker put out the M-2. This model is strikingly like the present day Lockheed and Northrop low-wing types in some respects. The body was of monocoque construction to a point just aft of the front seat. From then on wood framework with fabric covering. A plywood cone finished off the streamline at the tail end.

In this model the wing was more conventional, but still embracing the natural stability style of arrangement. These wings still had no ailerons and were more systematically braced with wire.

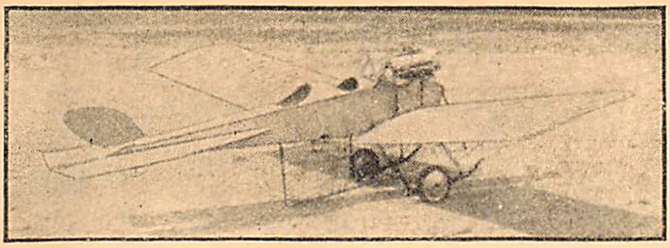
The motor was either a 120 HP Mercedes or an Argus of about the same power. The power plant was well faired in and drove a large propeller equipped with a spinner.

A much simpler undercarriage was adopted on the M-2. In this case, only two wheels were used, each wheel fitted with a skid. The axle was faired in by a spreader bar and was fitted with shock absorbers.

The tail assembly of the M-2 was very interesting. The rudder was a peculiarly shaped balanced type of very little area. In direct contrast, the stabilizer and elevator formed a surface of large area. The sweeping shape of the stabilizer was similar to the same component of the Austrian Etrich "Taube", or dove type machines of this same period.

There is little doubt that the M-2 was the most advanced in design for its time. It was in 1912 and 1913 that this design was copied in the construction of the Albatross seaplane.

THE third of this series of low-wing monoplanes, the M-3, seems to be a simplified design of the M-2. In this case, the wing has remained unchanged in outward appearances but the internal structure differed

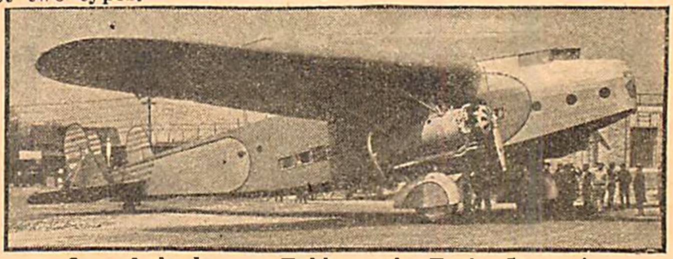

Fokker's third machine, the M-3. It was a refinement of the first two types.

somewhat. Ailerons were still ignored and lengths of wire were needed to provide safety in flight. The dihedral was still employed in great amounts.

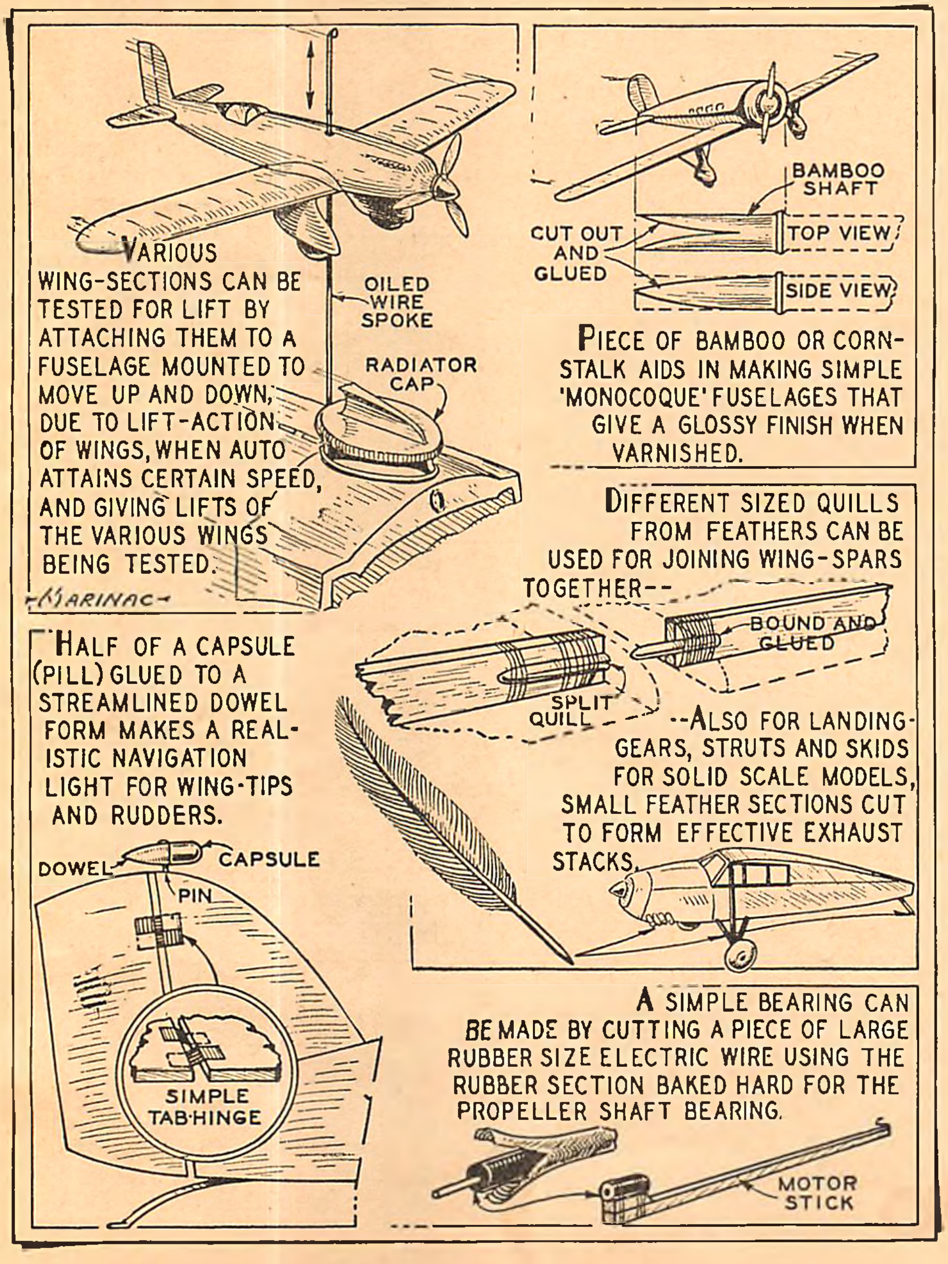
The most noticeable change was in the body design. The M-3 body was of rectangular cross-section with a turtle deck topside. Two large cockpits were located just aft of the trailing edge of the wing. A new type engine was employed that swung a propeller of not so great a diameter as the M-2. This propeller was not fitted with a spinner.

The undercarriage was essentially the same except for a few minor changes in the skid design. Likewise, the tail assembly was unchanged in shape or location.

The next installment in this series will take you into the realm of the first real "fighters", the M-4, M-5 and M-6. When one compares these first Fokker airplanes with one of the latest Fokker designs, the F-32 shown below, it is possible to appreciate the great advance made in the comparatively few years.


One of the largest Fokkers, the F-32. It carries thirty-two passengers.

Model Kinks —By MARINAC



Modelin' Planes

A feller isn't thinkin' mean,
Modelin' planes;
His thot's are mostly good an' clean,
Modelin' planes;
He doesn't knock his fellow men,
Or harbor any grudges then;
A feller's at his finest when
He's modelin' planes.

The rich are comrade to the poor,
Modelin' planes;
All brothers of a common lure,
Modelin' planes;
The boy; the joy the Models bring
Can chum with millionaire and king;
Vain pride is a forgotten thing,
Modelin' planes.

A feller's glad to be a friend,
Modelin' planes:
A helpin' hand he'll always lend,
Modelin' planes;
This brotherhood of "prop" and line,
And struts and wing is simply fine;
Boys come real close to God's design,
Modelin' planes.

A feller isn't plottin' schemes,
Modelin' planes;
He's only busy with his dreams,
Modelin' planes;
His livery is a lacquer pan
His creed—to do the best he can;
A feller's always mostly man,
Modelin' planes.

—*Silas Weatherby*

High Lights of Model Types

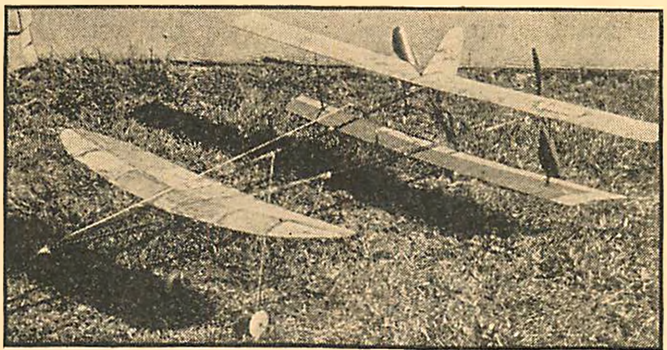
Why We Have Many Types of Model Planes and Features That Make Them Distinctive—Pusher Models

PART ONE

By JACK CLARK

NO LENGTHY description of the construction of the various models considered in this article is given, but only the general proportions are shown in the drawings and a broad discussion given in the text of the main types of flying models.

The three main classifications of flying models are, pushers, tractors and fuselage models; twisted rubber strands being the standard form of motive power. (Other issues of this magazine have treated of models driven by compressed air, carbon dioxide, etc.).



Something unusual, a high performance biplane twin-pusher.

A pusher model is one that is driven by one or more air screws that push or propel it through the air, see Fig. 1. Hence a pusher model is driven by *propellers.* A tractor model on the other hand, is one that is driven by one or more air screws that pull or draw it by traction through the air. Therefore a tractor model is driven by *tractors.* Exactly speaking, then, a tractor is an air screw that *pulls* an airplane and a propeller is an air screw that *pushes* an airplane; but through general usage, both forms of screws are called propellers or "props".

The third general class of models, fuselage machines are, as the name implies, constructed with some form of enclosed body and usually, also, with double surfaced wings; that is, wings with a built-up frame that is covered top and bottom and that has a wing section similar to the wings on large ships. Fuselage models more nearly resemble real planes than do other cut-down types of miniature flyers but they take more time to make. Their appearance in the air, however, is full reward for the extra time and effort required in building.

In the general classification of fuselage models can be included flying "scale" models which are fairly close copies of real planes and which can be made to fly some distance when properly designed as a model. Such changes would include a larger stabilizer and vertical surfaces, proper dihedral angle between the wings, larger propeller with more blade area, etc. Fuselage models are nearly always of the tractor screw

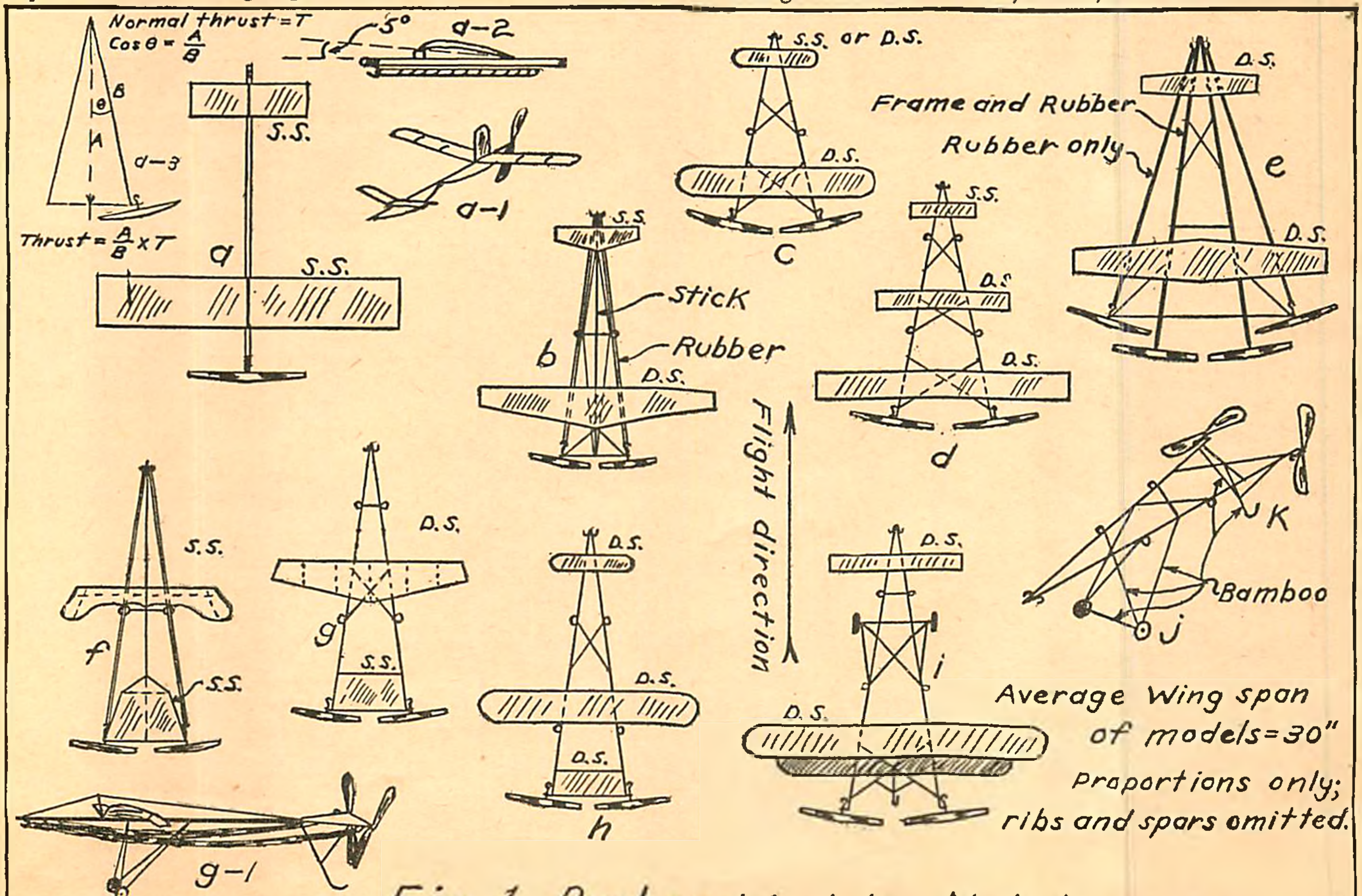


Fig. 1 Pusher Models. Not to scale.

kind. In the next issue we shall discuss tractors, fuselage and seaplane models in detail.

REFERRING back to Fig. 1, (a) shows the type known as a single-pusher, with single surfaced planes; that is, planes or wings that are covered on the top only. Often a simple model is made with sheet balsa or thin aluminum wings instead of with a single surfaced framed-wing design. In making reference to the drawings in these articles, remember that D. S. and S. S. mean respectively that the different designs of models so marked have, as a rule, either double surfaced or single surfaced wings. For instance a design marked D. S. indicates that for that particular type of plane the usual practice is to employ double surfaced wings.

At (a), Fig. 1, the small front plane is called the "elevator", and the rear big plane is known as the "main wing." Single-pushers should have a small vertical fin over or under the main wing. This is provided to increase lateral or side-to-side stability. If the fin is placed beneath, it can serve also as a protective skid for the propeller. As with all cut-down pusher models having a small front plane or elevator, a block is set under the front or leading edge of the elevator so that it will have a greater angle of incidence than will the main wing, to the line of thrust.

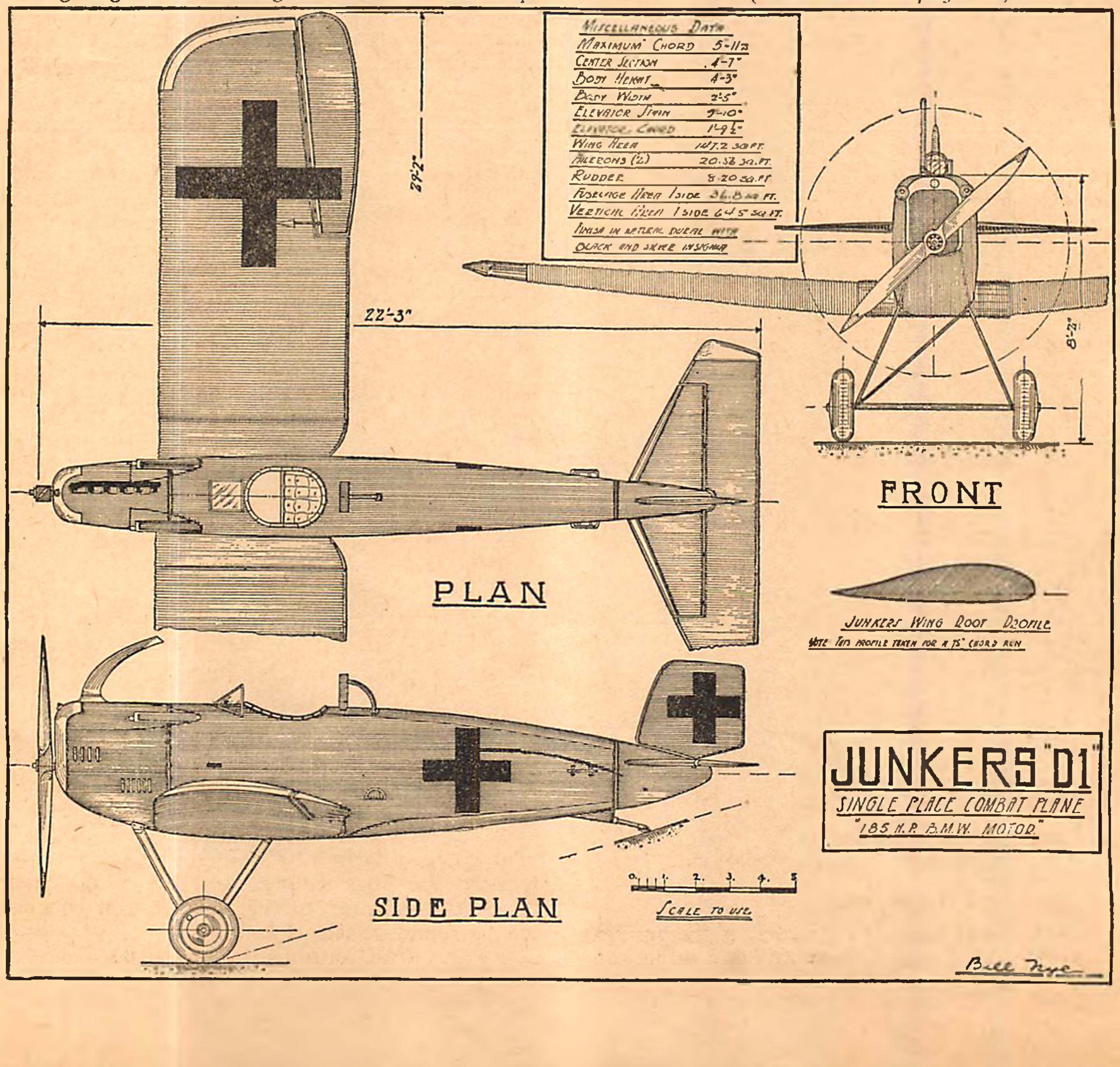
If wing clips of wire are used to hold the elevator to the fuselage stick, then the front clip supporting the leading edge must be higher than the rear clip. This setting of the elevator at a greater angle than the main wing to the line of flight is done to maintain longitudinal or fore-and-aft stability.

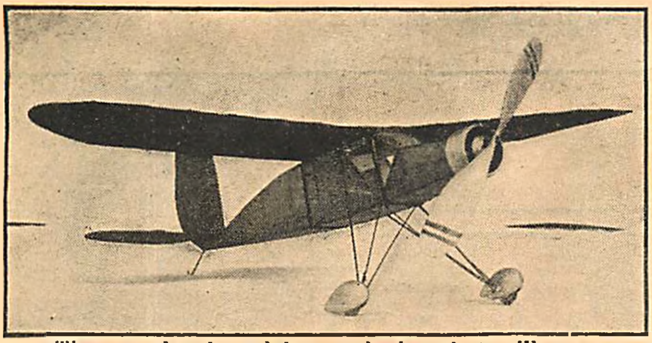
The angle of inclination that a wing makes with the relative wind is known as the "angle of attack," and the angle a wing is set to the propeller shaft or line of thrust is known as the "angle of incidence." On some models, especially twin-pushers, the angle of incidence of the elevator or front small plane is increased by bending the front edge of the surface up in a wide Vee-shape and leaving the rear or *trailing* edge straight. In Fig. 1, (a-1) and (a-2) show respectively the vertical fin for lateral stability and the setting of the elevator for longitudinal stability, which is usually from 5 to 10 degrees greater angle of incidence than the main wing.

(b), Fig. 1, shows a pusher model similar to (a) but modified to carry two propellers, making it a twin-pusher. The particular type at (b) is known as a "T-frame pusher". Note the cross-piece shown in the middle of the motor-stick. This piece carries wire loops or "cans" at each end through which the rubber motors pass; this eliminates the tendency of the frame to weave or buckle under the tension of the tightly wound rubbers.

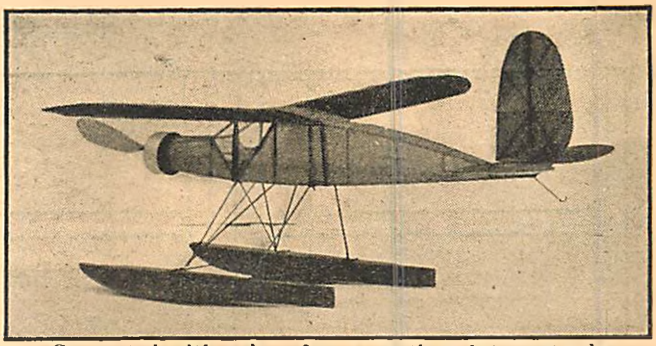
The driving air screw of an airplane, in rotating, creates a reaction that tends to capsize the machine in a direction opposite to the direction of rotation of the screw. This effect of the screw upon the plane tend-

(*Continued on page* 40)





The completed model as a hydro that will r.o.w. and fly seventy seconds.



Converted with only a few operations into a sturdy, fine flying land plane.

The Model Plane Goes Aquatic

How To Build A Consistent Flying Model That May Be Easily Changed From A Land Plane Into A Practical Hydro In A Few Minutes

By GORDON S. LIGHT

WHEN a model goes aquatic, several factors of design and construction are necessary for satisfactory performance. The outstanding characteristic which is desirable is the continued performance after many bad landings and duckings. The construction, throughout the model, should be rugged for this reason. The floats should be made entirely of sheet balsa, reducing to a minimum the danger of leaking floats. Since facilities for water flying are not as accessible as for land flying, the wing floats and motor stick should be demountable for convenience in carrying and the model should be easily convertible from landplane to seaplane.

The seaplane that will be described in this article possesses all these characteristics and is a very desirable model for a builder seeking performance under many conditions and for a long period of time. The distribution of the weight makes it an exceedingly easy model to fly. When this model was flown for the first time it averaged 70 seconds R.O.W. and slightly more R.O.G. without any alterations or changes other than an increase of negative incidence of the elevator.

It is a splendid model to take along on your vaca tion. Water flying is fine sport from a large lake launching and retrieving the model by use of a boat The landings on water are as big a thrill as the take-offs and that is some sensation.

The materials needed are:

9 pcs. balsa 1/8 x 1/8 x 24 (fuselage longerons, wing)
1 pc. balsa 1/8 x 1/4 x 24 (trailing edge)
5 pcs. balsa 1/16 x 1/16 x 24 (empennage, wing tips)
1 pc. balsa 1/4 x 3/8 x 18 (motor stick)
1 pc. balsa 1 1/8 x 1 1/4 x 12 (propeller block)
1 pc. balsa 1 1/4 x 1 1/4 x 5/8 (nosing)
1/16 flat balsa for ribs
1/64 flat balsa for floats (about 8 pc. 2x20)
1/32 flat balsa for elevator ribs and motor cowl
1 pr. wheels 1 1/8 diameter
4 inches of 3/8 diameter balsa doweling
2 sheets tissue
1 sheet celloplane
2 clothing snaps (one punched)
cement, banana oil, pins, wire, rubber, etc.

Fuselage

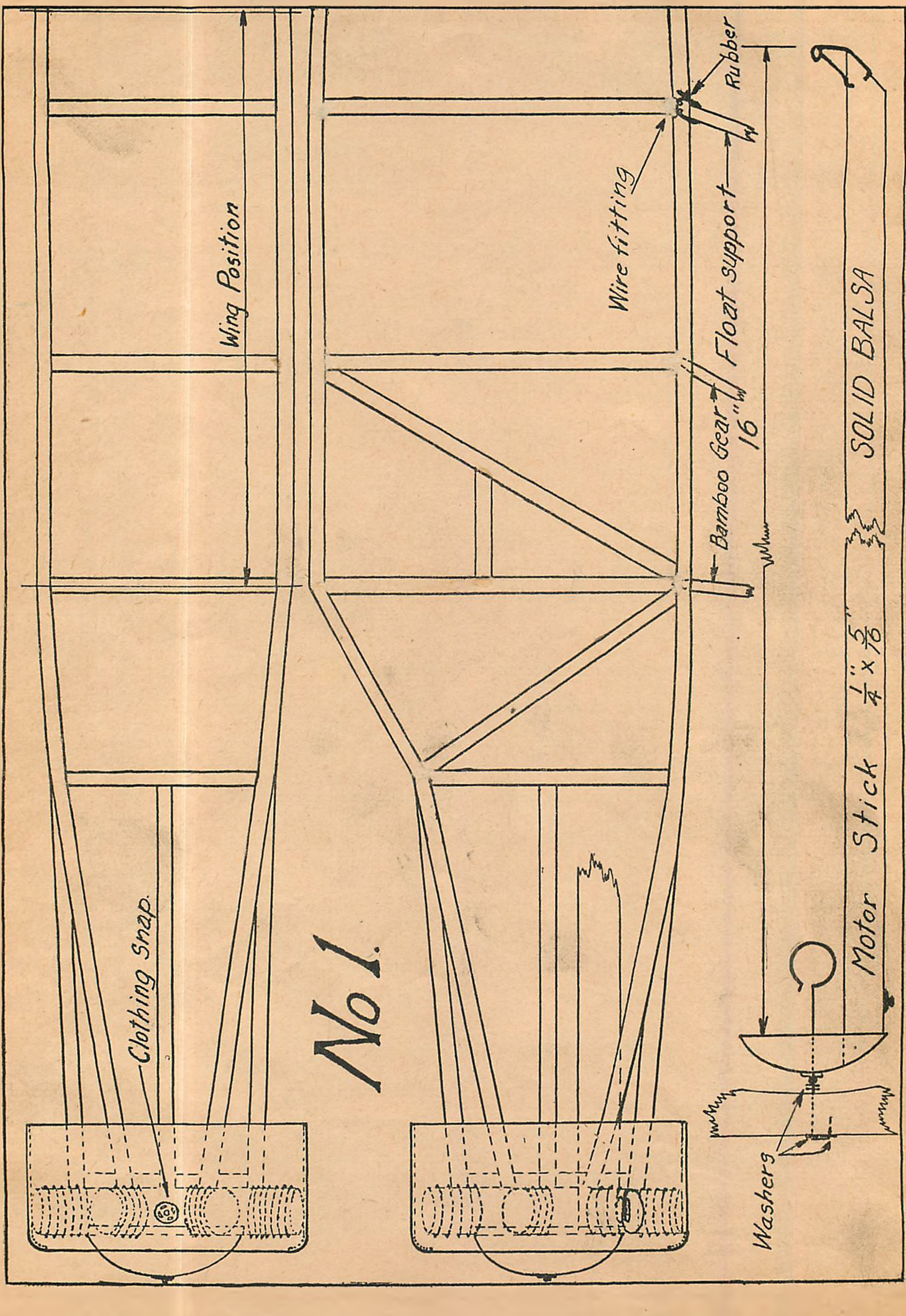
IT is conventional to start construction by building the fuselage. It is well to bear in mind while constructing this model, the idea of making everything strong to stand the shrinking of the paper which continues long after the model is doped. The longerons are 1/8 inch square. If a bit of care is taken the both halves can be made at the same time. The two halves are separated with a razor blade and will be identical. They are joined, starting at the position indicated as the position for the wing and working toward the tail.

