UNIVERSAL

MODEL AIRPLANE NEWS

JANUARY

15¢

"A COURSE IN AVIATION FOR FIFTEEN CENTS A MONTH!"

THE NORTHRUP ALPHA MAIL PLANE

Neither Snow Nor Rain Nor Heat Nor Gloom of Night Stays These Couriers from the Swift Completion of Their Appointed Rounds

ANNOUNCING *Another* AMAZING 50c FLYER!

COMET'S NEW SKY-TERROR—*The*

PHANTOM FURY!

50c at DEALER'S or PREPAID

• Limited Supply So Act Quick!

This brand-new FLYING sensation—this silent, speedy Rider of the Night Skies—will make thousands of builders surprised at the rock-bottom fifty-cent price—and amazed at the heaping value! This new Phantom Fury is an even BIGGER and EASIER built ship than the world-famous Comet Dipper! You get **pants, stream-lined landing gear!** Weighs ½ oz. Colored beautiful blue, yellow, black! **Look at it!** IS THIS the SECRET Army plane we've heard rumors about? The Phantom Fury is **Comet-Crafted** throughout, is 100% Guaranteed To Satisfy—and will FLY wonderfully, like all Comet planes!

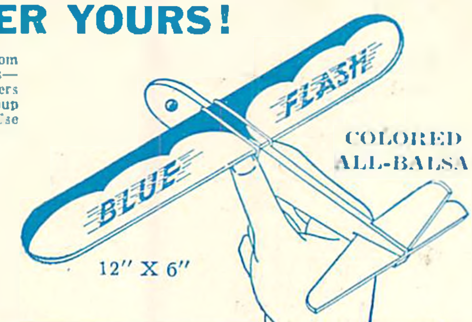
Here's a partial list of the COMPLETE kit you get for 50c (and you should see the "ghostly, strange" big box it comes in!): Ready-cut wheel pants, printed balsa rib sheet, disc wheels, special printed balsa "prop" block, shredded bamboo, colored Jap tissue, balsa headrest and noseblock, rubber motor, balsa pieces, tube Comet cement, banana oil, celluloid, all wire parts, FULL-SIZE 3-View plan, clear and illustrated instructions. HURRY! Order quick! Order **all 3 planes on this page** and SAVE 25c. You get 3 Gliders, or 1 Glider with EACH kit. Be FIRST to FLY Comet's PHANTOM FURY!

BOYS! MEN! For Real 100% FLIGHTS, Comet-Craft is Supreme!

GIVEN

This NEW 12" GLIDER YOURS!

Just out—and given Free with each kit you buy from here! Measures 12" x 6", all balsa, red, blue colors—loops the loop! Fun galore! Order 2 kits, get 2 Gliders free. 3 kits, 3 Gliders given! Hurry. Order a group of all 3 kits and SAVE 25c—get 3 Gliders! Use Coupon now!



COMET'S NEW, F-a-s-t RED RACER

"FLIES EXTRAORDINARILY WELL!"

It's sweeping the country like wild-fire—this popular, trim, speedy red demon of the air! All-red color! Black celluloid wheels! Costs only $1 prepaid—worth at least $1.50. Another exclusive Comet-Crafted design! The kit is COMPLETE, is EASY TO BUILD, and FLIES LIKE A FLASH. Full-size plans, etc., and all needed material comes in handsome, big box with a Given Glider. Get yours without delay today! Be FIRST to show the gang what REAL FLYING is like—with COMET'S Red Racer! Send Coupon!

Prepaid or at DEALER'S $1

3 KITS $2 Each in *own* big box, prepaid

and 3 FREE Gliders!

Order all three kits and **Save** 25c! Red Racer, Army Pursuit, Dipper, all for $2 prepaid. NOTICE — each kit is packed in its own box! **Don't confuse** this great offer with "3 in 1" kit - which come all jumbled together in one package. Get your buddies to chip in and 3 of you or two buy ALL THREE Kits for $2.

NEW ARMY PLANE! "Your Comet C-I-Pursuit MADE *RECORD FLIGHT* For Me of *1300 FEET!*"

"Was easiest ship I ever built, plans so easy to follow!" Clyde Kowalka, O. Looks like real Army biplane with khaki, orange, red, white 'n' blue colors. Takes off, sends thru air, makes perfect 3-point landing. Thousands built, flown! COMPLETE kit, with a Given Glider and Comet's 100% Satisfaction Guarantee, all in big 2-color box, all for only 75c prepaid. Order quick on convenient coupon, or write a letter—but ORDER!

75c Prepaid or at DEALER'S

100% Satisfaction GUARANTEED!

SEND NO MONEY — Just COUPON!

Order the convenient Comet way . . . . mark coupon C.O.D., pay on delivery of kits. Or send cash by money order **always.** If check, add 15c. Outside U.S. add 20% to remittance. International money orders **only** accepted. West of Mississippi, add 10c. If not satisfied with purchase, we exchange or replace **without cost,** or refund money. Order from COMET with CONFIDENCE — and for REAL FLIGHTS! QUICK!

YOUR COPY READY!

Our amazing 5-Color, 24-page CATALOG is Given with order. Send 3c stamp for mailing. None other like it! Shows all kits in FULL colors. Supplies. Send 3c. Limited supply, so hurry! It's the BIGGEST thrill you've had in Catalogs.

COMET Model Airplane & Supply Co.
3114 Harrison, Dept. M-13-F, Chicago, U. S. A.

C.O.D. Send C.O.D. kits checked. I'll pay postman for kits, postage, C.O.D. fee, **on delivery.** Comet guarantees 100% Satisfaction!

CASH I enclose $........ for kits checked. Comet pays postage. Comet Guarantees 100% Satisfaction!

ALL 3 Kits, $2 [ ]. Phantom Fury [ ]. Army Pursuit [ ]. Red Racer [ ]. CATALOG, 2c stamp [ ].

(Print Clearly)

NAME..

Street and No..

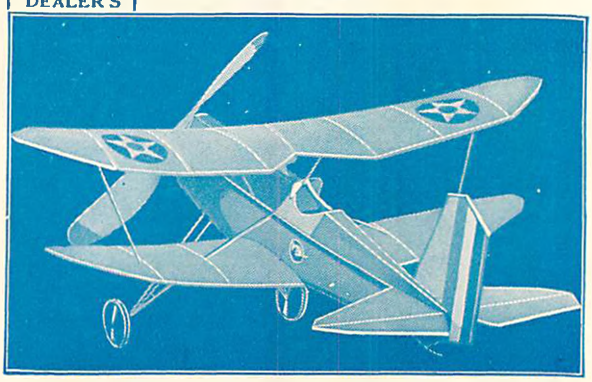
City. . ...State...............

SEND 1 GIVEN GLIDER WITH EACH KIT

(Here's My Dealer's Name, Address, Below Coupon)