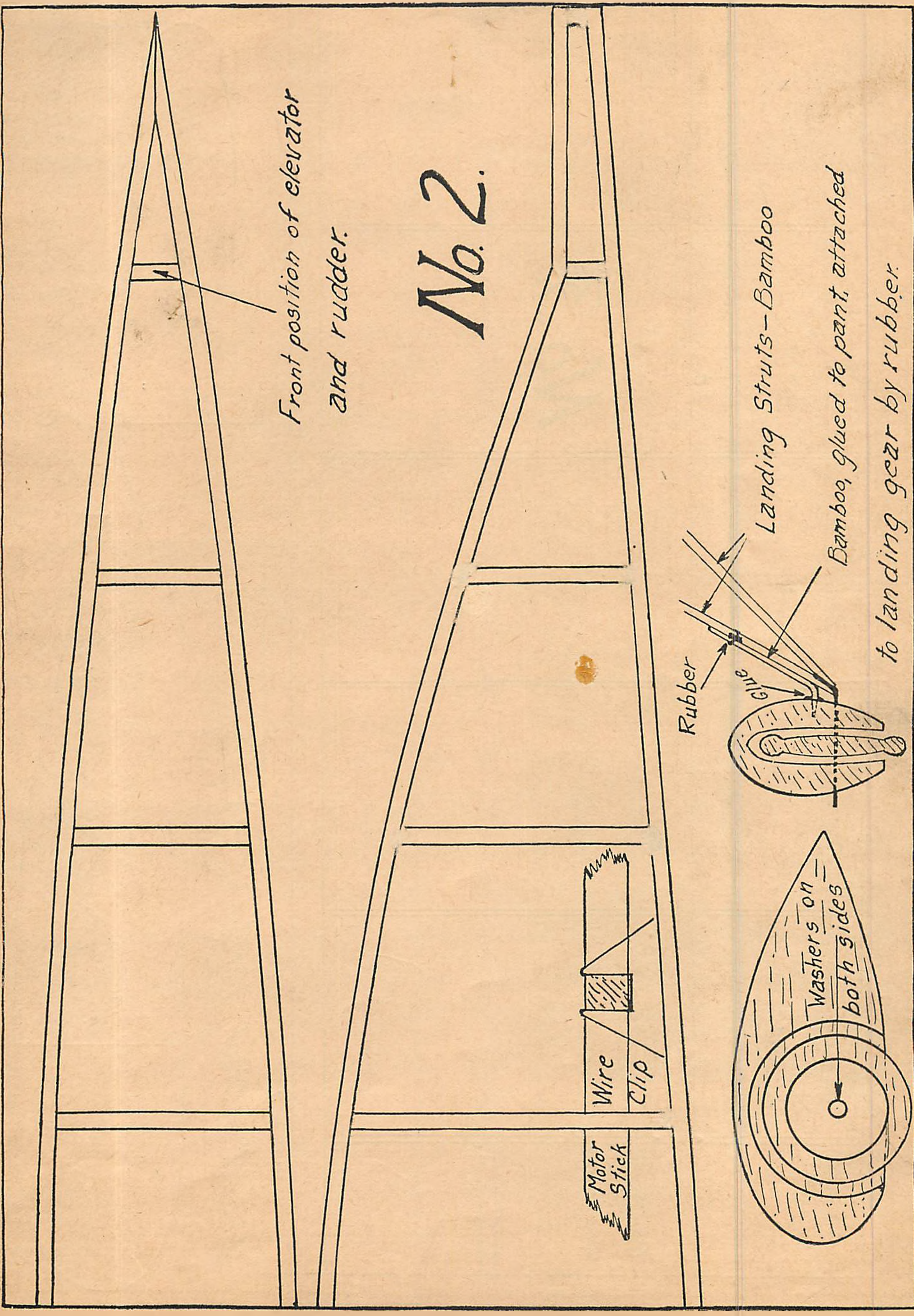
It is advisable at this point to begin work on the dummy motor and the nosing. Bend a circle 2 1/8 inches in diameter from 7/8 x 1/32 balsa. This is easily done by soaking the wood and bending about a hot can of correct diameter. Using a 4-inch piece of balsa doweling 3/8 inches in diameter, wrap cord about its entire length. Give a coat of cement and black color. Cut seven pieces 7/16 inches long to serve as cylinders. Then glue these cylinders to the balsa ring which has just been bent. Make sure the cylinders are spaced evenly. The distance can be found on the drawing and laid off on the ring—thus assuring perfect spacing. Bend a bamboo nosing 1-3/16 in diameter and cement this inside the cylinders. The bamboo is cemented even with the front part of the cylinders and the front of the cylinder should be in line with the edge of the balsa cowling.

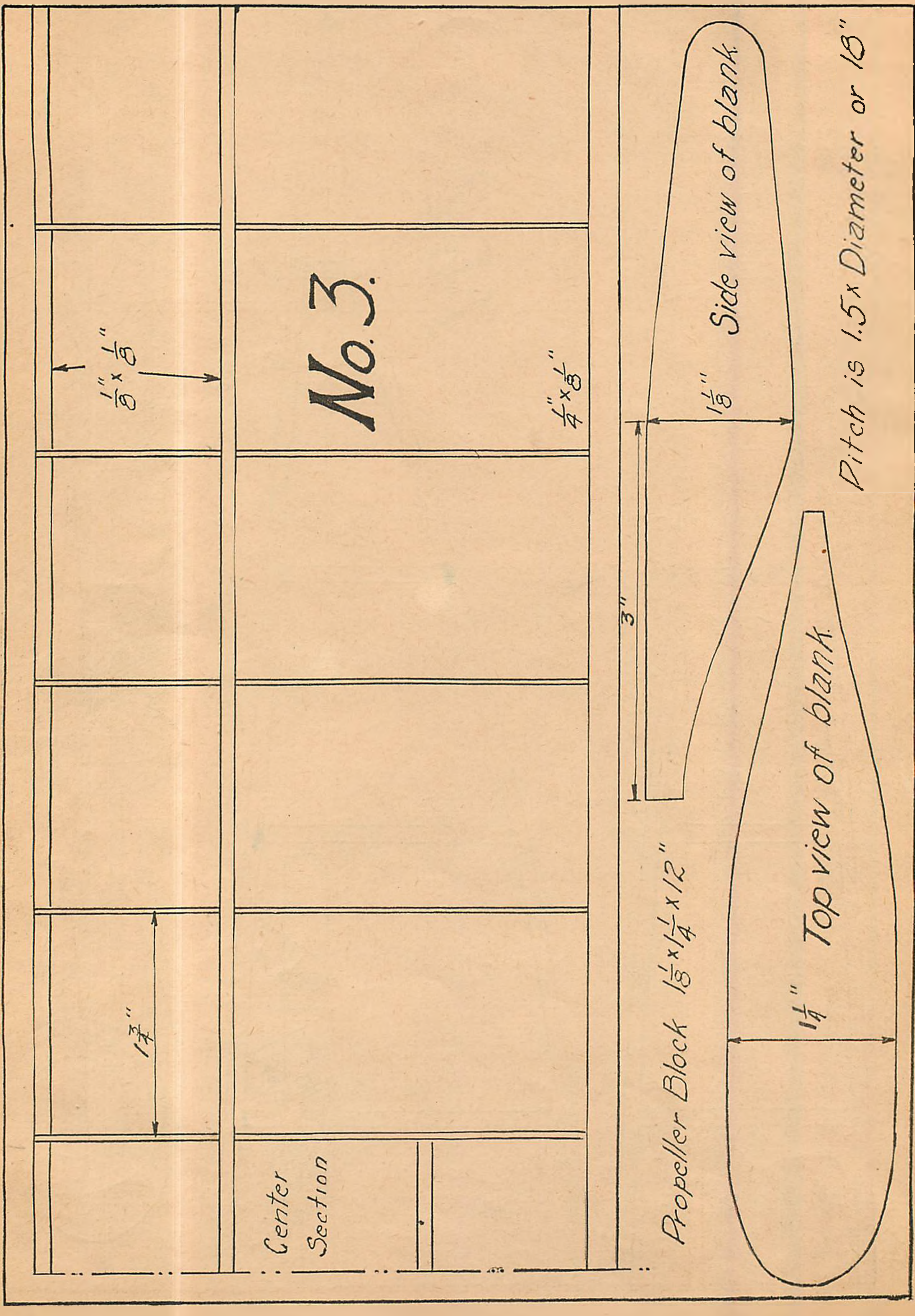
This dummy motor is cemented to the front of the longerons. A wire clip, bent to hold the motor stick tightly, is glued in position to the bamboo nosing. A similar clip is cemented to the fuselage several inches back of the wing position at the joint of the longeron and the struts. Near the front clip, glue a part of a clothing snap to the cylinder and the other part to the motor stick. A clothing snap is flattened by tapping lightly with a hammer and then punching the hole with a phonograph needle. This is glued to the balsa nosing.

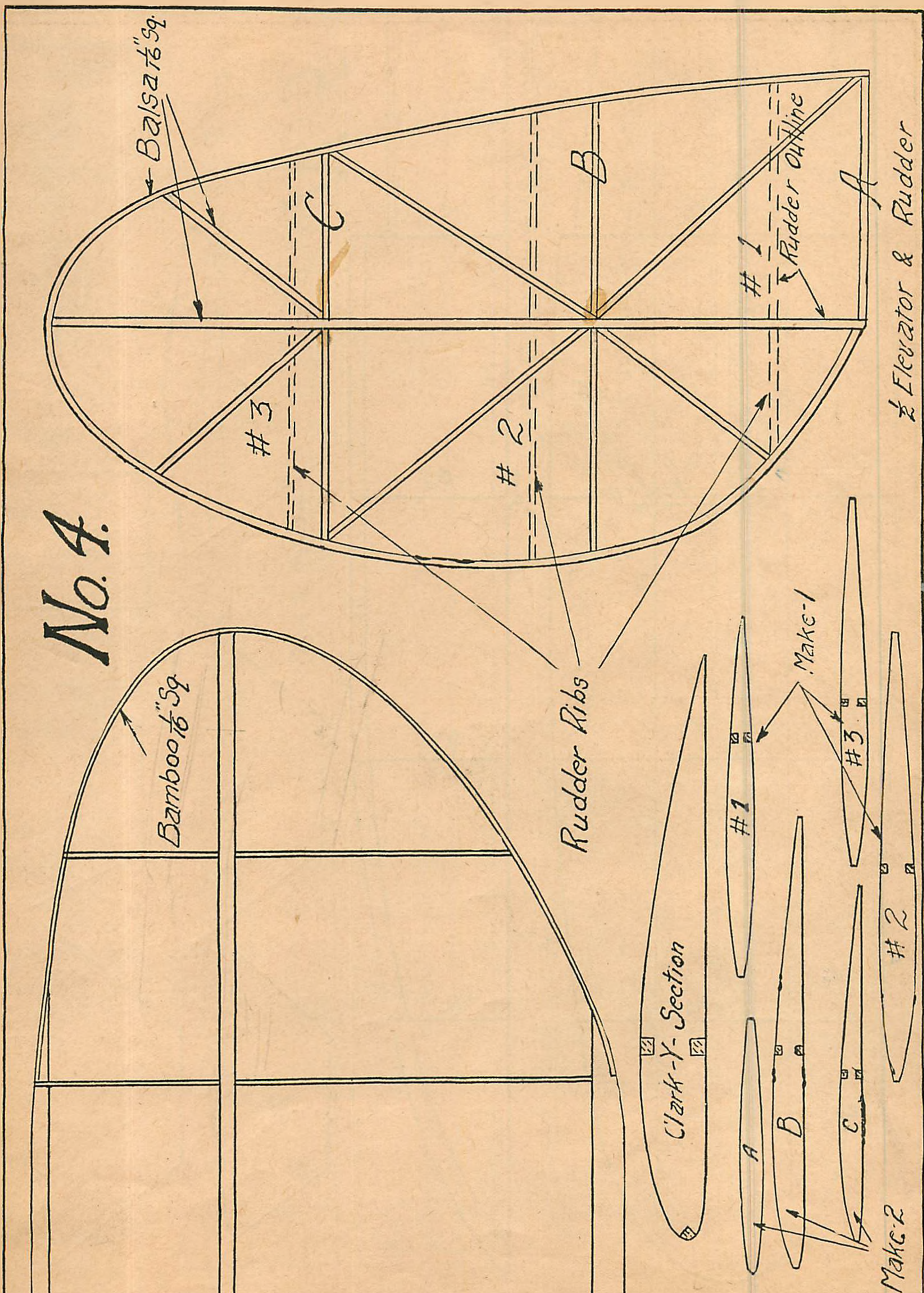
The nosing is cut from a balsa block 1 1/4 x 1 1/4 x 5/8 and cemented to the motor stick, making sure it fits snugly against the bamboo ring when the motor stick is snapped in position. The rear hook and the propeller shaft are bent from heavy wire because of the strain of many-strand motors. The other fittings used are from light wire. Two fittings or hooks used to hold the float support to the fuselage by rubber bands are cemented to the fuselage and this position can be found on the drawing.

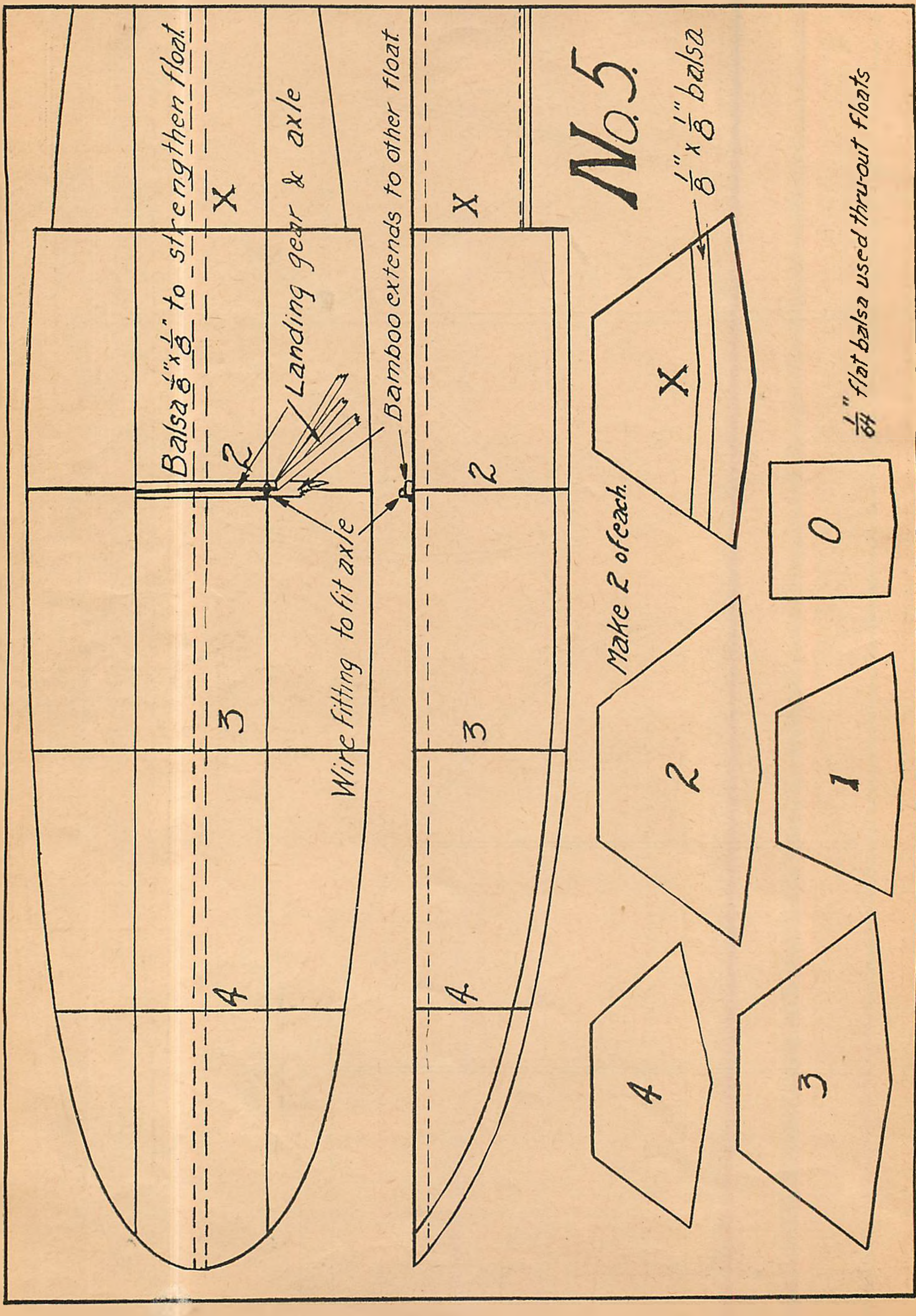
(*Continued on page* 18)

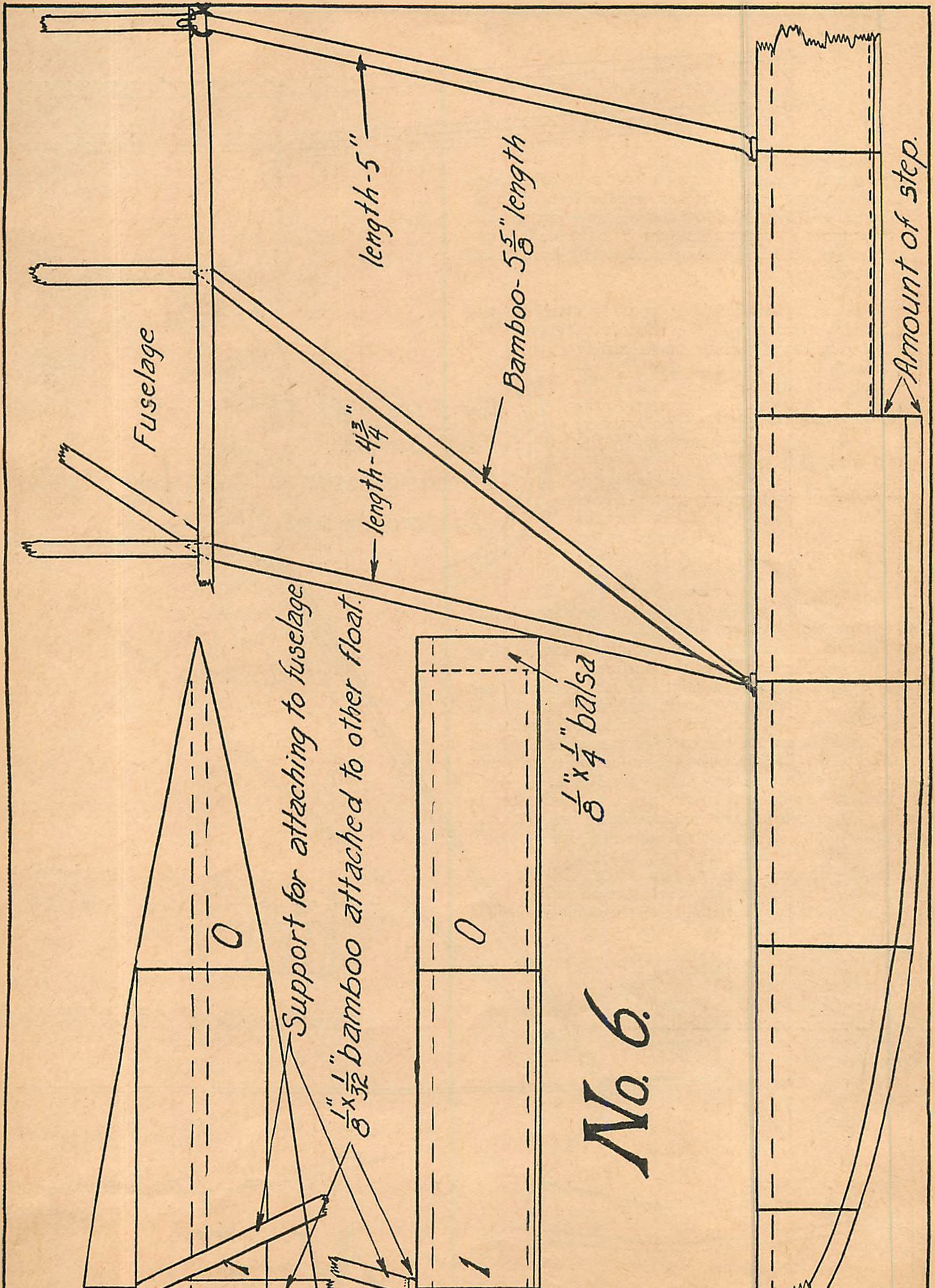

Wing Position
Wire fitting
Rubber
Float support
Bamboo Gear
16"
SOLID BALSA
Motor Stick 1/4" x 5/16"
Washers
Clothing Snap
No 1.

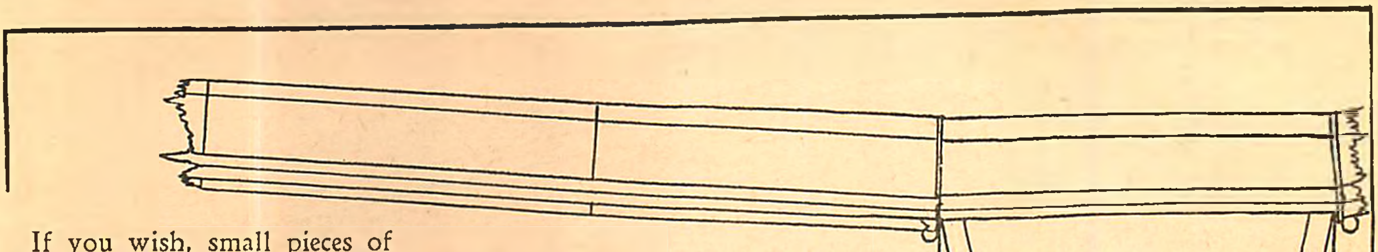

No. 2.
Front position of elevator and rudder.
Landing Struts—Bamboo
Bamboo, glued to pant attached to landing gear by rubber.
Rubber
Glue
Washers on both sides
Motor Stick
Wire Clip


No. 3
1/8" x 1/8"
1/4" x 1/8"
1 3/4"
Center Section
Side view of blank
1 1/8"
3"
Top view of blank
1 1/4"
Propeller Block 1 1/8 x 1 1/4 x 12"
Pitch is 1.5 x Diameter or 18"


No. 4.
Balsa 1/16" Sq.
Bamboo 1/16" Sq.
Rudder Outline
Rudder Ribs
½ Elevator & Rudder
Clark-Y- Section
Make-1
Make-2
#1
#2
#3
A
B
C


Balsa 1/8"x1/8" to strengthen float
Landing gear & axle
Bamboo extends to other float
Wire fitting to fit axle
No. 5
1/8"x1/8" balsa
Make 2 of each
1/64" flat balsa used thru-out floats
X
2
3
4
0
1


Fuselage
length-5"
Bamboo-5 5/8" length
length-4 3/4"
Amount of step.
Support for attaching to fuselage
1/8"x1/32" bamboo attached to other float.
1/8"x1/4" balsa
0
1
0
1
No. 6.