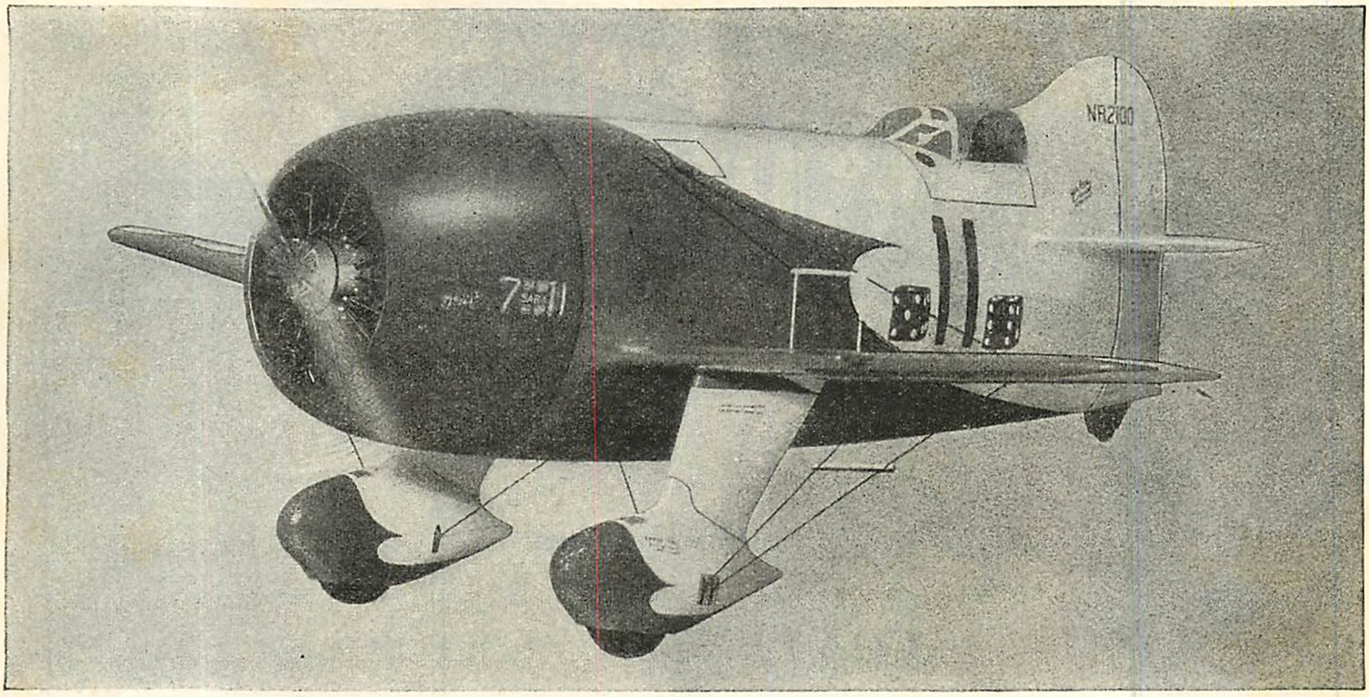
DEALERS! Sales are Guaranteed!

Write on letter-head at once for details of "Sales Guaranteed" plan that's putting extra, easy, NEW profits in hundreds of Comet Dealers' pockets! Lets you stock, sell at **no financial risk!** Greatest, fastest selling and only line of 50c to $1 kits that EVERY BUILDER wants! Write quick! Or send sample order NOW!



Comet's Famous Army C-I-Pursuit. 15 X 12¼

we believe this is the Most Sensational Offer Ever Made in Model Aircraft History

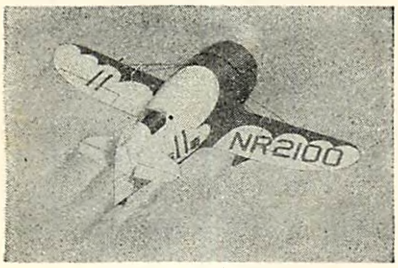


All pictures on this page are of actual Cleveland-Designed models, not artificially retouched sketches. We NEVER use photos of the big ships themselves for advertising our models.

Kit N-2 for Doolittle's GEE-BEE Supersportster, $1; Combination Kit N-1 HEATH PARASOL and PRIMARY TRAINING GLIDER (⅜") $1

THESE Kits were originally developed **ONLY** for readers of our new engineering service in magazine form, the "CLEVELAND MODEL-MAKING NEWS and Practical Hobbies"—but we know thousands of other model enthusiasts will also want them. Each Kit is thoroughly complete with all materials necessary to build these models—EXCEPT that there **is no drawing.** The full-size, ¾" scale, Cleveland-Designed drawings for these models are FREE—but are given ONLY with the first issue of the above-mentioned magazine, which sells at 25c per copy as long as the supply lasts. You may subscribe to our magazine if you wish—there will also be two more large ¾" scale drawings and a ⅜" soaring glider along with many other smaller models in the second issue—see coupon for rates.

THESE two Kits (or rather 3, for the Heath is 2-Kits-in-1) are "the buy of a lifetime." It marks a new era in the model world, due to the many past achievements of Cleveland Model & Supply Co., Inc. And there will be more to come.



Look at 'er Zoom!