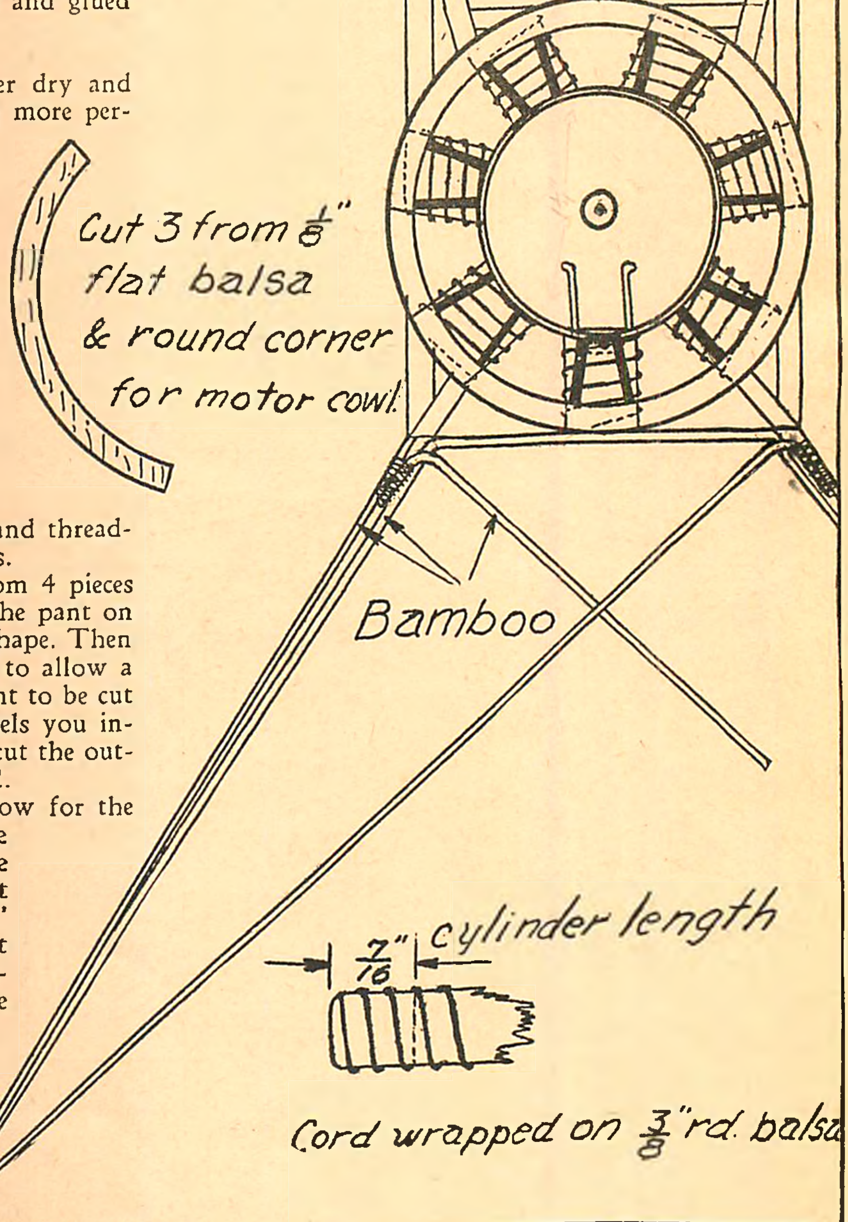
If you wish, small pieces of round bamboo can be cemented to each cylinder to represent rocker arms. These are also colored black. The motor is completed by cutting three circular arcs of balsa from 1/8 balsa. The shape of the arc is found in drawing No. 7. These arcs are rounded and glued to the balsa cowling.

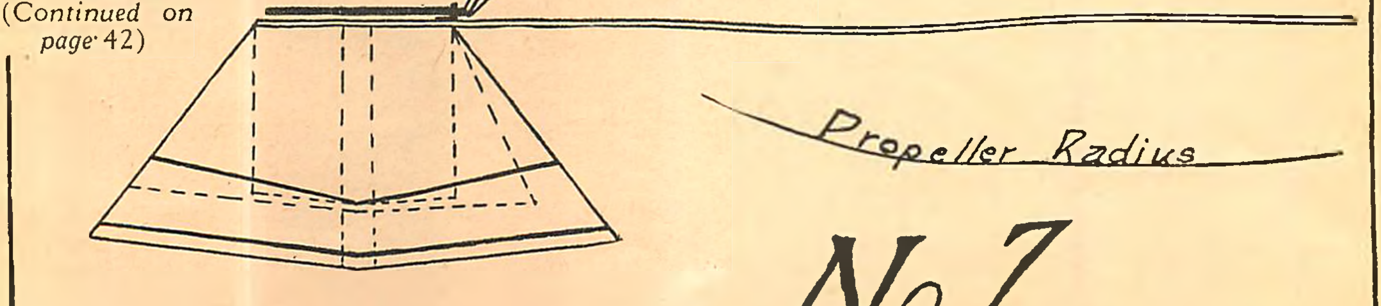
THIS can be improved by sanding after dry and making these arcs fit the balsa cowling more perfectly. The landing gear is made entirely from bamboo. Because of the hard usage, you should make it very substantial. The struts are pointed and stuck into the fuselage. Make sure it is at a point where the longeron and the struts join. Cement thoroughly.

A bamboo "X" is used to strengthen the halves of the landing gear. About one-half inch from the end of each of these X pieces bend a 90-degree angle. This part is cemented to the front landing strut and the other end is cemented to the axle end of the opposite strut. The axles are bent from heavy wire and glued and threaded to the three bamboo landing gear braces.

The wheel pants are made in halves from 4 pieces of balsa 3/8 x 3/4 x 3. Trace the outline of the pant on each of the four pieces of balsa and cut to shape. Then cut away in a circular form enough wood to allow a 1 1/8 inch wheel to turn freely. The amount to be cut away depends on the thickness of the wheels you intend to use. Glue the halves together and cut the outside to the shape shown in drawing No. 2.

Drill a hole in each of the pants to allow for the axle. The pants are kept in position on the axles by means of bamboo arms which are attached to each pant. The bamboo is bent to an "L" shape. The one arm of the "L" is about 1/4 inch long and the other about 1 1/2 inches long. The smaller part is pointed and stuck into the pant directly above the hole which was drilled for the axle. This arm is attached to the landing gear by rubber band. Make sure the pants are in the right position when the arm is secured. Glue washers at the centers to strengthen the wheels. It is (*Continued on page 42*)



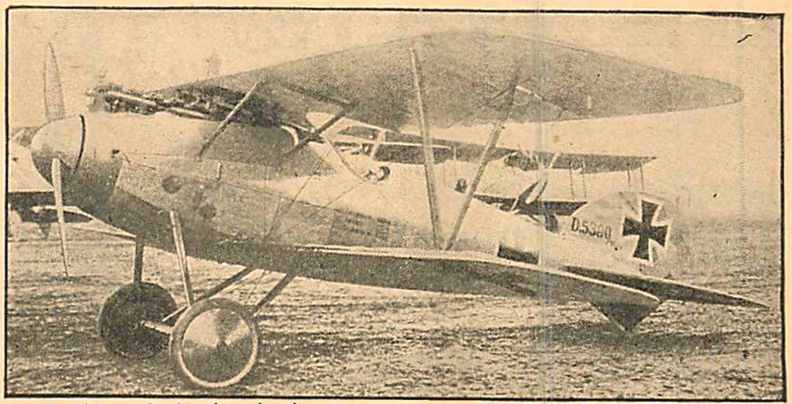


No. 7

Jean Le Coz Unloads

How A Great Flier Rendered Invaluable Service By Destroying The Enemy's Line Of Communication and a Fortified Supply Base

By F. CONDE OTT

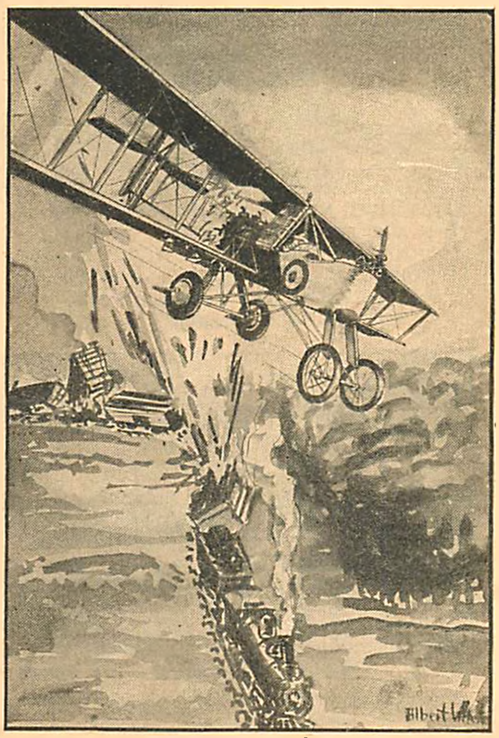


One of the bomber's greatest worries, an Albatross D.5.a. Note the remarkable streamline design.

JEAN LE COZ lolled in his bunk at the barracks, listening with some boredom to the ceaseless drone of stories and idle conversation that flew back and forth through the smoke-filled room.

A bitter raw day that dawned with a driving sleet storm had forced the cancellation of a bombing trip scheduled for that morning. A thick covering of ice on the wings of an already heavily laden bombing plane had rendered it almost useless as a transport.

So the commandant had been wise to postpone the expedition when Old Man Weather had so kindly intervened in behalf of some poor hapless Germans who would have been scattered to the four winds with the blowing up of their munition dump. The change of events made Le Coz idle for the day.



A tremendous roar and a violent concussion of air recorded the hit.

From out of the hum of conversation he caught the name Kleinhoff. He smiled to himself. So they were still worrying about that fabled German town.

"Yes," one of the men was saying, "The spies have finally learned that it is at Kleinhoff that their deadly new gas is being manufactured."

"And where," asked a skeptic, "is Kleinhoff? We've been hearing that name now for weeks but I'll confess I can't find it even on our newest and best maps."

"That's the devil of it," replied the first. "It is a newly created town in the mountains. Intelligence Service can't tell us exactly where just yet but they do know that it is an almost impossible place to reach by air. High treacherous mountains all around it."

Le Coz was about to ask a question when mess call sounded. Mess being one activity that was never slighted regardless of how bad the weather might be, the room full of idlers was suddenly transformed into a pandemonium of activity. During the meal the weather showed signs of clearing off and when the warm sun came out shortly after, Le Coz got in touch with his bomber. He then strolled leisurely over to the hangar to look over his plane.

The huge Voisin with more than an 80 foot wing spread looked like an awkward and ungainly creature there in its shed but Le Coz patted its nose, as he recalled her many trusty performances in the past.

When Perriet, the bomber, appeared on the scene Le Coz had already looked over his ship carefully. Prepared by the competent ground crew for the cancelled flight of the morning, everything was in readiness for a prompt take-off, gas and oil, bombs and a good supply of machine gun shells.

"Where to this afternoon?" was Perriet's greeting.

"The railroad spur at Balle," Le Coz responded as he climbed to his cockpit and motioned for Perriet to follow suit.

THEY were soon in the air with the rythmic "thrumming" of the engines pounding their eardrums.

This spur was an important artery to the Boche lines and invariably heavy with traffic. Because of this fact it was almost always closely guarded, German planes being constantly on patrol while anti-aircraft guns studded the line in profusion.

Perriet smiled discreetly to himself as he prepared his apparatus for instant action while the mammoth ship sped on. Together he and Le Coz had visited this stretch before and knew well the fullness of the task that lay ahead.

Soon the line became dimly apparent in the offing and in another few moments the gleaming rails sparkled beneath them in the afternoon sunlight. Far back on the rise, still sparsely fringed with trees that had miraculuosly survived former barrages, a train was puffing up the grade, the stumpy stack belching forth gobs of smoke as the engine labored mightily at her task.

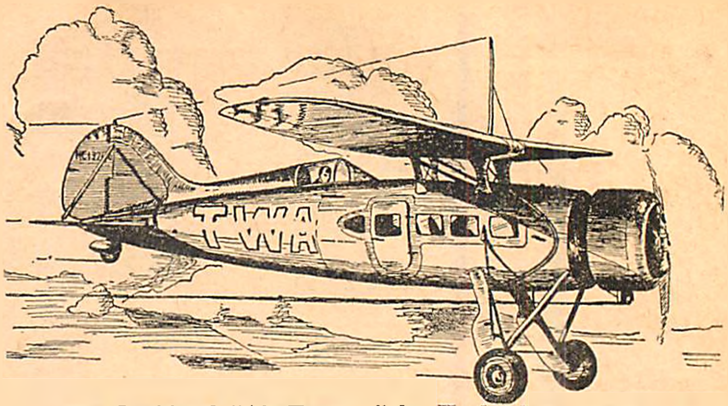
Le Coz turned and headed for it in a sort of wary semi-circle. As yet no Boche planes had appeared but the Germans were particularly prudent with the care of this line and awfully tricky with the ingenious defenses they concocted to keep it open. The Frenchmen remained vigilant.

The powerful motors of the gigantic Voisin soon brought her up alongside the train, made up mostly of box cars. There were also a few flats, indiscriminately loaded with odds and ends, interpersed here and there.

(Continued on page 41)

AIR WAYS
HERE AND THERE

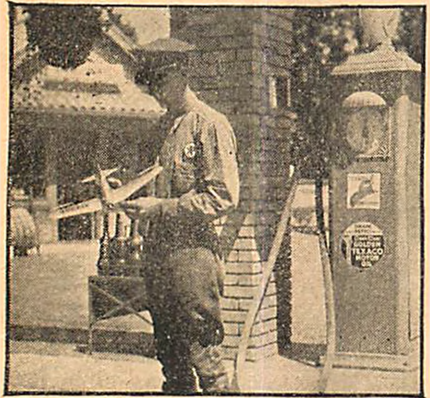
What Our Readers Are Doing to Increase Their Knowledge of Aviation. "Air Your Ways" of Building and Flying Model Planes Also



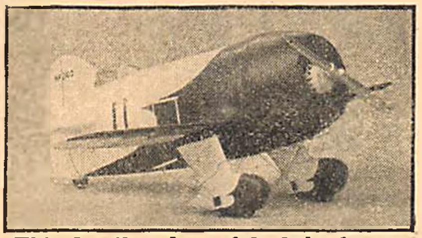
The Lockheed "Air-Express" by Harland C. Wood.

Here is a clever flying scale Boeing P-12 E built by William Eymann, 609 Riley St., Atchison, Kansas. It has a span of 20 inches, weighs 1½ ounces and flies 200 feet. Full details of engine and cockpit have been carried out carefully. It is the 250th model built by Eymann.

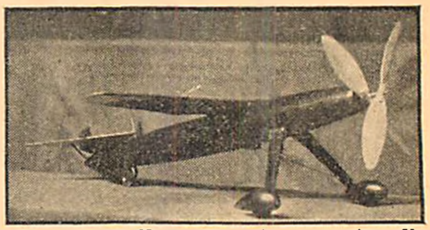
Maxwell B. Bassett of Philadelphia and his model which he flew at the National Championships for a record of 28 minutes, 18 seconds.



Byron Mowery who purchased this built-up scale model from Glen E. Courtwright of Lincoln, Ill., for a window display.

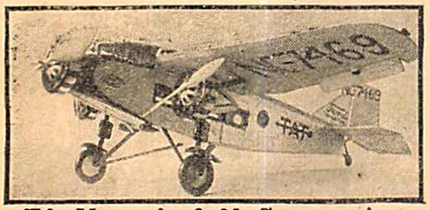


This detail scale model of the famous Gee Bee racer was built by Winfield Scott, 2704 36th St., N.W., Washington, D.C. This picture does not do justice to the actual model. It is a beauty.



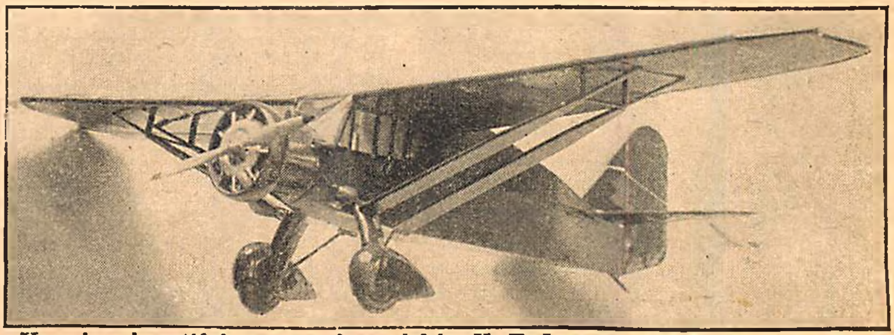
Two propellers turn in opposite directions around the same axis on this model. It was built by Geo. Wilson and Glen Rymer of the Akron Model Club, 1241 Jefferson Ave., Akron, Ohio, and attains great speed. Span 19 inches.

Two excellent scale models of a Sopwith Camel and Sopwith Triplane built by Arnold Smith, 2887 Beechwood Blvd., Pittsburgh, Pa.

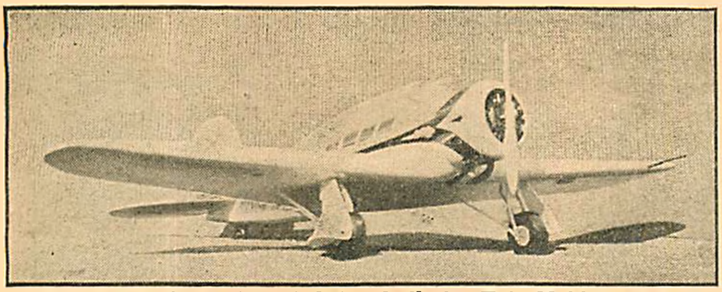


Ed. Marconi of 80 Seaman Ave., N.Y.C., says he recently completed this 37 inch replica of a Ford tri-motor. Every detail has been carefully carried out to include over 1000 parts.

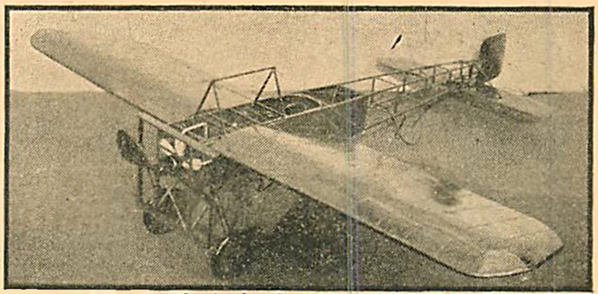
A sixty inch model of a "Mohawk Pinto" built by W. T. Winters, 813 Pipestone St., Benton Harbor, Mich. It is beautifully built to scale and placed among the winners in a recent national contest.



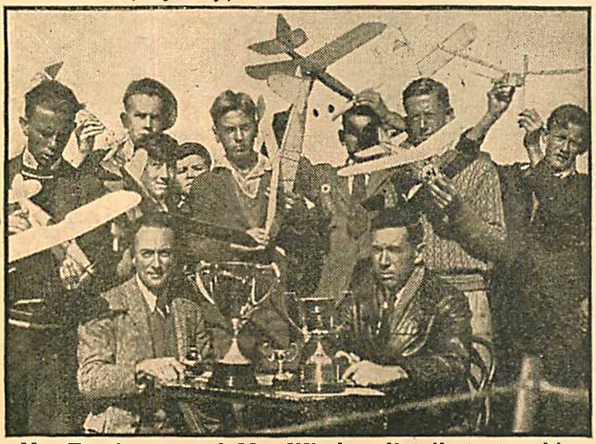
Here is a beautiful exact scale model by K. E. Laumer, 145 South Ave., Bradford, Pa., who made every part himself. It is complete in EVERY detail even Venturi tubes and instruments.



A detail scale Lockheed Orion built by Eric Noble and Jack Newton, Sydney, Australia. The detail is remarkable.



A model of Bleriot's famous ship that first flew the English Channel. More praise for Jack Newton and Eric Noble.



Mr. Freshman and Mr. Whaley distribute trophies to deserving winners of a contest in Sydney, Australia.

CLUB NEWS

AUSTRALIAN NEWS

MORE interesting news comes from our Australian friends this month. Mr. Freshman, Secretary of the Model Flying Club of Australia, has sent us several pictures. One is the Lockheed Orion appearing at the top of the page, which was built by Jack Newton and Eric Noble. The workmanship on this model compares favorably with the degree of accuracy shown in the scale models exhibited at the recent National Model Airplane Contest.

Jack Newton and Eric Noble also built the Bleriot shown at the top of the page, next to the picture of the Lockheed Orion. Students of aviation will recognize this model to be a duplicate of the ship which Louis Bleriot used when he flew across the English Channel July 14th, 1909.

It is a pleasure to note the increasing interest shown by model builders in the old types of ships which were responsible for the establishment of the fundamental principles of aviation. One must remember that our present high degree of efficiency in flight was established only by the sacrifices made by the early pioneers.

This model Bleriot was purchased by the Sydney Technological Museum where it is now on exhibition.

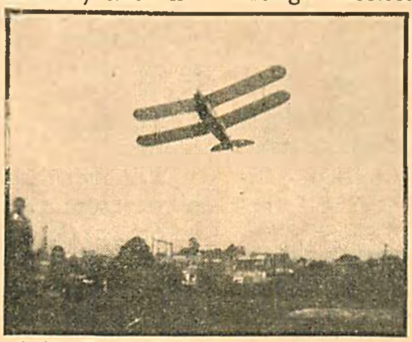
In our next picture, we see Mr. Freshman and Mr. Whaley, who is official clerk of the club, officiating at a contest held during a recent week-end. It is evident that these progressive Australians hold contests more often than we do in this country. Perhaps the contestants are pleased with a less expensive trophy, which makes it possible. We suspect that this club of model flyers is actuated by a spirit of sportsmanship to a high degree. The compensation received may not be a trophy but a great deal of experience with a good time thrown in.

I am wondering whether young men in this country would be moved to take part in contests under the stimulus of mere sportsmanship. There are many whom I know that would respond to this theory. If any of our readers would care to form or join a club which would fly regularly every week, will they not write in to the editor, expressing their views on the matter.

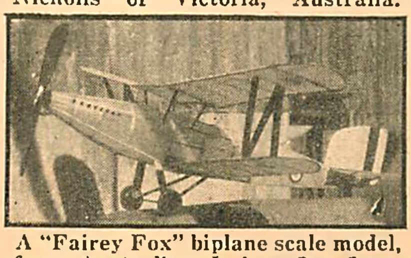
VICTORIA MODEL AERO CLUB

In the next picture we see a scale model D.H.Moth which has just taken off for a 40 second flight. It has a span of 36 inches. This machine was built by Dalwin G. Nicholls of 91a Glenferrie Road, Glenferrie, Victoria, Australia. Nicholls tells us that he is a member of the Victoria Model Aero Club and has been building models for about eight years.

He says, "Out here we get excellent time with our outdoor models but we are all puzzled as to how you can get 14 minutes indoors. Our models seem light enough although not covered with microfilm. Our outdoor record stands at 17 minutes officially although unofficially a flight of 32 minutes has been made. Most of our models are about 40 inches in span; our scale models are smaller of course."



A D. H. Moth making a 40 second R.O.G. flight. Built by Dalwin Nicholls of Victoria, Australia.

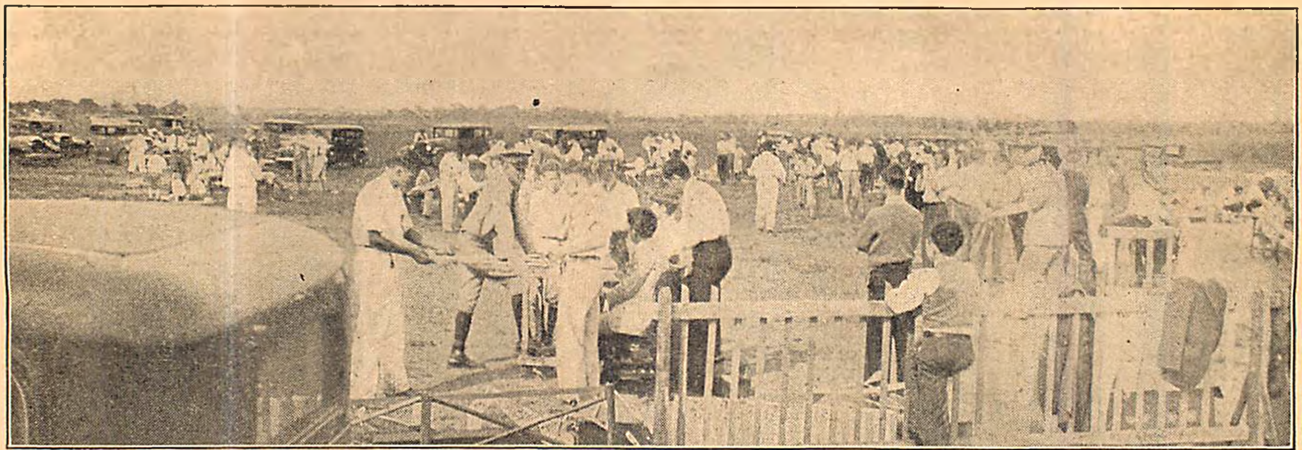


A "Fairey Fox" biplane scale model, from Australia. It is a fine flyer.

IT IS very difficult for anyone to realize how 14 minute flights can be obtained indoors unless they see the machines that set up such records. The record now, however, has been increased to 17 minutes, 43 seconds. The secret in flights of this nature rests upon several factors, the most important one of which is the weight of the machine. Some of these models are only 8/100ths of an ounce in weight, though they have a span of 30 inches. This is made possible through the use of microfilm and extreme care in building the framework. Hollow motor sticks are used universally and often hollow wing spars.

The manner in which the American flyers have solved the problem of sta-

(Continued on page 37)



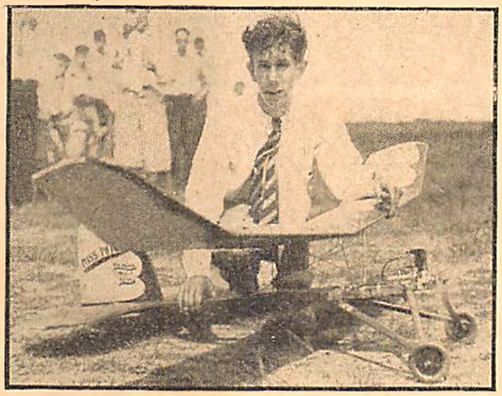
The 1933 National Championships in "full swing" at Roosevelt Field, June 27th.

Who's Who at the National Championships

Again the Records Go Up. 1933 Model Plane Champions Shatter All Former N.A.A. Marks. Gasoline Engine Models Successful

WHEN 165 of the best model plane builders and flyers from 18 states, Canada, and Scotland took part in the 1933 National Championship Model Airplane Meet in New York City, June 27-28, they set astounding new records in every one of the five flying events of the meet, conducted by Universal Model Airplane News under the sanction and supervision of the National Aeronautic Association.

John Bartol, Roxbury, Massachusetts, set an amazing new record of 17 minutes, 47-3/5 seconds in the Stout Indoor Contest, eclipsing the 1932 mark of 13 minutes, 03 seconds.



Maxwell B. Bassett of Philadelphia, with his "gas" model which won the Mulvihill Contest with a 14 min. 55 sec. world's record flight. (International News Photo)

Albert Levy, Toronto, Canada, flew his indoor fuselage model 8 minutes, 56 seconds, setting a new record, to win the Bloomingdale Cup, a new N.A.A. trophy.

Maxwell Bassett, Philadelphia, "stole the show" outdoors by capturing all three events with his gasoline powered models. Bassett flew one of his fuselage models 28 minutes, 18 seconds to establish a new gasoline engined model record and won the Rear Admiral William A. Moffett Memorial Trophy for international competition, another new N.A.A. annual trophy. He won the Mulvihill Trophy with a flight of 14 minutes, 55 seconds, took the Stout Outdoor Contest with a flight of 22 minutes, 22½ seconds and won the Texaco Trophy, also a new N.A.A. annual trophy, by making the best gasoline engine flight in the meet. Due to Bassett's demonstration of internal combustion powered model planes, N.A.A. officials have decided that henceforth rubber power will not compete against gasoline.

Vernon Boehle, Indianapolis, placed second in the Stout Outdoor Contest with a superb flight time of 8 minutes, 43 seconds, a new world's record for N.A.A. weight-rule fuselage models powered with rubber. Boehle also placed second in the Admiral Moffett Contest and fifth in the Mulvihill Contest, winning the Comet Model Airplane Co. Cup for making the best general outdoor rubber powered performance.

August Ruggeri, New York, established a new weight-rule record in the Mulvihill Contest with a flight of 7 minutes, 36 seconds, flying a rubber powered twin pusher, placing second to Bassett with his gasoline power.

Joseph Geigan, Washington, scored 98 points with his Curtiss Falcon Exhibition Scale model, to win the Universal Model Airplane News Trophy.

Each N.A.A. trophy, held one year by the winner, carried with it a minature trophy for permanent possession. This is a new N.A.A. plan and proved very popular with this year's contestants.

But all this is ahead of the story of the Meet, which actually began June 20 with the judging of the Exhibition Scale Models, under a group of experts headed by the ever faithful George F. McLaughlin, Editor of Aero Digest. The first five scale models all attained a score of 90 or more points.

The first distant arrival was Art Snyder who hitchhiked from Burbank, California to arrive four days before the date of the flying contests. Art did not win a high place, but before starting home, said he would not have missed the meet for anything as he felt he had learned more in the two days than in his previous six years of model experience.

MONDAY, June 26, was registration day at Meet Headquarters, Hotel Pennsylvania. Before 10.30 p.m. when registrations stopped, 165 contestants had entered. The "Model Repair Hangar" on the seventeenth floor was a busy workroom all day and night. Charles H. Grant, Editor of Universal Model Airplane News and Contest Director, was busily engaged there answering innumerable questions and discussing the eternal dihedral, center of gravity, line of thrust, etc.

At 8.30 Tuesday morning, the contestants took the Long Island Railroad train out to Roosevelt Field, provided for the day by Mr. George W. Orr, President of Roosevelt Field, Inc. A low ceiling and mist made flying conditions doubtful, but just as the U. S. Weather Bureau had promised, the sun appeared shortly before noon and conditions were nearly ideal for model flying. The timers, army aviation officers from Mitchel Field, loaned for the occasion by Colonel John H. Howard, Commanding, equipped with binoculars, stop-watches, and automobiles for model pursuit, took charge and the Meet was on. The models were checked for area and weight before every flight. Mostly, the fellows had built their models to the correct weight-rule specifications. A few had to add weight.

Karl F. Egge, Publicity Director of Bloomingdale's, presents the Bloomingdale Trophy to Mr. Charles L. Lawrence, New York Governor of the N.A.A. It was won by Albert Levy of Toronto, Ontario, by making a world's record flight of 8 min. 43 sec., with an indoor fuselage model.

The launching platforms were placed almost on the runway used by Lindbergh, Chamberlin and Byrd for their historic trans-atlantic flights. It would be difficult to find a more ideal setting for a model plane contest.

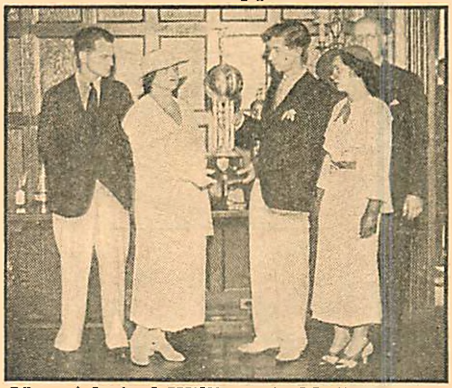
Last year's champions, Ginnetti, Parham and Light, were all on hand to defend their laurels. They made good showings but could not equal the winning flight times.

During the day there were several events of interest aside from the contests themselves. Mr. Spencer of Amphibions, Inc., demonstrated a successful ornithopter model. He kept the mechanism secret but the model actually flew, climbed and circled, all as a result of the flapping of its wings. Russell Thaw brought out his Gee Bee and circled the field at a speed of 250 miles per hour. Joe Crane, National Champion spot-landing parachute jumper, made an exhibition jump from a Fleet Trainer piloted by Husky Flewellen, Chief Pilot of Roosevelt Aviation School, who entertained the crowd by stunting after the jump. One contestant was heard to remark that "parachutes should not be allowed to compete against models as their wing area is too great." Joe picked out an open spot for his landing but before he reached it, about a hundred spectators were there to receive him. Army planes from Mitchel Field made a ground-strafing "attack" on "No-man's Land," the part of the field to one side of the contests.

Lt. Commander Frank Hawks admires the Texaco Trophy won by Maxwell B. Bassett, when he made the longest flight with a model powered with a gasoline engine.

Finally, at 7.00 p.m., after the winners had been determined, the three first and second place winners were taken on a cross-country flight in a Roosevelt Field Fairchild cabin plane piloted by Len Gower. Because Bassett had won all three first places and could take only one ride, some of the third place winners received the trip. Six happy winners had a flight over Long Island and New York City, saw the highest buildings reaching up above low drifting clouds, saw the lights of New York begin to come on, and arrived back at Roosevelt Field just before dark.

This ended the outdoor program and every contestant went back to New York City with expressions of satisfaction and appreciation for the Roosevelt Field staff and the Mitchel Field personnel who had done so much in providing the setting, equipment, and assistance necessary to a successful day of outdoor competition.



Mrs. Admiral William A. Moffett presents the William A. Moffett Memorial Trophy to Maxwell B. Bassett who won it with a gas powered fuselage model that flew for 28 min. 18 sec., a world's record. Admiral F. R. Harris, U. S. Navy Retired, (extreme right), made an address at the dinner. The trophy was given to the N.A.A. by the Balsa Wood Co. of Brooklyn.

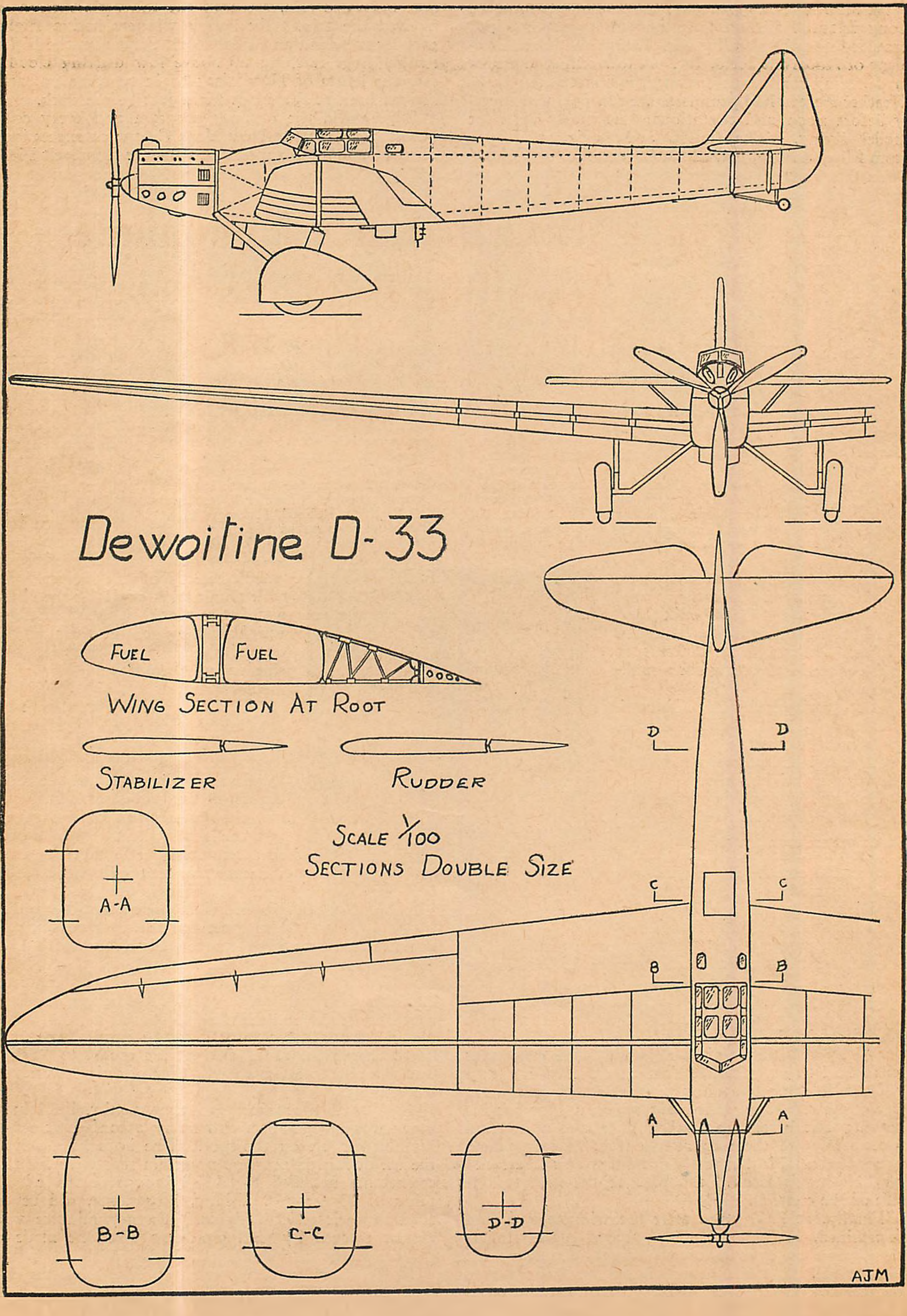
An examination of the results of the outdoor flying models show how well the model aviators have mastered the art and science of flying weight-rule models. Several, in their elimination trials for the Moffett International Contest, a non-weight-rule event, lost their models out of sight high in the air, thus eliminating themselves.

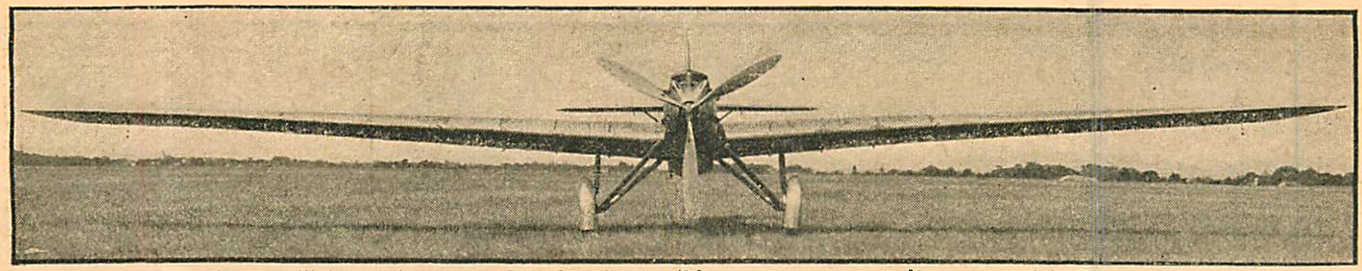
At 8.00 Wednesday morning, Colonel Paul Loeser opened the doors of his 258th Field Artillery Regiment Armory at Kingsbridge Road and Jerome Avenue, the scene of the indoor contests. There was an immediate influx of contestants into the huge building with its drill shed providing 106 feet of clear vertical space over a floor 300x600 feet. The early arrivals came to practice with their beautiful microfilm covered models. Ray Thompson, Detroit, was there to renew his rivalry with Carl Goldberg, Purchase, N. Y. It will be remembered that in the 1930 Detroit meet, Ray defeated Carl. But this year misfortune overtook Thompson as, in a practice flight, his only model lodged in the girders and could not be recovered. Joseph Kovel, Brooklyn, 1932 champion, could not get his model to "tick", and was able to make a flight time of only 9 minutes, 02 seconds.

All day, in the armory basement, a microfilm laboratory was in operation and many a contestant made his film for use on the spot. The boys have solved the use of microfilm in no uncertain manner. Fifteen contestants exceeded the 1932 indoor record of 13 minutes, 03 seconds. Many, in practice, did better than in their official flights. Twenty minutes was almost reached by Carl Goldberg when he made a practice flight of 19 minutes, 34 seconds.

However, it remained for two Massachusetts en-

(*Continued on page* 43)


Dewoitine D-33
FUEL
FUEL
WING SECTION AT ROOT
STABILIZER
RUDDER
SCALE 1/100
SECTIONS DOUBLE SIZE
A-A
B-B
C-C
D-D
AJM



The large efficient wing spread makes it possible to cover great distances with little power.

The French Long Distance Monoplane Dewoitine D-33

Details of Construction Which Will Enable You to Build an Interesting Model of This High Performance Monoplane

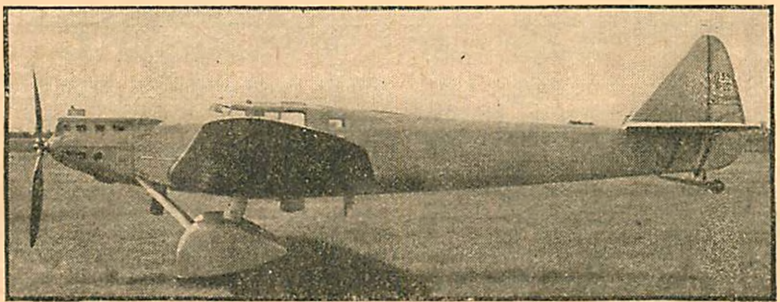
By A. J. McRAE, JR.

THE low-wing monoplane, Dewoitine D-33, was designed to break the world's record for distance flying, measured in a straight line.

The wing is very long without any exterior bracing while the fuselage is comparatively small. Its grace and efficiency is apparent.

Wing

The wing has a trapezoidal shape, the tips being elliptical, and it may be dismantled into five parts. A single spar is placed one-third of the way back from the leading edge with a set of tanks on each side. The whole structure is covered with sheet duralumin.



The smooth streamlined body causes little resistance.

The wing spar is composed of two-ply duralumin forced into an "I" beam shape, with two bores strongly fastened to the frame. The two-ply duralumin decreases in thickness along the entire span in order to obtain a resistance equal to the stresses at any point.

The spars of each half of the wing are fastened to each other by means of steel fittings in the form of very large hinges.

Toward the center part of the wing along the spar, are fuel tanks. They help to brace the wing against the twisting and wing drag forces. Their manner of construction permits easy riveting.

The tightening is obtained after the assemblage is completely finished by injecting a special product under pressure into the interior of the tank. This injected product, being hot and in a liquid state, penetrates all steel units and hardens upon cooling. A simple bath with hot water cleans the tanks perfectly.

The leading edge is formed of ribs and false ribs, held together by stringers.

The trailing edge is riveted in panels. Its end part consists of an adjustable surface with pinions at its joints, which allows it to be adjusted for trimming the ship.

The whole wing is covered with duralumin sheeting.

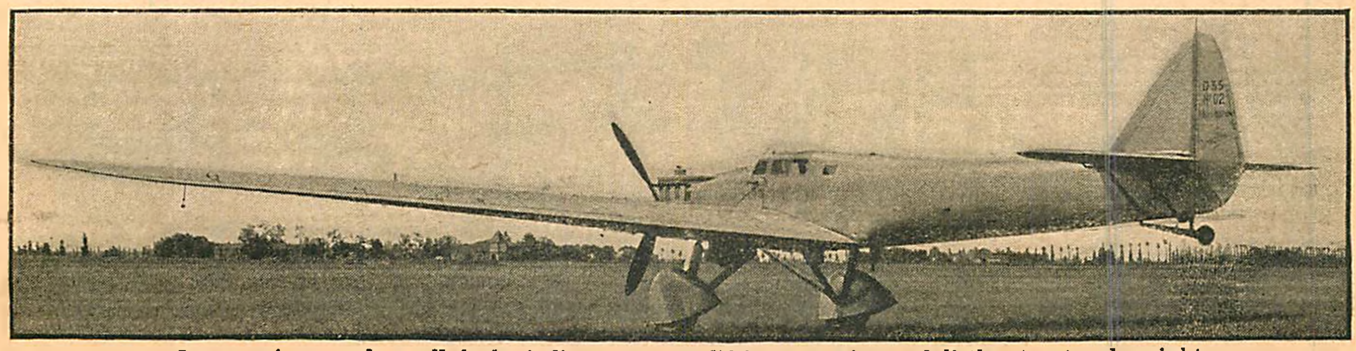
Fuselage

The fuselage is of standard Dewoitine construction. Its structure is composed of bulkheads and four main longerons with small intermediate stringers, fastened together by gusset plates and rivets. The covering is duralumin sheeting.

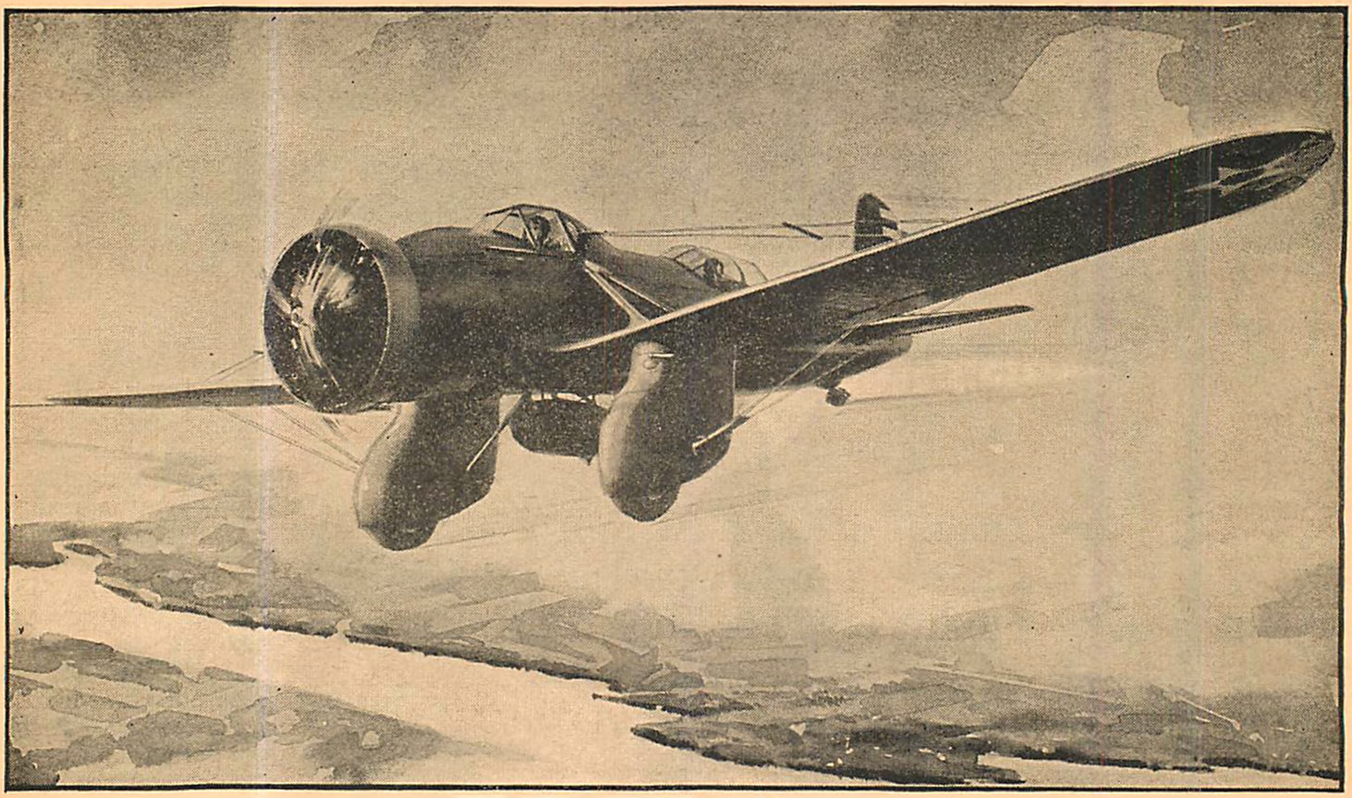
The motor mount is built in, the whole nose structure being attached to the fuselage by four pins. To the rear of the motor is the fuel tank filler cap.

The cabin is composed of two parts. The main

(Continued on page 38)

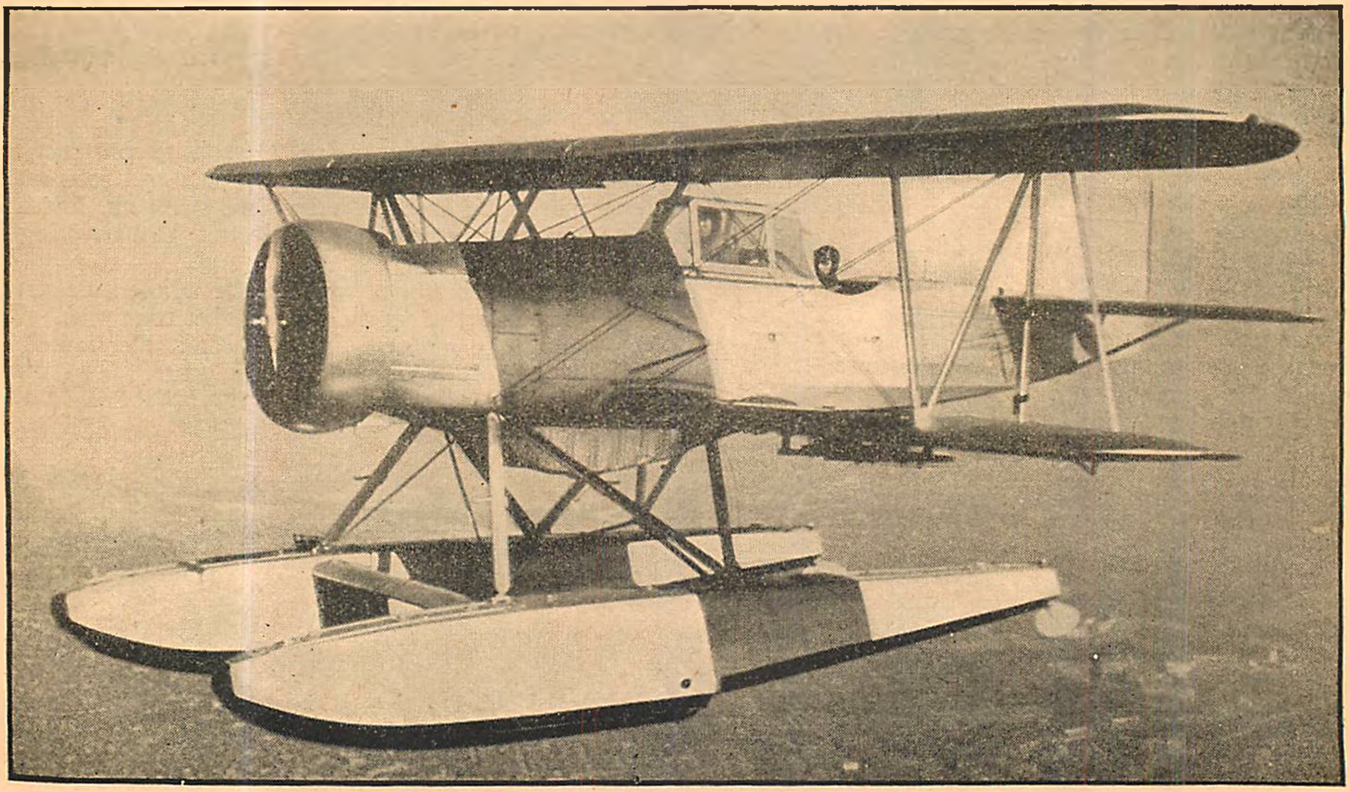


Large wings and small body indicates great lifting capacity and little structural weight.



THE NEW CURTISS "SHRIKE" A-12

It is like the Curtiss A-8 Attack plane except that it is equipped with a nine cylinder 700 h.p. R-1820E Wright Cyclone which weighs only 1.22 lbs. per h.p., instead of a twelve cylinder, Prestone cooled, 650 h.p. Curtiss Conqueror. This new model attack plane exceeds the 196 mile per hour speed of the A-8. It is referred to as the "flying fortress" because of its armament of five machine guns and a large bomb which it carries under the fuselage. A low landing speed is assured by the use of slots and flaps on the wings. Forty-six of these new ships are now being built for the United States Army Air Corps by the Curtiss Aeroplane and Motor Co. In three years the Air Corps has increased the speeds in attack aviation from 140 m.p.h., to over 200 m.p.h.