LET'S talk first about the C-D model of the Gee-Bee Supersportster. It's an authentic ¾" scale miniature of the super-racer that was piloted to victory in 1932 by Major James H. (Jimmy) Doolittle for the coveted Thompson Trophy at the Cleveland Races. His plane is known as the Gee-Bee Supersportster Model R-1, which in speed tests made 309 m.p.h. in the first lap, with an average of 294.39 m.p.h.; this was officially credited as the world's land plane speed record. This C-D model is the most beautiful we have ever produced. Built for exceptionally realistic appearance, it should also interest solid scale model builders because of its radically new features; still it can be made to fly by employing larger stabilizer surfaces as suggested on the drawing. The complicated parts are fairly simple, but require plenty of time because of the abundance of detail. When finished, it is a job you'll be proud of for the rest of your life. Span, 18¾"; length, 13⅜"; weight, 2.7 oz. Kit contains all necessary high quality, firm stock balsa wood, very accurately cut, all necessary Japanese paper, fiber propeller blades, prop hubs, music wire, hinge wire, thread for brace wires, celluloid, Cleveland colorless cement, paper cement, and other things, as well as the much-talked-about new Cleveland Enamel Dopes, both red and white. At this startlingly low price you needn't risk "cheap" materials. Complete Kit N-2, postfree and sold only direct from our factory, $1. Send for yours today—no waiting—we have thousands all ready to ship.

HEATH Parasol lovers will find this the authentic model they've been waiting for—and in addition will receive, at no extra cost, all materials for making the Primary Training Glider. This Kit contains all the necessary materials, just as supplied with the Gee-Bee model (with the exception of the dope for the Glider wings, where Cleveland old model dope is supplied instead of the new enamel dope because of the very light structure of the wings). At this low price, no model enthusiast should be without the C-D Heath, for it's fairly simple to build and flies beautifully. Span, 23⅝"; length, 12¾"; weight, 8/10 oz. Order this Kit right along with your Gee-Bee, and remember, it also includes all materials for making the ⅜" scale Primary Training Glider. Sold only direct from the factory. Order Kit N-1, postfree, only $1.

The world-famous Heath Parasol LNB-4

Our New Magazine

"CLEVELAND MODELMAKING NEWS and Practical Hobbies" is a simplified engineering service for modelmakers, in magazine form. It devotes itself to authentic models of airplanes that fly, ships, trains, complete railroads and equipment, tiny ⅛" scale planes, small machinery and other fascinating subjects. No theory. Every plan designed, tested and approved at the workbench. Valuable hints, articles, data and FULL-SIZE drawings. **Not sold on newsstands.** Large ¾" scale drawings of Gee-Bee Supersportster and Heath Parasol and many other drawings, 5 of them being ⅛" scale solid exhibition models (a regular feature each issue) FREE with first issue—now ready. No strings attached to this offer. It **may** seem too good to be true, but it's a brand-new model engineering service. Supply of this first issue is very limited. See coupon for rates. Act quickly!

Cleveland Modelmaking News
% Cleveland Model & Supply Co., Inc.
1866-NA West 57th St., Cleveland, O., U.S.A.

I enclose $........ for which please rush items checked:

[ ] Kit N-2: Gee-Bee Supersportster (complete except for drawing) $1.
[ ] Kit N-1: Heath Parasol and Primary Training Glider (complete except for drawing) $1.
[ ] Sample Copy of CLEVELAND MODELMAKING NEWS and Practical Hobbies. (first issue brings large ¾" scale drawings of above models FREE.) While it lasts, 25c.
[ ] Subscription for 6 issues of C. M. NEWS & P. H. (including first issue) $1 (saving 50c).
[ ] Subscription for 12 issues of C. M. NEWS & P. H. (including first issue) $1.75 (saving $1.25).
[ ] 15c extra for special delivery mail on kits only.

(Canadian and Foreign orders for C. M. NEWS & P. H. add 5c extra for single issue; 30c extra for 6 issues; 60c extra for 12 issues. Kit orders 15% extra.)