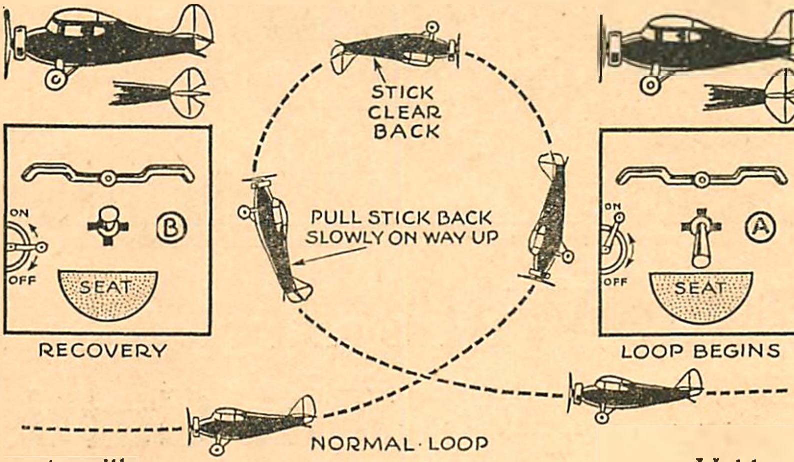
THE NEW CURTISS FALCON OBSERVATION BIPLANE

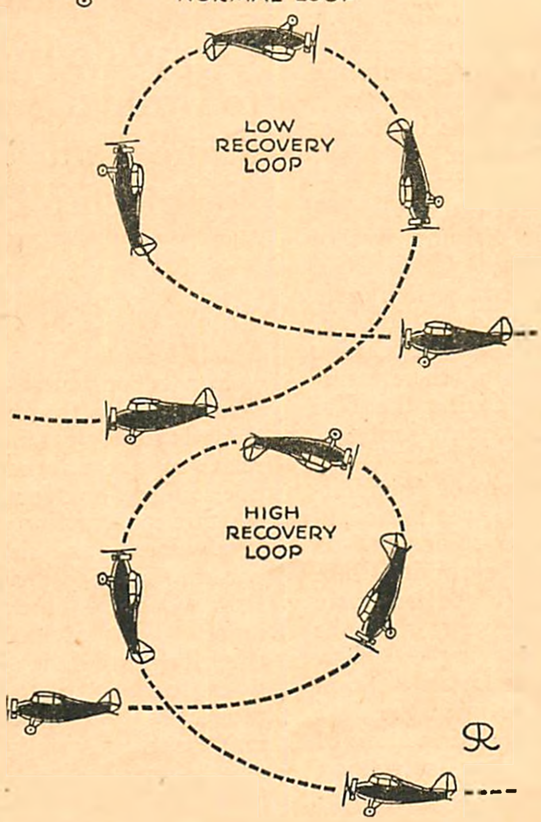
This ship is also powered with one of the new 700 h.p. Wright Cyclone engines and also floats. Its top speed is 185 m.p.h. A number of these ships have been sold to foreign countries.

Airplane Maneuver Contest

Here is the Winner of the June Contest and the Correct Answer to the Maneuver Pictured on the Cover of Our August Issue

Drawings By STEWART ROUSE





THE big contest is now all over except for picking the winners of the August cover and determining the winners of the grand prizes, given for the best groups of six answers to the six maneuvers pictured on the covers of the last six issues of Universal Model Airplane News.

The names of the winners of the August Contest will be published in the October issue of this magazine. Due to the large number of answers and the care required in selecting the grand prize winners, it will be necessary to withhold the final results of the whole contest for publication in the November issue of Universal Model Airplane News.

However, we have not told you who has won the June cover painting. Of course you all know the correct answer now, as you have probably read the details given about it in the August issue.

The June Contest Winner

Our maneuver fans seems to be getting better and better with each succeeding month and as you might expect, it is consequently harder and harder to choose the winner. However, after much pondering and rereading, we have chosen Mr. Ike L. Kibbe of 1105 San Jacinto St., Austin, Texas, as winner of our June cover painting. Congratulations. We hope that this picture will be a continual source of inspiration to you.

Many other fans sent in very fine answers. Those which were very close to first place are as follows:

Philip Chandler, Peabody Manor Apts., Nashville, Tenn.

H. W. Whitlock, 278 St. John Street, Spartanburg, S. C.

Roger F. Parkhill, 501 East 27th St., Minneapolis. Minn.

Albert R. Cline, Third Avenue, Derry, Pa.

Alvin J. Brault, 103 East Cook St., New London, Wisc.

Harry T. Carroll, 150 Fourth Avenue N., Nashville, Tennessee.

Wm. Henry Gladden, 737 College Avenue, Rock Hill, S. C.

Jean S. Chadwick, 110 Merriman Avenue, Syracuse, N. Y.

Cedric E. Galloway, 610 S. 4th Street, Austin, Minn.

Kenneth Harbor, 35 Atkinson Street, Rochester, N. Y.

Frank S. McDonald, Hardin, Illinois.

Dominick Osmulski, 3279 E. Thompson Street, Philadelphia, Pa.

William Drake, 123 Clifton Street, Malden, Mass.

L. H. Tarbox, 33-25 Union Street, Flushing, L. I., N. Y.

Arnold Gregerson, 1210—4th St. S.W., Mason City, Iowa.

Answer to the August Contest

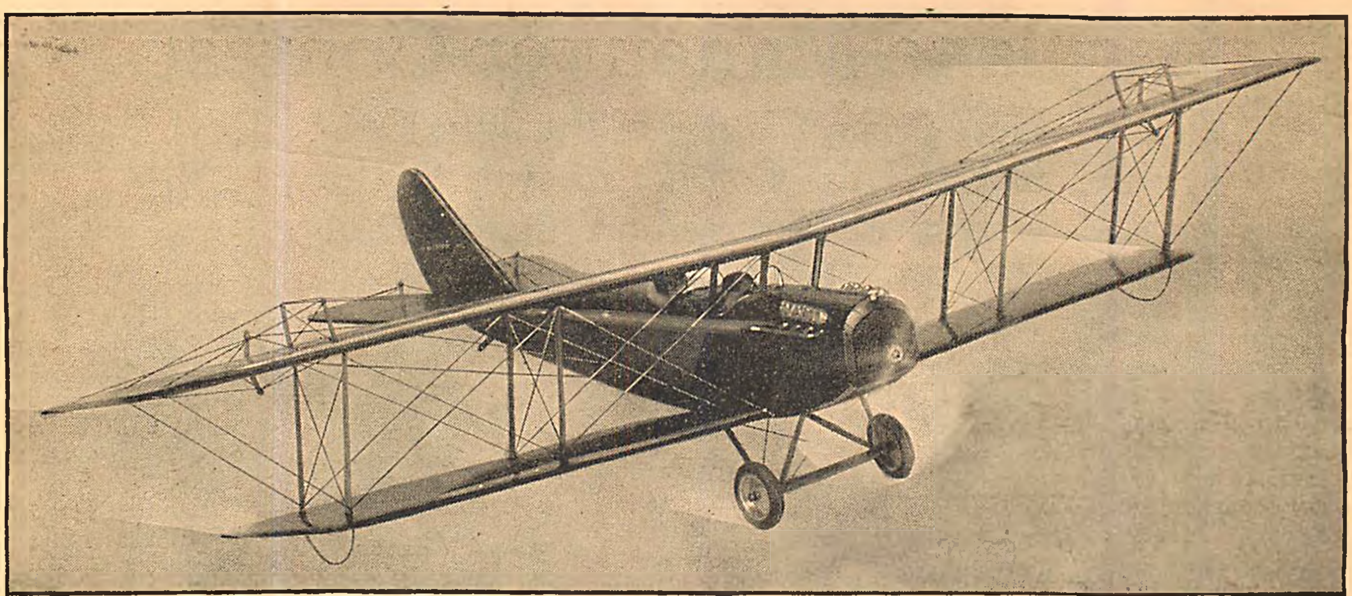
MOST of our readers gave the correct answer to the August Maneuver, some explaining its execution and uses in great detail. Though you may not be a prize winner, unquestionably you have learned a great deal from the study required to send in your answers. All the trouble is therefore worth while. The correct answer to the August Maneuver Contest is:—an INSIDE LOOP.

The Loop

If a pilot wishes to fly his plane through a loop, he first makes sure that he has enough speed to complete the maneuver. In most fast, modern planes, top speed in level flight with the engine wide open, is fast enough, but in many ships which have little power, a short dive in order to gain excess speed, will either be helpful or actually necessary to complete the loop.

When the pilot is sure he has enough speed, he begins to pull the stick back toward him, gradually, so that the nose come higher and higher and the plane finally flies right over on its back. The stick reaches the rearmost position shown in A, just as the plane is on its back. It is held back until the plane is in the "nose down" position, whereupon it is eased forward smoothly and finally put in the slightly forward posi-

(Continued on page 48)



The Curtiss J-N-4. This ship was used to train thousands of Canadian and American pilots.

The War's Greatest Trainer The Curtiss J-N.4

Complete Instructions and Plans to Build a Scale Model of the Airplane That Was Used to Train All of Our Pilots During the World War

By JOHN T. McCOY, JR.

WHEN in 1917, the United States took its place alongside the Allies, it found itself with a sadly inadequate air force. Millions were expended in a vain attempt to develop a suitable combat plane of American design and build. At the close of the war this country had built but few fighting planes and these were of French or English design. However, this country was in a position to make one important contribution to the air power of its allies.

Thousands of pilots, trained by America in American ships, were sent to the front and although they fought in foreign-made ships, their training was of vast importance to the ultimate fortunes of the Allies. The accomplishments of these pilots is a well known story to every American boy. For their training, the Curtiss J.N.4 commonly referred to as the Curitss Jenny, is justly famous. Thousands of these training planes were built by Uncle Sam during the War and it was in these ships that the vast majority of American pilots were trained.

At the close of the War our government found itself in possession of more of these ships than it could possibly find use for in the years to come, and so they were promptly placed on sale to the public. These surplus planes were sold as low as fifty dollars each, which enabled many American war pilots to continue flying in the barnstorming days following the War. As a matter of fact these planes did American aviation a great service by filling in the gap between the days of war flying and the later years when aviation attained a degree of commercial importance. For instruction purposes these planes were used by our leading aviation schools until 1927.

Following are some of the specifications of this plane.

Upper wing span—43′ 7″
Lower wing span—33′ 1¼″
Length—27′ 4″
Weight (fully loaded)—1920 pounds
Engine— O X 5 V-8 cylinder water-cooled rated at 90 H.P. at 1400 R.P.M.
Speed—75 M.P.H. (Max.) 45 M. P. H. (Min.)
Climb—200 feet per minute

The model here described is a perfect reproduction of this famous ship and designed to a scale of ½ inch equals 1 foot.

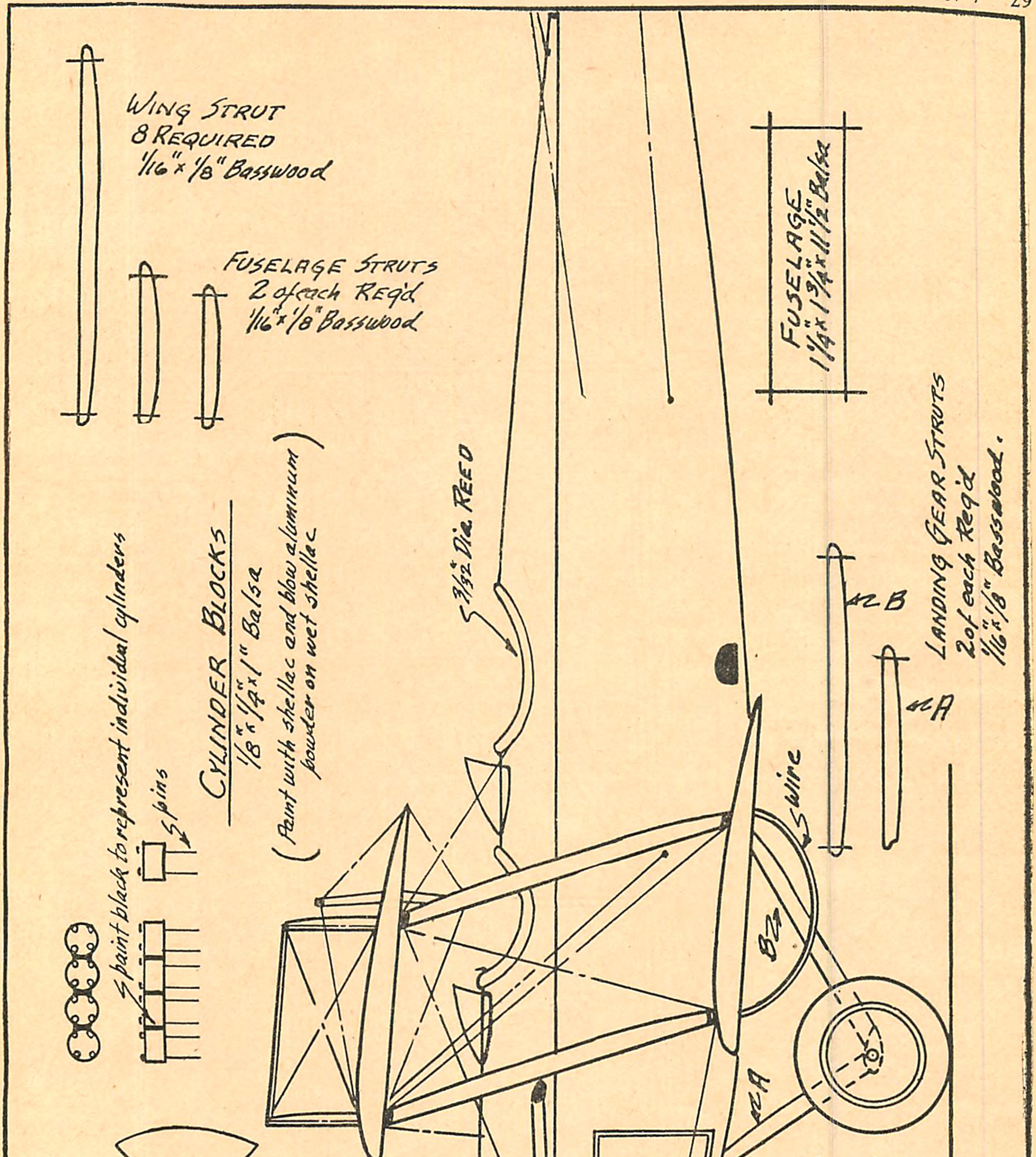
For its construction the plans are your guide. Understand them thoroughly before proceeding. Everything is clearly detailed. Remember that all drawings relate to one another. If a part appears unclear in one section, look for it in another part of the drawing.

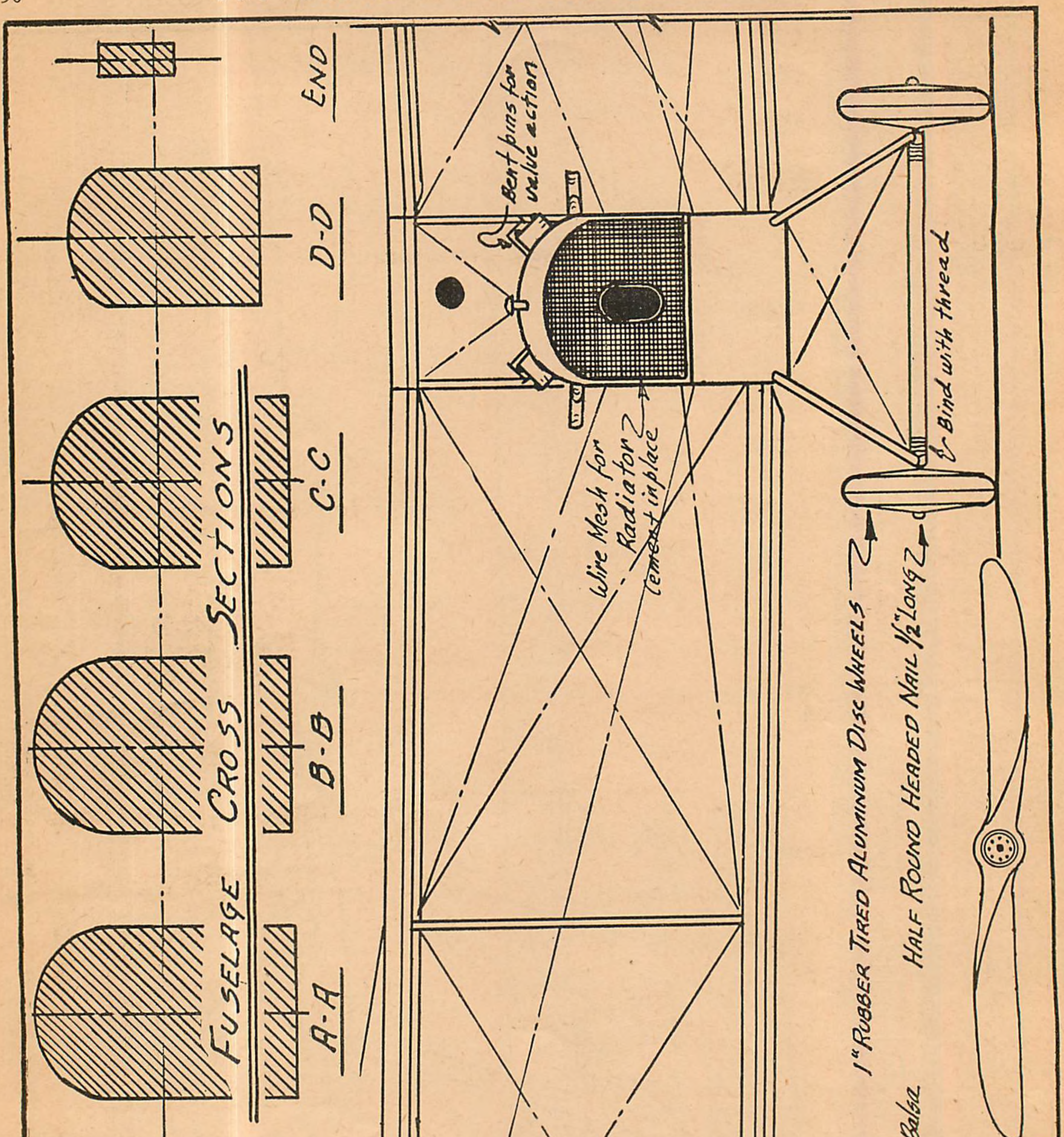
Start construction of the model by shaping the fuselage. Using the side elevation in the drawing as a pattern, mark off outline on balsa block of correct size. Cut the block to this shape using a knife or razor. Now proceed to outline the top elevation on the block and finish shaping. Refer to fuselage sections for proper cross-section. Hollow cockpits to proper shape. Smooth with coarse and then fine sandpaper. Trim with 3/32 diameter reed. Steam reed before bending to shape. Cement this into place. Make radiator by following the details on drawing. Use a fine copper or brass wire mesh to imitate the radiator cells. Drive a half round-headed nail in top for radiator cap.

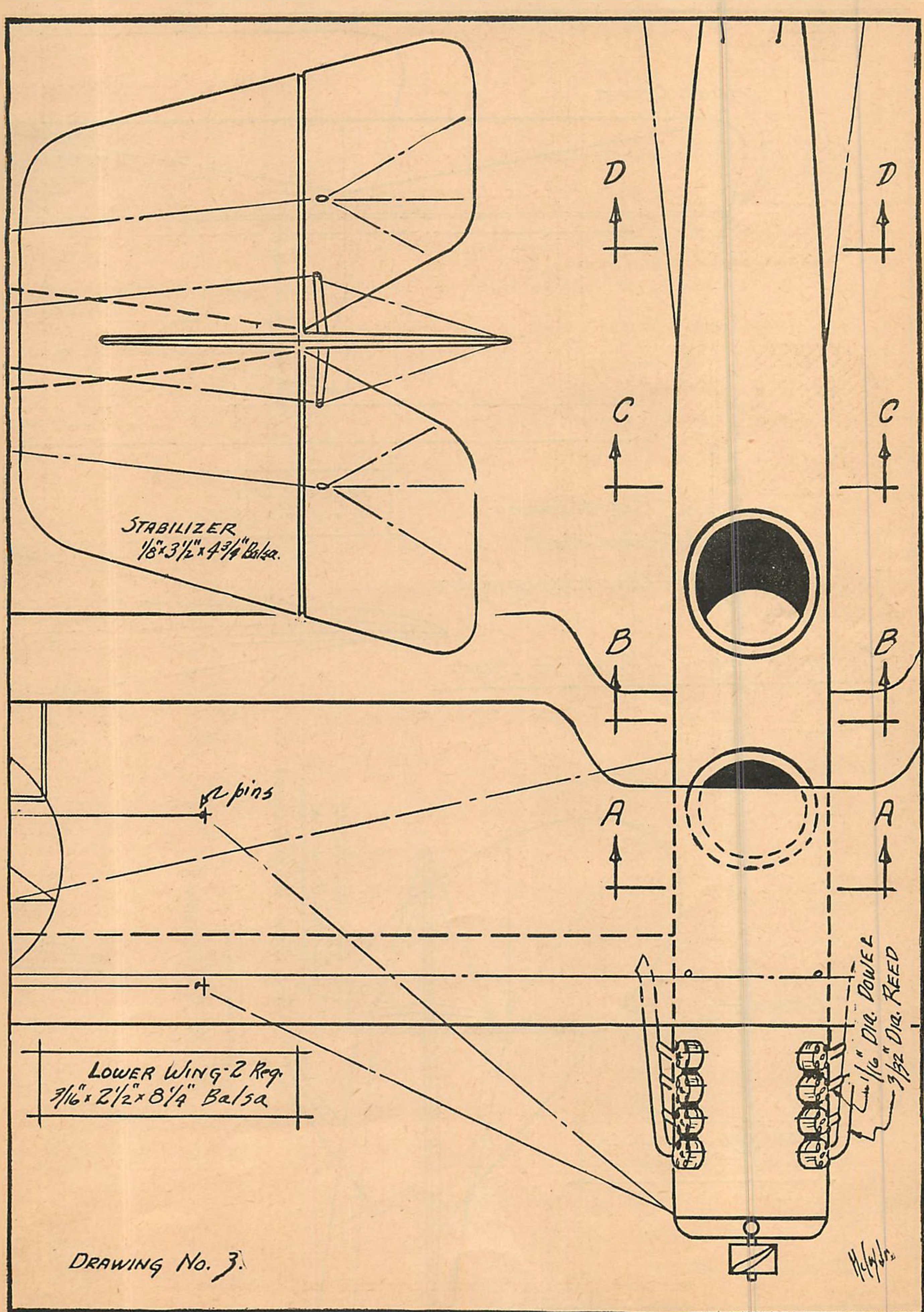
Carve propeller from ⅜″ x ¼″ basswood. Copy shape from drawings.

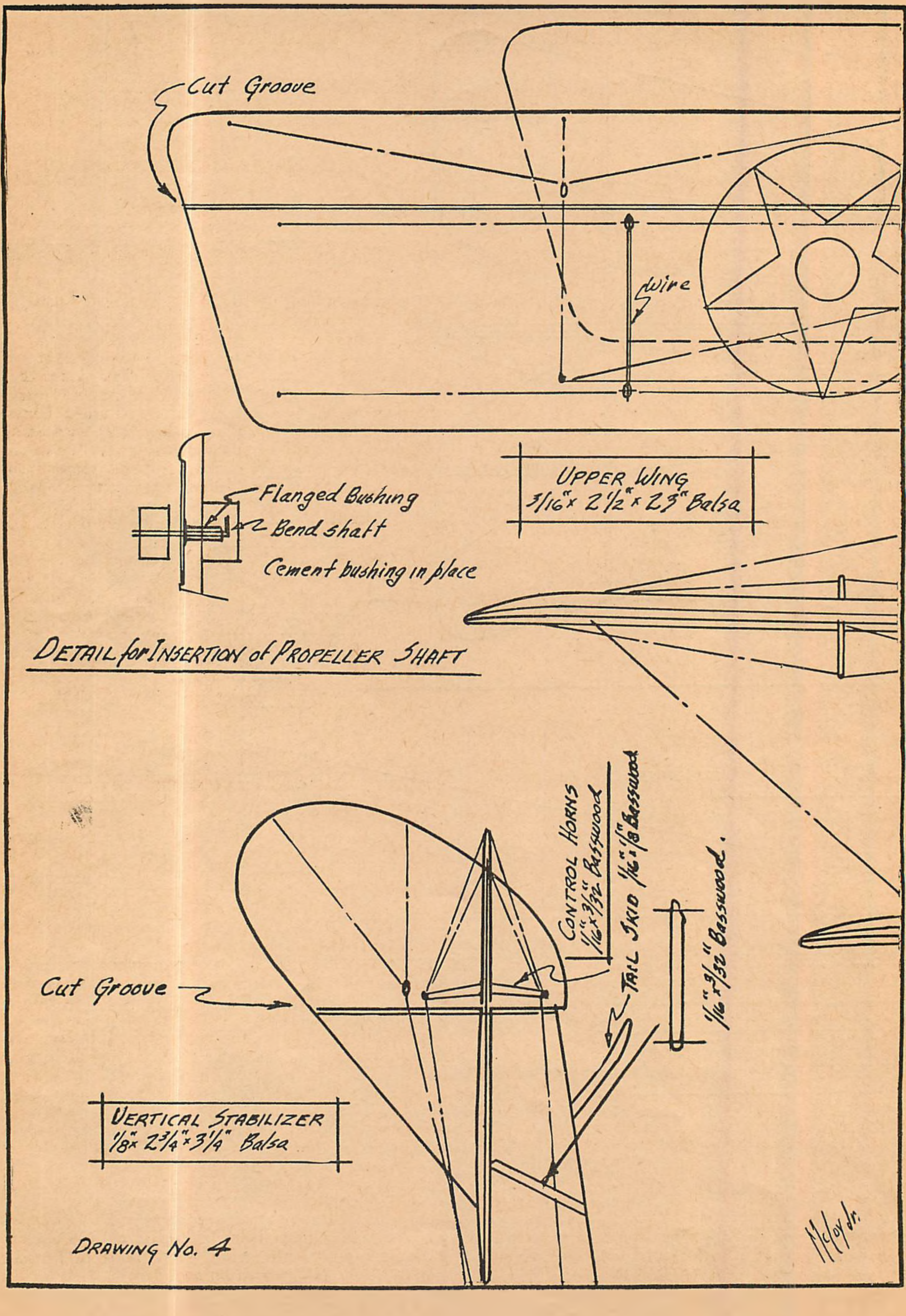
A VERY realistic O. X. 5 motor is made by shaping two pieces of ⅛″ x ¼″ x 1″ balsa as shown on Drawing 1. Smooth them with fine sandpaper and then shellac. Blow aluminum powder on the shellac while it is still wet. Insert four pins in each cylinder to represent hold-down bolts. After fuselage

(*Continued on page* 48)

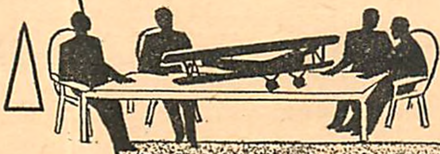

Wing Strut
8 Required
1/16" x 1/8" Basswood
Fuselage Struts
2 of each Req'd
1/16" x 1/8" Basswood
Fuselage
1 1/4" x 1 3/4" x 11 1/2" Balsa
Cylinder Blocks
1/8" x 1/4" x 1" Balsa
(Paint with shellac and blow aluminum powder on wet shellac)
paint black to represent individual cylinders
pins
3/32" Dia Reed
Landing Gear Struts
2 of each Req'd
1/16" x 1/8" Basswood.
B
A
wire
82
A
Draw louvers and door outline with soft pencil after final coat of enamel has been applied. (Same on other side
Pattern for Celluloid Windshields
Half Round Headed Nail
Propeller
1/4" x 3/8" x 4" Basswood
Drawing No. 1.


FUSELAGE CROSS SECTIONS
FRONT
A-A
B-B
C-C
D-D
END
Bent pins for valve action
Wire Mesh for Radiator cement in place
Bind with thread
1" RUBBER TIRED ALUMINUM DISC WHEELS
HALF ROUND HEADED NAIL 1/2" LONG
1/8" x 5/16" Balsa
AXLE STREAMLINE CROSS SECTION
DRAWING NO. 2.


D
D
C
C
STABILIZER
1/8" x 3 1/2" x 4 3/4" Balsa.
B
B
pins
A
A
1/16" Dia. Dowel
3/32" Dia. Reed
Lower Wing-2 Req.
3/16" x 2 1/2" x 8 1/4" Balsa
Drawing No. 3.


Cut Groove
wire
Upper Wing
3/16" x 2 1/2" x 23" Balsa
Flanged Bushing
Bend shaft
Cement bushing in place
Detail for Insertion of Propeller Shaft
Control Horns
1/16" x 3/32" Basswood
Tail Skid 1/16" x 1/8" Basswood
1/16" x 3/32" Basswood.
Cut Groove
Vertical Stabilizer
1/8" x 2 3/4" x 3 1/4" Balsa
Drawing No. 4
McCoy Jr.

Aviation Advisory Board



Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board
Formerly of
The Technical Section, Air Service, U. S. Army

A GREAT many of our model builders have lately realized the importance of science of design in building their models and it has resulted in a great many interesting questions arriving in our office. It seems that the more we know about any particular subject, the more we realize there is to learn and consequently the more questions we wish to ask about it.

We shall try to be rather ambitious this month and give the correct answers to a large number of questions which have come to us.

Some questions from our bashful friend of last month were not answered due to lack of space, so here they are.

(f) Would you have a high or low aspect ratio on the wing?

Answer: I would have an aspect ratio of about six. This is fairly low. On a speed plane a low aspect ratio may be used without a resultant loss of efficiency. This reduces the span of the wing which results in greater directional stability, and it will have a greater tendency to hold its course.

Have you heard of this one? It is a Great Lakes XPG-1, an experimental plane with great speed and fighting ability.

Question: My parasol model glides correctly. When wound slightly it flies very well but when wound full, it stalls. What should I do to remedy this?

Answer: In parasol models the line of resistance is very high so that when the model is flying fast, the top of the machine is pushed back and the bottom is pulled forward, thus depressing the tail and causing the ship to stall. You may do two things. Either raise the line of thrust considerably so that it is lined with the root or center section of the wing or increase the angle of incidence of the stabilizer so that the chord of the stabilizer when extended, will pass through a point half-way between the wing and the line of thrust. We hope that this will answer the questions of our "dark horse."

CLARENCE HOO of 602-A Kunawai Lane, Honolulu, Hawaii, asks us the following questions. We take great pleasure in answering Hoo because we realize that aeronautical information is not easily obtainable where he lives.

Question: How do you find the balancing point of a biplane which has a sweptback wing? Also in a straight wing?

Answer: By balancing point, I take it that our friend means the center of gravity. The wings of a machine have nothing to do with the center of gravity only insomuch as their weight is concerned. Center of gravity of a machine may be found by suspending the model by a thread and continuing the line of the thread down across the fuselage. Next, suspend the model from a second point so that it hangs approximately at right angles to the first position. Once more extend the thread line downward until it crosses the first line which you have drawn. Where these two lines intersect, is the center of gravity.

Possibly this young man means center of pressure of the wing rather than the center of gravity. The center of pressure of a straight wing is located approximately one-third of the chord-length back of the leading edge. If the wing is a sweptback wing, the center of pressure of each half must first be determined. This is located one-third of the chord length back of the leading edge and two-fifth of the one-half span measured out from the center of the wing, toward the tip. When this point has been determined for each half, the two points should be connected by a straight line. The center point of this straight line is the center of pressure.

In the case of a biplane the center of pressure of each wing should be calculated in the manner described here. When the two centers of pressure have been found they should be connected by a straight line. The center of pressure of the two wings is then at a point two-fifths down from the upper center of pressure along this line. This is rather a difficult problem to describe without a diagram. However, if you will study this answer carefully, I believe you will be able to work it out.

IN the case of a triplane the centers of pressure of the upper and center wings should first be found.

(*Continued on page* 37)

Official American Model Plane Records

THE National Aeronautic Association has officially recognized the following American model plane records, made up to and including June 30, 1933.

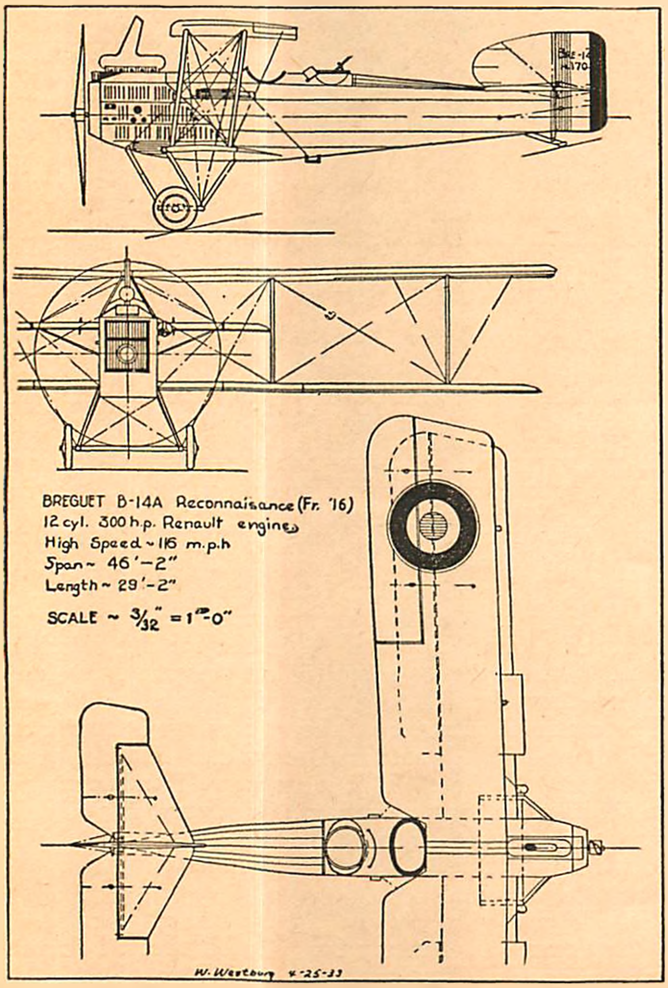
INDOOR RECORDS

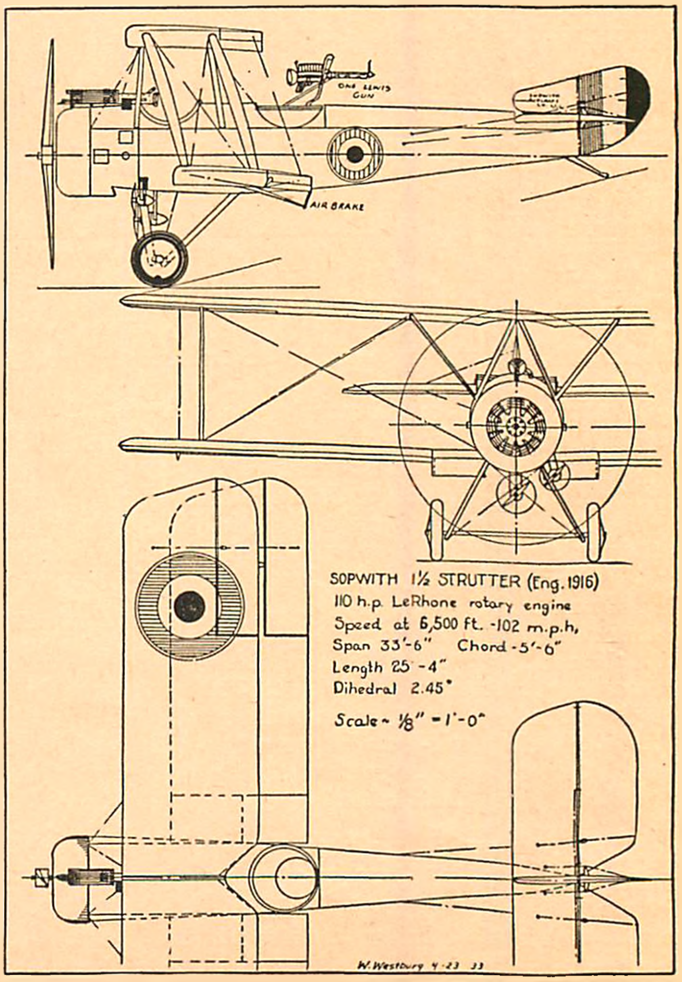
STICK MODEL AIRPLANES, hand-launched.
Class C.
Senior: Norman Schaller, Phila., 16 min. 20-1/5 sec.
Junior: Richard Vogt, Phila., 15 min. 50 sec.
Class D.
Senior: John Bartol, Roxbury, Mass., 17 min. 47-3/5 sec.
Junior: Merrell Malley, Atlantic City, 13 min. 42 sec.
STICK MODEL AIRPLANES, R. O. G.
Class A.
Senior: John Tyskewicz, Hartford, Conn., 7 min. 43 sec.
Junior: A. DuFlon, Ridgefield, N. J., 5 min. 27 sec.
GLIDERS, hand-launched.
Class B.
Senior: John Romanowski, Jersey City, 0 min. 28-2/5 sec.
STICK MODEL AUTOGIROS.
Senior: Everett Ward, Newark, N. J., 0 min. 51 sec.
FUSELAGE MODEL AIRPLANES, R. O. G.
Class C.
Senior: Albert Levy, Toronto, 8 min. 56 sec.
Junior: A. DuFlon, Ridgefield, N. J., 7 min. 25 sec.
Class D.
Senior: Alan Penn, N. Y. City, 7 min. 41-1/5 sec.
Junior: Wm. Sherwood, Tyrone, Pa., 4 min. 28-3/5 sec.

OUTDOOR RECORDS

STICK MODEL AIRPLANES, hand-launched.
Class D.
Senior: August Ruggeri, N. Y. City, 7 min. 36 sec.
Junior: A. DuFlon, Ridgefield, N. J., 7 min. 02 sec.
Class E.
Senior: David Hertzson, Rock Beach, N. Y., 7 min. 00 sec.
Junior: M. Malley, Atlantic City, 3 min. 37-2/5 sec.
GLIDERS, tow-line-launched.
Class D.
Senior: S. Faynor, Newark, N. J., 0 min. 32-3/5 sec.
Junior: S. Congdon, Glen Ridge, N. J., 0 min. 45-1/5 sec.
STICK MODEL AUTOGIROS.
Senior: R. Kummer, St. Louis, Mo., 2 min. 06 sec.
FUSELAGE MODEL AIRPLANES, R. O. G.
Class D.
Senior: V. Boehle, Indianapolis, 8 min. 43 sec.
Class E.
Senior: A. Ruggeri, N. Y. City, 2 min. 00 sec.
Class F. (gas engine) R. O. G.
Senior: Maxwell Bassett, Phila., 28 min. 18 sec.

(For class specifications see Page 33, June issue of Universal Model Airplane News.)





The Aerodynamic Design of the Model Plane

A Complete Summary of Outstanding Facts That Will Solve the Mystery of Stability For You

By CHARLES HAMPSON GRANT

ARTICLE No. 19 CHAPTER No. 3

IN PAST discussion, two phases of the problem of stability have been considered. First, it has been shown what the conditions are that influence and govern the problem, and second, it has been shown what procedure is required in order to obtain satisfactory results, or how the problem can be solved.

There is another phase however, which we must take up now to give you a clear conception of this important subject. The phase involves the explanation of the reason why the suggested procedure solves the problem adequately. It is a complete discussion of the underlying theory which prompts the methods used to obtain the desired results. This is of great importance to the serious student.

However, many students of plane design and experimentation, wish to apply the principles of design practically without study or research. Therefore, in order that they may obtain useful information about this problem quickly and easily, a complete summary of the important facts already discussed, is given here for ready reference before we proceed further into the subject of stability.

SUMMARY

1. What is stability? Stability is that quality that an airplane possesses when it successfully resists any tendency to displace or turn it from its normal flying attitude, or which causes an airplane to return to its normal flying attitude when once it has been displaced.

2. There are two general types of stability, *automatic* and *inherent*.

3. Automatic stability is stability obtained through the corrective action of some self-operating mechanism such as the automatic pilot.

4. Inherent stability is stability derived through the shape, relative position and proportion of the parts of the airplane and the relative distribution of weights.

5. There were three phases of stability, lateral, directional and longitudinal.

6. *Lateral stability* is that quality which an airplane may possess that causes it to resist any tendency to roll it sideways about the longitudinal axis or to recover its normal flight attitude after such a displacement has taken place.

7. In like manner, *directional stability* has reference to an airplane's displacement about the vertical axis.

8. *Longitudinal stability* has similar reference to an airplane's displacement about the lateral axis.

9. Factors that contribute to lateral stability are:
   (a) A *low center of gravity.*
   (b) *Sweptback wings.*
   (c) The wings set with a *dihedral angle.*

10. The center of gravity is that point at which when the airplane is suspended in any position, it will remain in that position in a state of balance.

11. In order to gain lateral stabilizing quality from a low center of gravity, it should be at least five per cent of the wing span below the center of lift.

12. A "sweep back" is an aid to lateral stability but it causes a small loss of wing efficiency and the airplane to have a tendency to spin.

13. The amount of sweep back to use on each wing varies from ten degrees to thirty degrees. The less that can be used the better. A good average in most cases is twenty degrees of sweep back on each wing.

14. The angle of sweep back is determined by the angle between a line running through the apex of the (V) formed by the wings, at equal angle to both sides of the (V), and a line drawn through the points that are back of the front edge of the wing a distance of 1/3 the wing chord lengths at the respective points. Fig. No. 42.

15. A low center of gravity used in conjunction with a sweep back will give a degree of lateral stability which will be equal to the sum of the amounts produced by the low center of gravity and the sweep back separately. It is an excellent combination.

16. One-half the normal amount of sweep back may be used when a low center of gravity is used in conjunction with it.

17. The dihedral angle is the most effective means of obtaining lateral stability.

18. The term dihedral angle is one which is used to describe a particular form of wing.

19. When a wing is formed so that its two tips are located in a higher horizontal plane than the center point of the leading edge, it is said to have a positive dihedral angle.

20. When the wing tips are lower than the center point referred to, the wing has a negative dihedral.

21. The less the amount of dihedral that can be used, the more efficient the wing will be. (The greater the L/D will be.)

22. The total amount of dihedral angle of a wing is measured by the angle formed between the leading edge of one-half wing extended and the leading edge of the other half the wing. If this angle is (10) degrees, each wing has a dihedral of (5) degrees.

23. For models in which the center of gravity is approximately on a level with the wing center section, the amount of dihedral should be about (11) degrees on each wing, or *each wing tip should be raised two inches for every foot of span.*

24. Mid-wing monoplanes, low-wing monoplanes and stick models in which the center of the wing is close to the rubber motor, all come under this classification.

25. A dihedral of (11) degrees on each set of wings, right and left, should be used for biplanes in which the center of gravity is located at a

point half-way between the upper and lower plane.

26. The rear wing of a twin pusher model should have a dihedral angle of about (5) degrees or the wing tips should be raised ½ inch for every food of span.

27. The front wing should have a dihedral angle equal to 2¼ to 2¾ times the amount of dihedral angle used on the rear wings.

28. When a curved dihedral is used, the wing tips should be raised the same amount as in the case of a wing with straight full dihedraled wings.

29. In order to determine the correct amount to elevate the tips of a wing which is partly straight and partly dihedraled, *multiply the proper value of any fully dihedraled wing by*

$$1+4\left(\frac{S-2X}{2S}\right)^2$$

in which expression (S) represents the total wing span and (X) that part of each half wing that is to have a dihedral angle.

30. Best combination for lateral stability is a combination of a dihedral angle and a low center of gravity. The center of gravity *should not be less than* 1/30 *of the span below the wing center section.*

31. In order to prevent a rocking tendency from being present, the periods of oscillation due to the dihedraled wings and the low center of gravity should be an even multiple or not a multiple of one another. The periods of oscillation are proportional to the dihedraled wings and the low center of gravity should be an even multiple or not a multiple of one another. (The periods of oscillation are proportional to the radii of the arcs of swing in either case). See fig. No. 51, article number twelve.

32. In the case of the average fuselage model where the center of gravity is about 4% of the span below the wing center section, the dihedral angle should be about (5) to (6) degrees on each wing. In other words, each wing tip should be raised (½) inch for every foot of span.

33. The lower the center of gravity, the less the dihedral may be and yet retain lateral stability.

34. Directional stability is the tendency of an airplane to resist any displacement about the vertical axis through the center of gravity, or the tendency to return to normal flight position when once it has been disturbed. (Swing of tail of the plane to right or left.)

35. The factors which influence the directional stability of an airplane are:-

(a) The area of the vertical tail surfaces (the fin and rudder)

(b) The distance of the fin from the center of gravity (the fin moment arm)

(c) The span of the wings.

(d) The distribution of weights in the horizontal plane relative to the center of gravity.

36. The controlling factor in directional stability is the fin area. (All other factors being equal.)

37. Insufficient fin area is the cause of spinning in any particular airplane.

38. The "spinning" tendency of an airplane may be corrected by increasing the vertical surfaces to the rear of the center of gravity, to the proper degree.

39. In the average model the fin area should be approximately 12% of the wing area.

40. The fin should never be less than 10% of the wing area if proper directional stability is to be assured.

41. The fin area of scale models should be about 10% of the wing area.

42. The fin area of stick models with a landing gear should be about 12% of the wing area.

43. The fin area of stick models without a landing gear should be about (14) to (15) per cent of the total wing area. (Note: No. 40, 41 and 42 refer to tractor monoplanes only.)

44. For biplanes, the fin area may be 1/5 or (20%) less than in the case of monoplanes.

45. The area of a fin (or any other irregularly shaped surface) may be calculated by dividing it up into triangles and parallelograms, the areas of which should be added together to give the total fin area after the area of each triangle and parallelogram has been determined.

46. The greater the height of the fin, the more efficient its action will be.

47. The height of the fin should never be less than 80% of its average length, from front to rear.

48. The fin moment arm is the horizontal distance from the center of gravity of the airplane to the center of area of the fin.

49. The longer the moment arm, the more effective any given area of fin will be or the smaller the fin can be.

50. The stabilizing effect is proportional to the moment arm times the area of the fin.

51. The fin moment arm should be equal to about one-half the wing span, in the average tractor model.

52. If it is desired to change the length of the moment arm of a model, the fin area must be changed also. The new fin area then equals, $A_2 = \frac{A_1 M_1}{M_2}$, where ($A_1$) equals the old fin area and (M_1) equals the old moment arm. (A_2) equals the new fin area and (M_2) the new moment arm.

53. The closer to the center of gravity that the various weights are located, that compose the structure or equipment of the airplane, the greater stability the plane will have and the less fin area will be required.

54. The nearer the propeller is to the center of gravity (main wings) the more directionally stable the plane will be.

55. The farther the propeller from the center of gravity, the larger the fin must be.

56. The correct amount of fine area that will be advisable can be calculated by solving the following formula:

$$a_F = (0.09)\ (A/M)\ (3 + S/8 + N).$$

A = the total wing area. (M) = the fin moment arm. (S) = the average wing span. (N) = the distance from the center of gravity to the propeller bearing at the nose of the fuselage.

57. *Spiral Stability* is a combination of lateral and directional stability and is that quality in an airplane which prevents the plane from executing a spiral dive.

58. Spiral Instability may be corrected by increasing the dihedral angle of the wings. This condition is also corrected in some cases by reducing the size of the fin.

59. The cure for spinning and spiral dives is a correct proportion between the fin area and dihedral angle.

60. In order to insure spiral stability:

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Aviation Advisory Board

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Then draw a straight line connecting these two upper centers of pressure. The center of pressure of these two upper wings is then one-third of the length of this line measured down along it from the top wing. Next the centers of pressure of the center and lower wings should be connected by a straight line. The combined centers of pressure of these two wings is on a line connecting them at a point three-tenths of this line measured up from the lower wing. These two calculated combined centers of pressure should then be treated as described in the case of the biplane.

Hoo also wants to know:

Question: What should the ratio of a six foot glider be?

Answer: I presume Hoo means the aspect ratio. I would use an aspect ratio of 10. That is the chord should be 1/10 of 6 feet approximately.

Question: How much area should the tail surface on a glider be in proportion with the wing area?

Answer: It should be approximately 30% of the wing area.

Question: What should its aspect ratio be?

Answer: An aspect ratio of four is satisfactory.

Air Ways Here and There

(*Continued from page* 21)

bility without losing flight efficiency is partly responsible for the long flights. In future issues of Universal Model Airplane News, plans of some of the recent record-breaking indoor ships will appear.

Mr. G. Hopkins of the Model Aeroplane Association of Australia gives us some more news regarding the Hurstville "Falcons." One of the greatest flying events in Australia is the Association's contest for the Wright Cup. This event is the premier outdoor fuselage hand-launched duration contest and determines the Australian champion for this type of plane. This contest was held in April on the Randwick Rifle Range which is situated a few miles from the city of Sydney.

"The day was ideal. Quite early in the contest, Maurice Davis of the Hurstville "Falcons" took the lead with a beautiful flight of 3 minutes, 16 seconds. He retained this position for a considerable period of time. A little before noon, Sid Wigsell of the Bondi "Black Hawks" launched his model. Almost immediately it entered a very strong up-current which bore it aloft and eventually out of sight. From the officials it was found that this flight had eclipsed the Australian record of 17 minutes, 7 1/5 seconds and the British Empire record of 18 minutes, 2 seconds. The new fuselage record for rubber powered models constructed to Wakefield Cup specifications therefore now stands at 20 minutes, 49 2/5 seconds.

"Since we last wrote you, Albert E. Hopkins of the Hurstville "Falcons" was successful in gaining the Queensland and Australian records for indoor and R.O.G. fuselage duration, when his model remained aloft for 1 minute, 47 seconds, when flown in a recent contest held in the Brisbane Town Hall.

(*Continued on page* 47)

WHY ADVERTISED MODELS ARE BEST

Of the five hundred model manufacturers doing business in this country today, the fifty advertising in UNIVERSAL AIRPLANE NEWS are the largest and oldest. These firms whose advertisements you see in this magazine have reached their present positions because their models were good, their prices fair, and their service excellent. These firms which advertise are anxious to continue growing and are following their old successful method of pleasing the customer. Order from them with confidence!

The French Long Distance

(*Continued from page 25*)

part is at the front and is occupied by the pilot and radio operator, while the compartment in the rear is for the passengers.

A trap-door in the lower part of the fuselage permits the pilot full view below the ship. The upper part of the main cabin is enclosed by glass panels. These may be pushed back by the pilot, thus allowing him to "bail out" quickly. A trap above and slightly to the rear of the radio operator's seat is for the use of a retractable generator. One berth is provided to enable a member of the crew to rest when necessary.

The fuselage ends in a stern post encased in duralumin, to which the rudder is attached.

The Tail Group

BOTH the stabilizer and vertical fin are constructed with two spars. The front spar is parallel to the leading edge and the rear spar is at the point of attachment with the elevators and rudder respectively.

The main front spar is attached to the longerons by two pins. The stabilizer rear spar is attached to a pin on the upper longeron upon a square threaded screw, regulated by a nut fastened to a wheel placed near the pilot by means of cables. A pointer fastened to this wheel, shows the pilot the exact angle of incidence of the stabilizer at any time.

The rear spar of the fin is attached directly to the stern post of the fuselage. Both the stabilizer and fin are duralumin covered.

The elevators are joined in two parts at the rear spar of the stabilizer, the covering of duralumin sheeting being reenforced by small airfoil sections on the inside.

The rudder is of the same type of construction as the elevators.

Landing Gear

The landing gear has a tread of four and one-half meters. (One meter=39.37 inches.) It is composed of two wheels mounted on ball bearings rotating upon a bent split axle. These axle trees are attached to the lower part of the fuselage. Shock absorbing qualities are provided by vertical oil-filled pneumatic shock absorber struts which are attached directly to the wing spar.

Controls

The ailerons are controlled by a wheel through a horizontal tube and a set of levers fastened together by steel rods of great strength. All have ball bearing mountings.

The rudder is directly controlled by cables from the rudder bar or pedals. The elevators are controlled by cables enclosed within the fuselage.

Stabilizer Adjustment

The rear spar of the stabilizer is fixed upon a square threaded nut which receives its movement of ascending and descending from a "worm." To this worm, a drum is attached on which a cable is rolled up. The ends of the cable are attached to the fly-wheel located near the pilot. The adjustment is limited by means of stops.

Motor Installation

The motor, a 650 h.p. Hispano Suiza 12Nb, is mounted at the front of the fuselage on a removable mount. An easily removable cowling permits perfect access to all parts. At the rear of the motor is a retractable radiator (Vincent Andre) which may be drawn up into the lower part of the fuselage.

A heater placed upon the exhaust pipes permits the regulation of the temperature of the air admitted to the carburetors and prevents frosting. The shape and sizes of all the pipings have been carefully designed.

Fuel Circulation

THE gasoline tanks, numbering sixteen, are located on both sides of the fuselage in the wing. A set of valves permits the cutting out of the separate groups of tanks but under normal conditions, the pilot need not use these.

The angle of the wing permits a regular draining to the feed tank located in the lower part of the fuselage.

All connections are of flexible metal piping. A "feeder" permits the direct supplying of the pumps. A small hand-pump allows the pilot to eliminate water which may collect in a water trap.