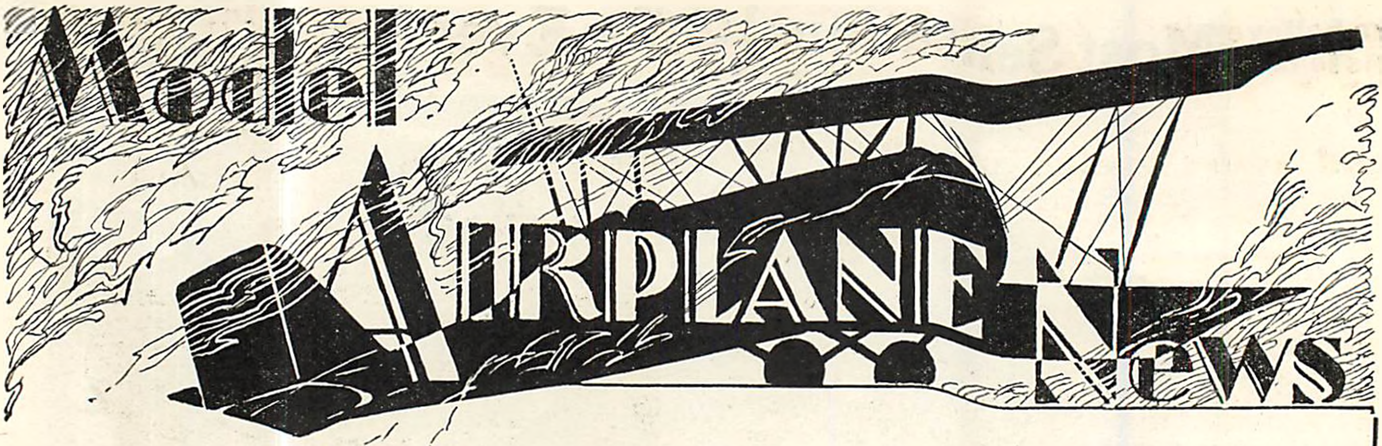
Name .... Age........

Address..................................

City........................ State......

Address CLEVELAND MODELMAKING NEWS
c/o CLEVELAND MODEL & SUPPLY CO., INC.
"Model Engineers Since 1919" 1866-NA West 57th St., Cleveland, Ohio, U.S.A.

UNIVERSAL



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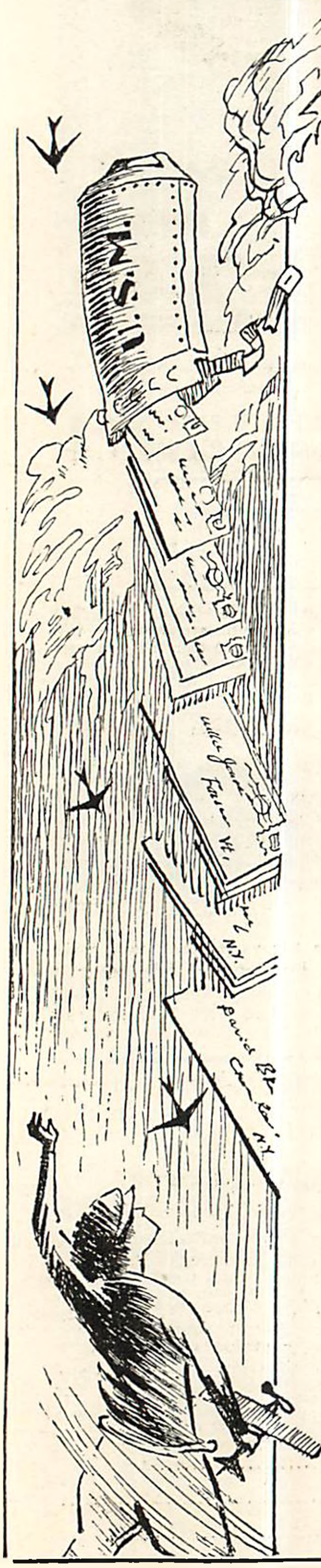

Edited by Charles Hampson Grant

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JANUARY - 1933

In Our Next Issue

We have a big surprise for you. An eminent authority on aeronautics, Alexander Klemin, Professor of Aeronautical Engineering, New York University, in the first of a series of three articles entitled *Reflections of an Airplane Designer*, tells you about the many facts that must be considered when you attempt to design an airplane. Here is something you have been looking for.

You have another pleasant surprise. Howard McEntee makes a comeback with plans for the construction of a flying scale Monocoupe. Also, another instalment of "Whats" and "What Nots" of Model Plane Building.

Ted Bellak, the glider world record holder, tells you how he did it and how you can duplicate his record flight in How You Can Build a World Record Glider.

A vivid War Ace story by F. Conde Ott, and other instructive and interesting features, make the February issue a very unusual and valuable one.

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.