The dimensions of the plane are as follows:

Span	28 meters
Length	14.4 meters
Height	5 meters
Wing Area	78 square meters
Fuel Capacity	800 liters

(One meter=39.37 inches)

Flying Blind

(*Continued from page 5*)

represent the earth. Midway across the face of the instrument, there extends a bar which represents the horizon. The maneuvers of this miniature plane correspond exactly to those of the airplane in which it is installed. If, for example, the machine on the instrument appears to be diving, the pilot knows that his ship has nosed down and he pulls back the control stick; or, if the left wing of the model appears below the bar, he knows that he is flying left wing low. Any abnormal position is instantly registered and to keep in level flight, the pilot merely has to manipulate the controls so as to keep the miniature plane lined up properly with the horizontal bar on the dial.

THE Automatic Pilot, or Gyro-pilot, makes it possible for giant airliners to wing their way through fog and darkness entirely unguided by human hands. Untiring metallic arms of this ingenious device handle the rudder, elevators and ailerons even more smoothly and accurately than the most seasoned pilot and keep the ship on a given course hour after hour until the destination is reached.

Recently, a large tri-motor flew from Dayton, Ohio, to Washington, D. C. with the pilot's compartment empty. Back in the cabin of the plane throughout the flight, the airman was chatting with his passengers and enjoying the scenery below. Plans have been completed for a solo round-the-world flight with a robot at the controls doing practically all of the flying. The pilot will be free to sleep, eat, and perform other duties. Eastern Air Transport, one of the largest operators in the United States, is now equipping its huge eighteen passenger Curtiss Condors with automatic pilots.

The model, which weighs but fifty pounds, is carried in a small box beneath the pilot's seat. It consists of two gyroscopes, one mounted vertically and the other horizontally. A small propeller, mounted in the slipstream, generates the necessary power. As the gyroscopes maintain their position relative to the earth regardless of the movements of the airplane, the airplane actually turns around them. In so doing, it makes and breaks electrical circuits which operate lever arms connected to the three controls. Thus corrections are made instantly for changes of direction and altitude caused by bumpy air. The device is sensitive to deviations of one-half of one degree, which is more sensitive than human pilots.

Take-offs and landings in the present stage of development must be made by a human pilot. Once in the air, however, the Automatic Pilot is connected and takes over the controls. An adjustment is provided for trimming the ship for any condition of load. Changes of the compass course may be made as desired by manipulation of the course adjusting knob. Maneuvers such as flat or banked turns, climbs, or guides, may also be made with precision. Whenever it is desired to take over the controls, as in landing, the automatic pilot may be instantly disconnected by the movement of a single lever.

The human pilot is thus relieved of straight flying and is permitted to devote his attention to maps, weather reports, radio communications, and watching out for other airplanes.

BLIND flying in dirigibles is dangerous business, too, unless artificial eyes are carried. Like a spider swinging by a thread of web from the ceiling, an observer in a newly developed sub-cloud observation car can direct the maneuvers of an airship. The car may be lowered thousands of feet below the control cabin, while the airship continues at a safe altitude above the clouds. The equipment is now undergoing tests at Langley Field, Virginia, aboard the Army's new giant blimp TC-13.

The car is constructed of wood, streamlined to within an inch of its life, and looks for all the world like some sort of deep water fish. The tail consists of a large vertical fin which acts as an automatic rudder and prevents any tendency of the car to revolve after being lowered. The snug little cockpit is so small that the observer almost has to be fitted into it with a shoehorn.

For raising and lowering the car, a power-driven windlass is carried in the airship cabin, which is capable of raising the outfit at 200 feet per minute. This windlass may also be operated by hand in case of engine failure. The lowering of the car, of course, can likewise be accomplished without the use of the engine. Nevertheless, special automatic brakes have been installed to limit the rate of descent.

A telephone wire is enclosed in the flexible cabin, permitting the observer to keep in direct communication with the airship. Headphones are built into his helmet and a microphone is carried before his mouth. He thus maintains continuous conversation with the mother ship, giving complete directions for its maneuvering.

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High Lights of Model Types

(*Continued from page* 10)

ing to turn it over is known as the *torque*. By designing propellers to revolve in opposite directions, as on a twin-pusher model, the torques will oppose each other and cause the little ship to be extremely stable laterally.

IN passing it is well to note one big disadvantage of the design at (b). This is that it is difficult to secure the wings firmly to the single motor-stick, particularly in large models of this type. For this reason a much more practical and stronger type of ship is the "A-frame" model at (c), which allows a wide support for the wings and can be scientifically braced. The T-frame design, of course, is somewhat lighter.

The A-frame model at (c) is the most common type of rubber-driven twin-pusher and this style of machine has made some remarkable flights in duration, altitude and distance contests.

With all twin-pushers having their propellers working at an angle to the air stream instead of straight ahead into it, there is a slight loss of thrust. The actual thrust of a propeller on an A-frame pusher type is the product of the normal thrust and the cosine of the angle between the center line of the model and the longeron; or $A/B \times T$, if A is the length of the center line from apex to propeller base, and B is the longeron length from apex to propeller, with T representing the normal thrust. See (A-3), Fig 1.

On the other hand, for the same geometrical pitch, a propeller of larger diameter and slower speed is more efficient than is a smaller propeller working at higher speed. The reason for this is that more thrust results from moving a large volume of air slowly than does by moving a small volume rapidly. This is why model propellers are actually more efficient while they are revolving than are the high-speed metal screws on our real ships.

The particular purpose for which a given machine is designed, of course, sometimes introduces exceptions in this broad rule. The geometrical pitch of a propeller is the circumference ($3.1416 \times$ diameter), multiplied by the ratio of the depth to the width of the propeller at its tip; or, as expressed trigonometrically, by the tangent of the tip angle. If the propeller is carved from a block that is ½-inch by 1-inch at the ends, then the ratio at the tips of the finished propeller will be simply ½, which is multiplied by the circumference in inches to give the geometrical pitch of that particular propeller in inches. This brief discussion at this point on thrust and propellers will show the reader how much thought can be devoted to even so apparently simple a design as a hand-launched twin-pusher model.

At (d), Fig. 1, is given a form of three-wing tandem pusher. This type sometimes proves effective, although the closeness of the wings causes some inefficiency because the downwash of the air stream from each forward wing reduces the effective angle of attack of the wing immediately behind it. In this design only the smallest or front plane is set at a greater angle of incidence on the ship.

(e) IS a form of quadruple pusher, a type used occasionally for speed flying. Models of this design have made flights of over fifty miles an hour along short marked courses. However, there is inefficiency in this design, as the two inner propellers are working in the churned air of the two outer propellers. Let us note here, in passing, that whenever a design calls for a propeller to work in back of another propeller, in its slipstream, the rear screw must be either of higher pitch, larger diameter or of three or four blades—if the diameter clearance is limited—in order to have the same efficiency in the disturbed slipstream that the front propeller has in meeting new, undisturbed air.

(f) and (g) show two forms of twin-pusher that fly "big-wing" forward. These types are very pretty in the air but care must be used in building one of these kind to keep the tail light or the model will drop tail first at the end of its flight, instead of settling down gracefully. As a rule, no vertical fin or rudders are used on this style of ship.

This design at (b) is slightly modified over the original machine of this type which was first introduced about 1910 by the English expert model builder and designer of his day, Flemming Williams. Even then in the early days of model flying, this design proved to be very effective and flights of over one-fifth of a mile were often attained with a ship having a rather long motor base of fifty inches.

(G-17) shows the side elevation of a type (f) model fitted with wheels. (H) indicates a type of twin-pusher similar to one originally designed by the model expert, Mr. Joseph Lucas. This type is sometimes referred to as a "three-wing tandem", and it is unusually efficient. The small plane at the propeller base is cambered similarly to the main wing and elevator—to lift.

(i) is a twin-pusher A-frame type of model modified to a biplane machine with landing gear. A twin-pusher biplane is extremely attractive in the air and by arranging the biplane surfaces in certain relationships to each other, such as having the top wing at a greater angle of incidence than the bottom one—which is called decalage—a great degree of stability can be attained.

(j) and (k) illustrate a common form of landing gear and rear skid for attachment to hand-launched (h. l.) models to convert them into rise-off-ground (r. o. g.) models. Note how the front struts are crossed and bound to prevent side-weave of the landing gear. With such a change of an (h. l.) model to an (r. o. g.) ship it is often necessary to use lower-pitch, higher speed propellers to provide the extra initial dynamic thrust needed for a take-off.

FIG. 4, showing different seaplane models, or "hydro" types is practically self-explanatory as all the types shown have been considered above. The drawing gives an idea of the general location of the pontoons on the ships and their approximate proportions to each machine. Experimenting will determine the best pontoon setting and position of any given machine.

With tractor hydros, care must be taken not to have the propeller placed too high as a nosing-over tendency will be encountered while the model is taxiing for the take-off. The front of the pontoons must plane well above the surface of the water, and they must make sufficient upward angle with the machine to prevent "digging in" when the plane is landing at its normal gliding angle. A slightly greater fin area on seaplane tractor models is advisable to neutralize the side-to-side rocking tendency sometimes produced by the pontoons.

The hydro at (a) is the most common type—a three-pontoon twin-pusher. (b) is a pretty design in the air and takes off quickly if properly built. (b-1) is a modification to the bow-frame type and (c) shows an effective type of hydro pusher flying "big-wing first."

At (d) we have the most difficult seaplane model type to balance—the two-pontoon fuselage ship. If the pontoons are too far back the plane will not take off, and if they are placed too far ahead, the model will be tail-heavy on the water and tend to submerge its empennage—tail unit—in a breeze. However, by careful planning, a satisfactory flyer in this type can be developed and then its beautifully realistic appearance in the air is well worth the extra care required in designing and balancing.

(e) shows us a five-pontoon, biplane twin-pusher hydro. This is probably the most stable type of model for landing on the water.

(To be continued)

Jean Le Coz Unloads

(Continued from page 19)

Although not an anti-aircraft gun had popped from the brush alongside the tracks thus far and the sky was still free and clear of German planes, Le Coz redoubled his vigilance as he approached the wheeled serpent.

Previous experience in bombing trains had taught him to be on guard against hidden anti-aircraft guns, expertly camouflaged, ready to strike from the tufts of brush alongside the railroad bed. To make himself as difficult a target as possible against such a contingency, he wisely resorted to the clever but more difficult stunt of flying obliquely against the train rather than directly over it or parallel to its course.

Such tactics naturally gave his bomber but a momentary shot at either the train or the road-bed, an important and vital point of attack in itself.

As a result, the first missile was wide of its mark. A huge shower of stones and dirt scattered from the crater where the bomb had fallen but the train proceeded on unscathed. It had reached the crest of the rise now and was gathering momentum as the heavily'laden cars started on the down'ward slope.

LE COZ had brought the heavy Voisin around again and darted in to launch another shot. Both he and Perriet were surprised that as yet no German ships had come up in defense of the harrassed train.

The reason for this lack of supporting talent became self-evident within a few moments. When the Voisin was once more within hail of the rolling cars, the apparently idle flats suddenly became centers of activity.

Coverings and flimsy boxes, mere camouflage, were thrust aside in a twinkling and ugly, sharply tilted guns rose menacingly from their midst. They burst into instant action; sharp, shrapnel scatterings tearing viciously into the ambushed Voisin.

Angered by this sudden and unexpected Boche reprisal, Le Coz threw caution to the winds and altered his course to bring his ship directly over the tracks. The left wing of the craft got an ugly tear from a bursting shell as a result of this blunt bit of bravery but the price was worth the cost as Perriet made the most of his fleeting opportunity.

In the very instant that the plane swooped over the racing line of cars the masterful bomber let a small one go to check his aim With flight as true as an arrow the missile sped earthward directly onto the careening cars that were now setting a mad pace down the grade.

The bomb landed neatly, about our cars back from the locomotive. By a strange freak of circumstance, the blast occurred just in front of one of the car couplings which was totally shattered by the impact.

Thus, suddenly released from its impeding heavy load, the engine with her throttle wide open, instantly leaped ahead and was soon outdistancing the rest of the train now running free some yards behind it.

Le Coz was quick to perceive the possibilities of this situation and when another screaming shrapnel from the guns below added further damage to his beloved ship, a vindictive urge to score his coup directly, overwhelmed him.

Speeding up his motors, Le Coz sent the Voisin with her torn wing coverings flapping madly, racing down the tracks a few hundred yards, meanwhile signalling to Perriet to let "Big Boy" go. "Big Boy" was the massive 300 pound bomb crammed full with deadly explosives.

Despite her badly crippled wings, the ponderous bomber obeyed the controls in fine style as Le Coz shot her directly along over the line of tracks. Perriet awaited the most favorable moment and then snapped the release triggers.

The unwieldy bomb let go, its 300 pounds of dead weight drawing her toward the tracks in an instant. A tremendous roar, shortly followed by a violent concussion of air that bobbed the buxom bomber in mid-air despite the distance she had covered in the short interval, recorded the hit.

Glancing backward, both Le Coz and Perriet were gratified to see a huge hole marking an ugly yawning gap in the road-bed. They circled immediately to watch the result of their efforts and had not long to wait.

THE engineer, unable to stop his speeding steel giant in so short a space, slammed his brakes on to no avail. The locomotive plunged into the gap and burst her boiler from the harsh impact. The fire she scattered immediately caught the wooden cars that plunged in after her and the crater was soon a man made mass of flames.

Rushing toward this horrible inferno was the rest of the train, the forward progress of which remained unchecked despite the desperate efforts of the frenzied crew to set the hand brakes.

The cars plunged off the road bed into

(Continued on page 44)

Flying Blind

(*Continued from page* 39)

The car will be of particular assistance in making landings. A fog landing in a dirigible, or in fact even a landing under normal visibility, is the most crucial time in its whole operation. At a high altitude, a ship may ride through storms that buffet it about like a scrap of paper, but when it is approaching a landing even a light gust of wind is apt to wrought havoc. It can be readily seen that when a ship six or seven hundred feet long is maneuvering at only one hundred feet or so of altitude, a slight deflection of the keel will cause the stem or stern to be bumped against the ground.

The ship must be kept headed into the wind and clear of all obstructions that might cause eddies or tricky currents of air. An experienced observer in the sub-cloud car can be relied upon to guide the dirigible in, much as a tug bringing in an ocean liner.

These blind flying devices are the answer of science to the challenge of bad weather, which is the last real barrier to aviation. Although transport planes at present are grounded by poor visibility and low ceiling, the day is not far distant when dense fog will be no more of a hindrance to aircraft than it is to surface vehicles.

The Model Plane Goes Aquatic

(*Continued from page* 18)

not necessary to do this to the pants where the axles pass through, as the pants remain in one position and no wearing results. It may seem difficult to slip the pants and the wheels on the axles at the same time, but after one or two trials it is a matter of several seconds.

The wing section used in this model is Clark-Y. This is a splendid section for the qualities desired in this type model. The chord is 4½ inches and the ribs are cut from 1/16 flat balsa. The leading edge is ⅛ x ⅛, the same as the spars. The trailing edge is ¼ x ⅛ cut to triangular shape. The wing is made in two parts and then joined, allowing enough distance between the halves to fit the fuselage snugly. Each tip is raised 1¼ inches. At each corner of the center section, glue a small hook to which the rubber is attached to hold the wing in position.

THE rudder is practically half the elevator and both are constructed over the same outline. The rib patterns are shown and the ribs are cut from 1/32 flat balsa. The outline is bent from 1/16 square balsa. This is because of the twisting which occurs when the paper continues to stretch after being soaked and dried many times. The braces for the rudder are similar to the elevator, as shown in the drawing. The ribs of the rudder are spaced at different intervals as indicated by the dotted lines. The rudder frame is glued in position before covering. Be sure the joint is solid. This does not apply to the elevator.

The propeller is carved from a block of medium soft balsa 1⅛ x 1¼ x 12. The shape of the blank is shown. The blades are cut to medium thickness to the shape of a wing section. Reenforce the hole for the shaft with washers. When putting the propeller on the shaft, bend a "U" in the end of the shaft and pull back into the propeller. Where this pierces the propeller cement a washer.

Correct design of the floats is essential to the performance of an r. o. w. model. Since paper-covered floats are difficult to keep water-tight, it is advisable to make the floats of sheet balsa. 1/64 inch sheet balsa is used in this case although 1/32 inch may be substituted. Start this task by cutting the bulkheads. Be sure to make both floats at the same time. The instructions are written for one but apply equally to the other. Do not work on one float without completing a similar task on the other.

Cut the top of the float which is 1 x 15, as shown in the drawing. Mark the positions for the bulkheads and cement in position. Be sure the bulkheads are perpendicular to the top. A bit of advice: float-making is not difficult but requires a bit of patience and a fast-drying cement. Inside of the top, glue ⅛ inch square balsa, the length of the float. It is necessary to do this in sections.

On bulkhead "X", the depth of the step is indicated. At this position glue ⅛ square balsa. The bottom of the float is put on in 4 pieces. It is best to put the 2 forward sections in position first. Do not cut to shape until glued to the bulkheads. Using a piece of 1/64 flat balsa, glue to bulkhead "X". Have the straight edge in the center. Cement to each bulkhead, holding in position until the glue is dry enough to retain its shape. Then bend to join the top section at the front. Repeat this process on the other forward half.

THE two rear sections are constructed in the same manner, first cementing to the ⅛ square balsa which you have cemented to bulkhead "X". At the rear, the bottom and top pieces are joined by a piece of balsa ¼ x ⅛ cut to a triangular shape. The bottom of the float is reenforced with ⅛ square balsa, the length of the float at the center. The sides are next glued in position. This operation requires no explanation other than that each side should be glued to the bulkheads, the upper and lower pieces and then trimmed and sanded. Using a fine grade of sandpaper, remove all rough spots and surplus glue.

The method of attaching the floats to the fuselage is very simple. The floats are joined by two bamboo pieces ⅛ x 1/32. The centers are 8 inches apart. These pieces are cemented to the top of the float at bulkheads Nos. 1 and 2. Fittings large enough for the axles are glued to the floats near the front bamboo brace at bulkhead No. 2. Bend a bamboo "U" from a piece ⅛ x 1/32. The dimensions are: top, 1⅞; opening, 8; each leg, 5. This is glued to the float at bulkhead No. 1 with the ends of the U secured to the bamboo brace.

Since weight is not so important, it is well to use a strong grade of tissue. The covering is done the same as that of most other models, using banana oil as the adhesive. The floats are covered with tissue to aid in preserving the wood. . The cellophane is glued to the fuselage. It is well to cover the surfaces with banana oil or a heavy dope. If you wish, colored paper can be used, thus eliminating the use of colored dopes.

An attractive color scheme is as follows: dark blue fuselage, center section, tops and bottoms of floats; brown empennage and sides of floats. It is necessary to use coloring on the dummy motor. The cylinders and the rocker arms are black. The cowling and the center nose block and the propeller are silver.

Glue the elevator in position. Be sure to place a 1/8 inch balsa block beneath the elevator at the mid-point. This gives the elevator a slight negative angle. Put the wing in the position indicated, using rubber bands to hold in place. Use from 8 to 10 strands of 1/8 inch flat rubber depending on the weight of the complete model. It is better to try the model first as a landplane. If it is tail-heavy try less negative incidence of the elevator. If this does not remedy the difficulty, shorten the motor stick. It is advisable not to move the wing to secure balance because the model is most attractive when the wing is in the position shown on the drawing.

IT is possible that the model will be nose-heavy since the dummy motor and the wheel pants are used. In this case use positive incidence on the main wing and more negative incidence on the elevator. When convinced of the flying qualities as a landplane, try it R. O. W. To attach floats put the axles through the fittings on the front part of the floats. Since these fittings are closer than the ends of the axles it will be necessary to bend the landing gear. This will not harm the landing gear and will keep the floats in position. Attach the U-support by rubber bands to the hooks on the fuselage.

Since the weight with the floats attached is distributed slightly differently, it is well to glide in a grassy field and then make necessary adjustments. Be sure the model, as a seaplane, circles to the right as the torque causes more drag on the left float. It is very important that the rear tips of the floats rest in the water. This makes the take-off easier. Allow the model to take off directly into the wind. If the model does not seem to gather enough speed to take off, then more rubber might be needed. Before adding rubber, however, make sure the part of the float to the rear of the step does not rise above the water when the model starts to move. If this happens, the resistance of the water is so great that a take-off is unlikely. To remedy this, add weight to the tail. It is a remote possibility that a model of this design will perform like that, but it was a source of annoyance in earlier experimental models.

Do not hesitate to add rubber if the occasion warrants. For example, while flying a model of this design at dusk, the performance was cut down by the moisture in the air and by the drops of water which had accumulated on the model. However, by adding 6 strands more rubber than normal, the flight was as high, the take-off swifter and the glide flat, although the duration was not as long.

In still air the take-off has been accomplished in as short a distance as 15 feet. A light weight model of this type ready to R. O. W. weighs about 22 ounces. The floats alone weigh .5 ounces. The dummy motor adds some weight, but it improves the appearance and the balance of the model.

Who's Who At The 1933 National Championships

(*Continued from page 23*)

trants, John Bartol, Roxbury, and Wilbur Tyler, Everett, to finish first and second, respectively, in the Stout Indoor Contest, with flights of 17 minutes, 47 3/5 seconds and 16 minutes, 32 2/5 seconds. Tyler used ingenious wing tip stabilizers, small auxiliary horizontal surfaces fastened by a short boom to the rear edge of the main wing, near the tips, to keep the wing tips from washing out.

Albert Levy, Toronto, won the Bloomingdale Indoor Fuselage Contest with a flight of 8 minutes, 56 seconds. He used microfilm covering on his wing and a paper covered fuselage of rectangular cross-section. Levy hopes to attend next year's meet to defend his championship.

Indoor flying was finished at 5:45 p.m. and everyone went to the banquet as guests of U. M. A. M. There were short speeches by Rear Admiral Frederic R. Harris, U. S. Navy, Reginald M. Cleveland, Aviation Editor of the New York Times, Harry Bruno, who is Lieutenant Commander Frank Hawks' representative, Mr. D. M. Freudenthal of Bloomingdale's Department Store, New York, and Charles H. Grant, Editor of Universal Model Airplane News.

A note of honor was injected into the banquet when the New England delegation distributed a cleverly edited pamphlet burlesquing several of the participants in this and other air meets. It seems that the future editor situation is as secure as the future of America in the Air.

Mrs. William A. Moffett, widow of Rear Admiral Moffett, made the presentation of the Rear Admiral A. Moffett Memorial Trophy, offered by the Balsa Wood Co., Brooklyn. Harry Bruno presented the Texaco Trophy, offered by the Texas Company. Mr. D. M. Freudenthal presented the Bloomingdale Cup on behalf of Bloomingdale's. With each of the first place awards, went a miniature for the recipient's permanent possession. The Curtiss-Wright Trophy was awarded as a complement to the Stout Outdoor Trophy. One of three Duco trophies accompanied the Universal Model Airplane News Trophy for the winner of the Exhibition Scale Model Contest. One of the two Whitfield Paper Works trophies went to the winner of the Mulvihill Trophy. One of the two Japan Paper Company trophies went with the Stout Indoor Trophy. Zip Tool Air-travellers' Tool kits, offered by the Model Builders Guild, were presented to Bartol, Boehle and Levy, as also were Scientific American yearly subscriptions.

The first six places in each event received cups and trophies. The seventh to twelfth places received medals. Besides the seven annual N. A. A. Trophies, awards were offered by L. Bamberger & Co., Comet Model Airplane Co., Construct-A-Plane Co., Curtiss-Wright Corporation, Finishes Division of E. I. duPont de Nemours and Co., Ideal Aeroplane and Supply Co., Ed-

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Who's Who At The 1933 National Championships

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win T. Hamilton, author of Complete Model Airplane Manual, Japan Paper Co., Model Builders Guild, Scientific Model Airplane Co., Universal Model Airplane News, Whitfield Paper Works, Woburn Model Airplane Shop, and others.

Besides those named, the following are among many who participated in making the meet a success: Empire State Incorporated, Hotel Pennsylvania, Bertram Pond of Peru Model Airplane Shop, Roxy Theatres, Incorporated, and Mr. Horace Stoneham of the New York Giants. Enough of praise cannot be said for all the contestants, judges and others, who, by their spirit of cooperation and helpfulness, made possible the 1933 National Championship Model Airplane Meet.

Results of 1933 National Championship Model Airplane Meet

Entrants—165

MULVIHILL CONTEST

for Outdoor Stick Models, Hand-launched

1. Maxwell B. Bassett, 18, 11th St. & 66th Ave., Philadelphia, Pa. 14 minutes, 55 seconds. (Gasoline powered model.)
2. August Ruggeri, 77 East 4th St., New York City (age 17). 7 minutes, 36 seconds. (New world's record for rubber power.)
3. Alton H DuFlon, Jr., 15, 561 Prospect Ave., Ridgefield, N. J. 7 minutes, .02 seconds. (Junior champion.)
4. David Hertzson, 19, 87-10 Rockaway Blvd., Rock Beach, N. Y. 7 minutes, 00 seconds.
5. Vernon Boehle, R.R. 1, Box 188, Indianapolis, Indiana (age 18). 6 minutes, 41.5 seconds.
6. Garland Eichmeyer, 16, 1314 Woodbine Place, Ft. Wayne, Indiana. 6 minutes, 27 seconds.
7. Michael Roll, 19, 1036 Brady, Dearborn, Michigan. 4 minutes, 55 seconds.
8. Carl Goldberg, 20, Anderson Road, Purchase, N. Y. 4 minutes, 45 seconds.
9. Herbert W. Owen, 17, 50 Mason Drive, New Britain, Conn. 3 minutes, 51 3/5 seconds.
10. Joseph Vaccaro, 16, 216 Spring Street, Rome, N. Y. 3 minutes, 51 1/5 seconds.
11. Merrel Malley, 14, 26 States Ave., Atlantic City, N. J. 3 minutes, 37 /5 seconds.
12. Albert W. Courtial, 16, 5226 Murdoch, St. Louis, Missouri. 3 minutes, 35 seconds.

STOUT OUTDOOR CONTEST

for Fuselage Rise Off Ground Models

1. Maxwell B. Bassett, 18, 11th St. & 66th Ave., Philadelphia, Pa. 22 minutes, 22½ seconds. (Gasoline powered model.)
2. Vernon Boehle, 18, R.R. 1, Box 188, Indianapolis, Indiana. 8 minutes, 43 seconds. (New world's record for rubber power.)
3. Wilbur F. Tyler, 16, 77 Foster St., Everett, Mass. 5 minutes, 22 seconds.
4. Joseph Kovel, 18, 404 Bristol St., Brooklyn, N. Y. 2 minutes, 30 seconds.
5. John Ginnetti, 17, 3106 Pacific Ave., Atlantic City, N. J. 2 minutes, 12 3/5 seconds.
6. Albert W. Courtial, 16, 5226 Murdoch, St. Louis, Missouri. 2 minutes, .05 seconds.
7. August Ruggeri, 77 East 4th Street, New York City (age 17). 2 minutes, 00 seconds.
8. Bruno Marki, 17, 83 Central Ave., Medford, Mass. 1 minute, 56 2/5 seconds.
9. John Lemick, 17, 134 Lake Shore

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Jean Le Coz Unloads

(Continued from page 41)

the burning mass as they reached the gap in the tracks. Piling one on top of another, they were all in flames in a moment.

Another instant and the terrific heat had begun its deadly work on the cargo of explosives which the train was carrying to the front. Soon the scene was practically obliterated from the view of the airmen above it as tons of powder and shot blew up, mingling a dense black smoke with the dirt and dust they threw over the surrounding landscape.

Evidently feeling secure with the anti-aircraft guns they had hidden on the train, the Germans had failed to follow this cargo with protecting ships. Le Coz and his companion had thus been able to complete their work unmolested.

Now, however, they deemed it time to depart. Their little afternoon's escapade was one of the neatest and most annihilating pieces of strategic destruction ever accomplished by a single bombing plane and they brought their ripped and battered aerial giant back to the airport with a wholesome and well merited feeling of pride and satisfaction.

As the weeks wore on and the Germans pounded the Allied lines with wave upon wave of field gray men, preceded by long and vicious barrages, the stories of the terrifying gas persisted.

At last Intelligence Service came through with definite information about the source of the deadly new vapor.

Kleinhoff was the place where it was manufactured and its location was looked upon as almost impregnable. The place was completely hemmed in by high, jagged peaks that sucked the air about them in treacherous swirls which boded evil consequences for those uninitiated in its intricate approach by air.

The latter was obtained by following the serpentine line of tracks that wound up from the valley through the narrow mountain pass. These tracks were literally lined with dozens of anti-aircraft guns that could set up a blanket of fire, flight through which was practically suicidal.

By flying high enough to escape the blasting effects of the guns below invading aviators in turn, were forced to such altitudes of such proportions that direct hits by bombs could be scored only by the merest chance.

THESE obstacles were all so disheartening that after several gallant but unsuccessful attempts in which valuable machines and pilots were lost, headquarters withdrew its orders to destroy the town at all costs. Volunteers were accepted but the call was not pressed.

Le Coz and his bomber had reconnoitered the place well from safe altitudes at various times and when he believed he had a plan worked out, he asked for permission to attack the settlement.

In their scouting Le Coz and Perriet had been able to confirm many rumors concerning Kleinhoff and also to add a bit of information of their own.

The place was certainly well guarded by ground armaments. The Frenchmen had remained sufficiently high to laugh these efforts off but they fully appreciated the significance of what might befall them at lower altitudes.

There were German ships, too, to be reckoned with but in between skirmishes with the latter, Le Coz and Perriet found sufficient time to plot the course of the pass well enough for their own purposes.

One more element of knowledge they garnered also and this last bit of wisdom was an all-important phase in their carefully laid plans.

The railroad bed from Kleinhoff rose in a long grade for about a mile or more of straightaway track with innumerable spurs and switches that led off to the various sidings and loading platforms.

As a natural military precaution for such a strategic post as Kleinhoff, despite its apparent invulnerability, trains leading to and fro ran without lights at night.

It was during the hours of darkness that Le Coz had planned his attack for then the anti-aircraft guns would be at a disadvantage. On the other hand, he had to have some kind of guiding marks to lead him to his destination.

The long straightaway, with its many switch points, offered him the sole hope of consummating his clever *coup*. These switches were naturally lighted at night and their tiny glowing specks of red, green and yellow, Le Coz determined, were to be the beacons of beckoning for his audacious accomplishment.

Once all the plans were worked out in detail, Le Coz and Perriet sat on the proverbial pins and needles awaiting a favorable night—one without benefit of moonlight, yet clear and crisp so that visibility for them would be at its best.

When their seemingly endless vigilance was eventually rewarded with such an evening, the two intrepid Frenchmen donned the flying garb in an atmosphere of excitement and expectancy that made trembling fingers fumble with buttons that ordinarily fastened in a flash. The flames of adventure were singeing the souls of men bent upon a mighty mission.

LOADED to capacity, the flying behemoth was wheeled from her hangar and trundled to the runway. Fond *adieus* waved the ship away as she responded readily to the gun and Le Coz soon had the Voisin headed for his objective. The plan of operations had been minutely worked out and the determined pilot never deviated from it.

Directly toward Kleinhoff he flew, the roar of the motors acting as applause for his efforts while the throb of vibrations that passed through the ship acted as pats of encouragement to the hopes of the men who sat rigid within her.

Le Coz was a master at flying by instruments and his uncanny ability stood him in good stead this night. Landmarks below, almost indistinguishable in the night, were sighted from time to time, and checked thereby. Long association with the familiar terrain made this feat possible.

Within ten miles or so of Kleinhoff Le Coz nosed the bomber up a bit to gain additional altitude. Another few miles and there, off to the east a few points, the deeper shadows of a long valley marked the nestling place of Kleinhoff. Not a light burned in the town, a light at least that the fliers could see.

But they had not worked so diligently at their task for naught. Leading off to the south were the tracks, their somber pathway faintly traced by tiny torches of multi-colored flickerings. From high up in the sky, the little line of lights looked to Le Coz like beams beckoning him on to the portals of fame.

The roar of his powerful motor faded to a hum as he cut the switch and dove silently for his objective. As yet no searchlights had broken out. Apparently his approach was unsuspected as he had so carefully planned to make it.

Down, down, down dove the volplaning Voisin. The long storage sheds by the tracks were the first buildings to take shape in the darkness. Thus they were the first to feel the fierce fire of the Frenchmen.

Down went a bomb upon the first shed, falling just alongside and tearing the walls to bits. On the next shed, a direct hit was scored and it blew up with a detonation that rocked the village from its beds to the streets.

So at least, it seemed to the jubilant fliers who were making the situation. At the bursting of the first bomb, Le Coz had turned the ignition on again and his motor was revolving at full blast.

Sirens set up their idle screech of danger as searchlights burst into blaze from a dozen different poists, their long white fingers seemingly scratching the sky in vain pursuit of the shrouded invader.

Guns began to pop at random here and there but Le Coz, taking full advantage of the confusion in the inkiness below, flew on to other potent points of attack. He circ'ed the main manufacturing plant which, from their low altitude, fell easy prey to Perriet's unerring eye. It caught fire the moment the shot hit.

BY this time the entire village was bathed in a wierd light as the searing red flames licked their hungry way up the wooden structures. As the conflagration gained headway and the fires mounted to the roof tops, the light became more brilliant. Soon the scene was encompassed by an intense white glow that reflected into the sky.

Obviously the entire town was doomed. Le Coz and Perriet had done their self-appointed task with a degree of completeness that was as gratifying to the fliers as it was disheartening to the poor Germans rushing about in aimless confusion below.

The flame-tinted sky had now become an unhealthy place for the visiting airmen to remain in. Having already delivered them-

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The Aerodynamic Design of the Model Plane

(*Continued from page* 36)

(a) Make fin with an area of not less thas (10) per cent of the wing area.

(b) Make the wings with a dihedral of not less than (5) degrees on each wing.

(c) Place the fin area well above the longitudinal axis of the fuselage.

(d) Be sure the design of your airplane is such that the center of *lateral projected area* of the airplane is approximately coincident with the center of gravity.

61. If the center of lateral area is too far above the center of gravity, the plane will bank excessively and spiral dive.

62. *Longitudinal Stability* is that quality that an airplane possesses which causes it to resist or recover from any displacement about the lateral axis of the airplane.

63. The factors which govern the longitudinal stability of an airplane are:

(a) Those that tend to displace it from its normal flight attitude.

(b) Those that resist a displacement or cause the plane to recover from a displacement.

64. Factors which may have a disturbing influence upon a plane's longitudinal stability are:

(a) The position of the center of gravity relative to the center of lift. (position of the resultant lift on a wing or wings.)

(b) The type of wing section.

(c) The size of the wing chord.

(d) The difference in angle between the wing and the stabilizer.

(e) The speed of the airplane.

(f) The length of the stabilizer moment arm.

(g) The position of the line of thrust or propeller pull relative to the center of resistance of the airplane as it passes through the air.

65. The factors which may influence the resistance of the model to displacement from its normal flight attitude and which may act to right the ship when once it has been displaced, are as follows:

(a) The position of the center of gravity relative to the center of lift, considered in a vertical plane.

(b) The area of the horizontal tail surfaces.

(c) The distance of the stabilizer from the center of gravity.

(d) The angle of the stabilizer to the line of thrust.

The summary of these important facts relating to stability will be continued in the next issue of Universal Model Airplane News.

Happy landings.

—NOTICE—

Please write and tell us what you would prefer to see published in Universal Model Airplane News.

—The Editor

Jean Le Coz Unloads

(*Continued from page* 45)

selves of their most potent greetings, Le Coz and Perriet had nothing left to offer in parting but an ungentlemanly posture of the fingers to the face as they turned away from the steaming cauldron of fear-crazed humanity below. This they delivered with consummate grace as they rose in sweeping spirals and headed for home.

At first their companions could hardly credit the story of Kleinhoff's annihilation when Le Coz and Perriet returned but it was quickly confirmed next day by other aviators who flew over the scene. The devastation was even more complete than the Frenchmen had hoped for and what the day previous had been a center of humming activity, was now but utter desolation.

The shining medals that these two heroes had pinned to their breasts shortly after this brilliant accomplishment, glistened brightly, but no more so than the happy gleam of satisfaction within the hearts of the men when they pondered on the service they had rendered their more helpless fellow fighters in the trenches.

Who's Who At The 1933 National Championships

(*Continued from page* 44)

Road, Toronto, Ontario. 1 minute, 45 seconds.

10. Gordon S. Light, 17, 1404 Oak St., Lebanon, Penna. 1 minute, 44 seconds.

11. Welcome Bender, Jr., 17, 699 Newark Ave., Elizabeth, N. J. 1 minute, 22 seconds.

12. Virgilio Sturiale, 17, 1677-85 Street, Brooklyn, N. Y. 1 minute, 20 seconds.

ADMIRAL MOFFETT INTERNATIONAL CONTEST

for Outdoor Fuselage Rise-Off-Ground Models, no weight requirements

1. Maxwell B. Bassett (U. S. A.) 11th St. & 66th Ave., Philadelphia, Penna. 28 minutes, 18 seconds. (Gasoline powered model.) Age 18. (World's record.)

2. Vernon Boehle, 18, (U. S. A.), R. R. 1, Box 188, Indianapolis, Indiana. 3 minutes, 21 4/5 seconds.

3. Albert W. Courtial, 16, (U. S. A.), 5226 Murdoch, St. Louis, Missouri. 2 minutes, .01 second.

4. John Young, 17, (Scotland), 241 East 49th St., New York, N. Y. 1 minute, 50 4/5 seconds.

5. Jesse C. Jessen, 17, (U. S. A.), 2853 N. Marshall St., Philadelphia, Pa. 1 minute, 36 seconds.

6. William F. Campbell, 18, (Canada), 23 Algonquin Ave., Toronto, Ont. 1 minute, 29½ seconds.

7. Robert Huddleston, 16, (U. S. A.), 1310 N. Gale St., Indianapolis, Ind. 1 minute, 26 seconds.

8. Gordon S. Light, 17, (U. S. A.), 1404 Oak St., Lebanon, Pennsylvania. 1 minute, 25 seconds.

9. Joe Purvis, 15, (Canada), 18 Gamble Ave., Toronto, Ontario. 1 minute, 20 seconds.

10. Harry Burrows, 17, (Canada), 398 Sherbourne St., Toronto, Ont. 1 minute, .09 seconds.

11. John Lemick, 17, (Canada), 134 Lake Shore Rd., Toronto, Ontario. 1 minute, 00 seconds.

12. Ben Tarnofsky, 19, (Canada), 3738 Laval Ave., Montreal, Quebec. No flight (qualified for final but did not fly).

BLOOMINGDALE CONTEST

for Indoor Fuselage R. O. G. Models

1. Albert Levy, 19, 1036 Bloor St., W. Toronto, Canada. 8 minutes, 56 seconds. (World's record.)

2. John P. Tyskewicz, 20, 32 South Governor St., Hartford, Connecticut. 8 minutes, 08 2/5 seconds.

3. Allan B. Penn, 17, 14 East 174th Street, New York, N. Y. 7 minutes, 41 1/5 seconds.

4.4 Bruno Marki, 83 Central Avenue, Medford, Mass. (age 17). 7 minutes, 34 2/5 seconds.

5. Lawrence Smithline, 16, 301 West 109 Street, New York, N. Y. 7 minutes, 34 seconds.

6. Alton H. DuFlon, Jr., 15, 561 Prospect Ave., Ridgefield, N. J. 7 minutes, 25 seconds. (Junior champion.)

7. Herbert W. Owen, 17, 50 Mason Drive, New Britain, Connecticut. 7 minutes, 23½ seconds.

8. Harold Mitchell, 17, 9 Baldwin Terrace, Everett, Massachusetts. 6 minutes, 43½ seconds.

9. Jesse C. Jessen, 17, 2853 N. Marshall St., Philadelphia, Pa. 6 minutes, 34 3/5 seconds.

10. Adolph Duda, 18, R.F.D. No. 3, Rome, N. Y. 6 minutes, 22 4/5 seconds.

11. John Ginnetti, 17, 3106 Pacific Ave., Atlantic City, N. J. 6 minutes, 20 4/5 seconds.

12. William F. Campbell, 18, 23 Algonquin Ave., Toronto, Ontario. 6 minutes, 11 3/5 seconds.

STOUT INDOOR CONTEST

for Stick Models Hand-launched

1. John A. Bartol, 17, 7 Codman Hill St., Roxbury, Massachusetts. 17 minutes, 47 3/5 seconds. (World's record.)

2. Wilbur F. Tyler, 16, 77 Foster St., Everett, Massachusetts. 16 minutes, 32 2/5 seconds.

3. Norman Schaller, 19, 324 E. Allen's Lane, Philadelphia, Penna. 16 minutes, 20 1/5 seconds.

4. Carl Goldberg, 20, Anderson Road, Purchase, N. Y. 16 minutes, 19 seconds.

5. Richard Vogt, 15, 7039 Lincoln Drive, Philadelphia, Pa. 15 minutes, 50 seconds. (Junior champion.)

6. Jimmy Throckmorton, 18, 122 N. Congress Ave., Atlantic City, N. J. 14 minutes, 52 seconds.

7. Lawrence Smithline, 16, 301 West 109 St., New York, N. Y. 14 minutes, 46 3/5 seconds.

8. Herbert W. Owen, 17, 50 Mason Drive, New Britain, Connecticut. 14 minutes, 10 seconds.

9. Jack Greenwell, 16, 94 O'Hara Ave., Toronto, Ontario. 13 minutes, 49½ seconds.

10. William F. Campbell, 18, 23 Algonquin Ave., Toronto, Ontario. 13 minutes, 47½ seconds.

11. Merrel Malley, 14, 26 States Ave., Atlantic City, N. J. 13 minutes, 42 seconds.

12. Robert Wilde, 3821 N. Darien., Philadelphia, Penna. 13 minutes, 37 1/5 seconds.

13. John Ginnetti, 3106 Pacific Ave., Atlantic City, N. J., (age 17). 13 minutes, 31 3/5 seconds.

14. Michael Lichstein, 20, 3099 Kensington Ave., Philadelphia, Pa. 13 minutes, 28 2/5 seconds.

15. Harold Mitchell, 17, 9 Baldwin Terrace, Everett, Mass. 13 minutes, 23 2/5 seconds.

EXHIBITION SCALE MODEL CONTEST — Score

1. Joseph E. Geigan, (Curtiss Falcon), 22 T Street NW, Washington, D. C. .... (98)
2. Harold Diget, (Monocoupe), 45 Groveland St., Battle Creek, Mich. .... (96)
3. Arthur W. Kronfelt, (Bellanca Skyrocket), 215 Mountain Ave., Arlington, Massachusetts .... (95)
4. Harmon W. Thomas, (Gee Bee), 37 Water St., Bradford, Pa. .... (91)
5. Leo Weiss, (Boeing Navy Pursuit), 201 W. 16th St., New York, N. Y. .... (90)
6. Earl Brinning, (Stinson R), 2508 Fairview, Detroit, Michigan .... (89)
7. Melvin Johansen, (Curtiss Fledgeling), Lewellyn Rd., San Loranzo, California .... (88)
8. Philip Zecchitella, (Stinson Jr. Monoplane), 397 15th Avenue, Newark, N. J. .... (87)
9. George Egner, (Waco RNF), 113 West 106 St., New York, N. Y. (85)
10. George B. Rak., (Boeing P. 12. B), Box 198, Vandergrift, Penna.
11. Joseph A. Strilowich, (Lockheed) 20 Holland Ave., White Plains, N. Y.
12. Donald Erbeck, (Boeing P. 12. B), 110 Edwin St., Ridgefield Park, N. J.

Air Ways—Here and There

(Continued from page 37)

Connecticut Model Airplane Meet

THE Connecticut Model Airplane Meet was held at the State Armory in Hartford, Conn., on May 27th, 1933. One of the outstanding performances was put up by John Tyskewicz of Hartford, when he broke the former Baby R.O.G. record by flying a microfilm model for 7 minutes, 43 seconds. The results of the meet are as follows:

Duration Contest

1. John Tyskewicz, Hartford, Conn. —11 min., 38 sec.
2. Alton Du Flon, Ridgefield, N. J.—9 min., 47 sec.
3. Herbert Owen, New Britain, Conn. —9 min., 37 sec.

Baby R.O.G.

1. John Tyskewicz, Hartford, Conn. —7 min., 43 sec.
2. Herbert Owen, New Britain, Conn. —6 min., 41 sec.
3. Alton Du Flon, Ridgefield, N. J.—5 min., 27 sec.

Flying Scale

1. John Tyskewicz, Hartford, Conn.
2. Julius Sobansky, Hartford, Conn.
3. Philip Zecchitella, Newark, N. J.

Solid Scale Models

1. Philip Zecchitella, Newark, N. J.
2. I. M. Bailey, New Haven, Conn.
3. Herbert Owen, New Britain, Conn.

Hartford Model Aero Club Trophy

High Point Winner, John Tyskewicz, Hartford, Conn. Total 15 points.

Club Scores

Hartford	25
New Britain	12
Newark, N. J.	8
Ridgefield, N. J.	7
New Haven	4
Windsor	1

John Tyskewicz's record has been recognized by the National Aeronautic Association. His time beats by 40 seconds that of Herbert Owen of 50 Mason Drive, New Britain, Conn., which was established last year in New York City.

Bamberger Aero Club

Our old friend, the Bamberger Aero Club, sends us some interesting news this month. The club recently held a glider meet in which Stanley Congdon, 15, of 200 Linden Avenue, Glen Ridge, won the Jack O'Meara glider trophy with a flight of 45 seconds. This is the first annual Bamberger Aero Club glider meet, which was held at Newark Airport. He towed his six foot soaring model with a one hundred foot line, releasing it into the wind. The model circled gracefully for 700 feet at a one hundred foot altitude.

Stephen Faynor, 18, 166 Congress Street, won second place and John Young, 18, of 441 East 49th Street, N. Y. C., was third.

In the hand-launched event for gliders of less than 36 inch wing span, Clem Weissman, 15, of 961 Bergen Street, was the winner. John Starbinski, 15, and John Zebeyen, 17, both of Newark, were second and third, respectively.

A feature of the afternoon was a talk by Jack O'Meara, national gliding champion.

This club wishes to announce that the Bamberger Aero Club and Somerset Hills Airport, will hold a Waco U. I. C. Exhibition Scale Model Contest, September 6th to 16th, 1933. This contest is open to all boys under 21 years of age, residing in the state of New Jersey.

For full information regarding other details of the contest, write to Mr. Irwin S. Polk, Bamberger Model Airplane Club, L. Bamberger & Company, Newark, N. J. Entry blanks must be in not later than September 1, 1933.

Elmira Glider Meet

AT this time we are waiting for full information regarding the results of the Elmira Glider Meet. However, it is possible that some of our readers have not heard the details about this remarkable competition.

This contest was held at Elmira, New York, July 9th to 23rd. It is the fourth annual soaring contest at which gliders will compete from all over the country, under the auspices of the Soaring Society of America.

Among those who expected to fly were, Jack O'Meara and Martin Schempp who last year established several records. While much gliding is done by amateurs. such recognized institutions as the Massachusetts Institute of Technology, U. S. Army Air Corps and others are interestde in this sport because it provides a remarkable training for those who wish to fly large planes. A good glider pilot is always a finer flyer than a pilot who has learned on a power machine from the start.

(Continued on page 48)

Air Ways—Here and There

(Continued from page 47)

It is interesting to note that our public spirited aviation enthusiast, Mr. du Pont, offered a prize of $3000 for a flight from Elmira to New York City. Up to this time, no glider pilot has accomplished this feat. The distance is not very much more than the present record.

CORRESPONDENTS

THE following young men would like to have other model builders write to them even though they may live in remote parts of the world. Many of them wish to exchange information, pictures and plans.

One young man, whose name appears here, Mr. Ray Hayes of 54-46 65th Place, Maspeth, L. I., N. Y., wishes to hear from fellows in his town who are interested in forming a model club. He says, "call Newtown 9-7307.

Mr. Bankine Stuart, c/o Miss M. Barclay, 4 Carnegie Park, Port, Glasgow, Scotland.

Norman Zipkin, 704 F Street, N.E., Washington, D. C.

Wilfred Turner, 2 Midland Place, Toronto, Ontario, Canada.

Airplane Maneuver Contest

(Continued from page 27)

tion as shown in B. The reason for pushing the stick a little forward is to prevent a swift climb due to excessive speed gained in the last half of the loop. Note in B that the motor is at half throttle at the end of the loop, to help retard the speed.

The loop is a maneuver which is executed with the stick control but it is necessary to keep the plane balanced with the ailerons all the way around the loop, watching to see that the wings are parallel with the horizon. It is also necessary to steer with the rudder or the loop will be more like one turn of a corkscrew instead of a true loop.

Looking at the side view drawings of three loops which accompany this article, you will first see the common, normal loop, fairly circular in shape and entered and left at about the same altitude. It is used often by military pilots, for as long as a plane is in any kind of a loop, it is practically impossible to hit it with the rigid, front guns of a pursuing enemy plane. The August cover picture shows a Boeing P12-E looping away from an attacking enemy ship of composite design. It cannot use its rigid front guns on the Boeing, so it is pecking away at it with its rear gun. If a pilot can loop suddenly enough to surprise a pursuing enemy, he will find himself behind the enemy and in a position of vantage.

The low recovery loop is a loop in which the looping plane leaves the maneuver at a lower altitude than that at which it entered the loop. Its military use is to place the looping plane at a lower altitude than the enemy plane with a chance for a "belly shot."

In the high recovery loop, the looping plane leaves the loop at a higher altitude than the altitude of entry. This should make it bad for the enemy providing he stays at the same altitude (which he probably would not do), for then the enemy would be below the looper who could dive down on the enemy's tail and finish him.

The War's Greatest Training Plane The Curtiss J-N-4

(Continued from page 28)

has been painted, pin blocks in place. Then insert bent pins for valve action. Insert exhaust stacks. You will find yourself agreeably surprised at the final results.

Now prepare the tail surfaces. Both the horizontal and vertical surfaces are made in one piece, that is, the horizontal stabilizer and elevators are one piece and the vertical stabilizer and rudder are also one piece. Cut them from ⅛" sheet balsa and shape with coarse sandpaper. Then smooth with fine sandpaper. With a pencil, make grooves to separate rudder and elevators from stationary parts.

The upper wing is made in one piece. From drawings, make pattern of left wing and draw the outline on 3/16" balsa sheet. Now reverse pattern and draw right side of wing. Cut to shape with knife. Shape to proper cross-section with coarse sandpaper. Finish smooth with fine paper. Now cut part way through wing to give impression of the center section. Force cement into the cut made with the knife. Place a weight across the center section and lift the wing tip to give proper dihedral and allow to dry. Make the lower wing also in one piece to give a uniform cross-section. Then separate into two parts to fit on both sides of fuselage.

Cut and shape all struts, seeing drawings for the necessary number and sizes.

Give all parts two coats of shellac, smoothing with fine sandpaper after each coat. Then give all parts two coats of enamel of designated color. Take great care in painting parts, for proper painting is most important in the final appearance of a scale model.

Color Scheme

Fuselage, radiator, wings and tail surfaces, olive drab.

Engine blocks aluminum.

Exhaust stacks black.

Struts left with smooth final coat of shellac.

Insignia placed as shown on plans.

This is the color scheme as furnished for the Army Air Service. After the War it was seldom that one saw two Jennys used by civilians painted alike, so if the builder wishes, he is more than justified in using his own color scheme.

The parts are now ready to be assembled. Locate position of all struts (where they are cemented to fuselage or wings) and gouge small holes for struts to be fitted into.

Before attaching wings to fuselage, cement in place windshields and as much rigging as possible. All rigging is done with No. 60 black mercerized thread. Follow plans for rigging. Fasten thread by wrapping it around struts and cementing or by inserting it through pinholes in wood and cementing as case may be.

Cement lower wings to fuselage. Fasten upper wing to fuselage by means of center section struts. At the same time insert remainder of wing struts. Make sure job is lined up properly and allow to dry.

Assemble landing gear support with cardboard form work while drying.

Retouch any marks in paint due to assembly and the model is complete.

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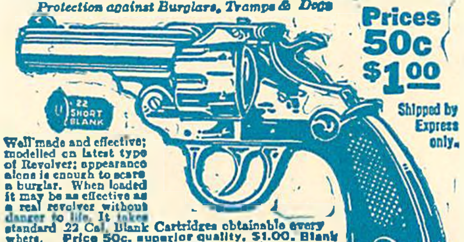

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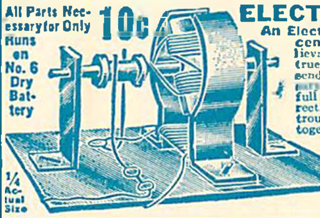

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