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O. K. AMERICAN BOYS

(and your foreign cousins, too)

If You Want to Build Scale Models

HERE'S A REAL ONE

The famous SOPWITH TRIPLANE, the neatest ship in the late war. This was the last design used by England, and the most improved wartime plane. See the cover of "Model Airplane News" for an art picture of the SOPWITH TRIPLANE in action. (April 1932)

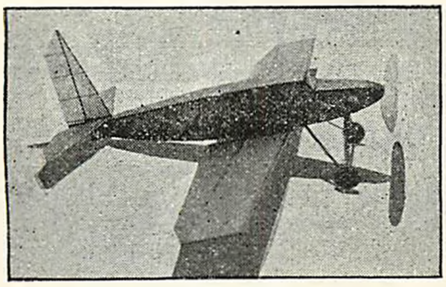
This complete kit contains nearly 60 feet of accurately cut balsa sticks; over 90 ribs, wing and tail tips, fuselage fairing formers and instrument panel printed on balsa veneer; wire parts all finished; cowling cut to shape; two-inch CELLULOID WHEELS; correct colors of Jap tissue and insignia; and the regular LAWRENCE FEATURES which include an 8-inch LAWRENCE MACHINE CARVED PROPELLER, LAWRENCE SEMI-STREAMLINED landing gear struts, LAWRENCE SHRINKLESS model cement and paper cement, and the LAWRENCE unusually complete DRAWINGS and INSTRUCTION NOTES, covering all details, including the Vickers Machine Gun.

"—and when this Tripe flies, she goes to town!"

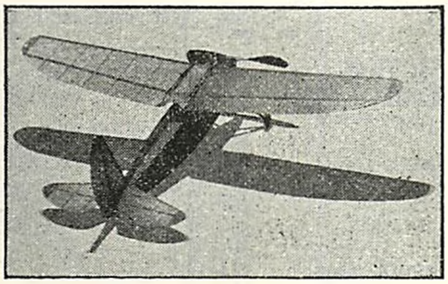
SOPWITH TRIPLANE

COMPLETE KIT, postpaid

$2.50



LAWRENCE LOW WING JUNIOR



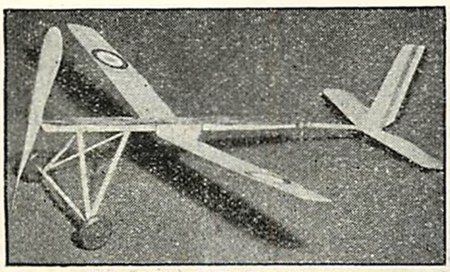
LAWRENCE PARASOL JUNIOR

THE LAWRENCE JUNIOR KITS, sister ships of the line, contain more for the money than any other kits on the market, and the performance of these models is a credit even to Lawrence Engineering.

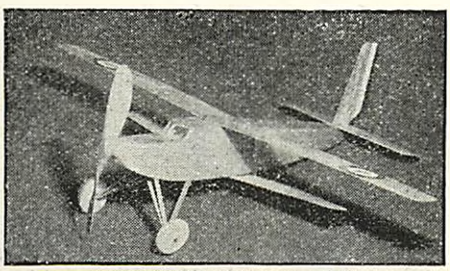
Each of these kits contains more than 30 feet of accurately cut balsa sticks, LAWRENCE Machined Carved Propeller, notched and drilled nose and tail blocks, LAWRENCE SHRINKLESS Model Cement and Paper Cement, all fittings finished, two colors of Jap tissue, rubber motor, and Unusually Complete Drawings and Instructions.

Both these models are practically stall proof when properly adjusted and will make flights of more than a minute duration. They have a wing span of 20 inches and weigh about ¼ ounce when complete.

EITHER JUNIOR KIT, postpaid .... **50¢**



LAWRENCE FLEDGELING



LAWRENCE SESQUIPLANE

LAWRENCE ALL-BALSA MODELS will surprise you, for they really fly better than most paper covered planes. This wonderful performance is due to a thorough knowledge of aerodynamics on the part of Lawrence Engineers, and to the use of carefully selected light weight and thin balsa veneers, which could not be used except for LAWRENCE SHRINKLESS Model Cement.

The wings in these kits are cut to an efficient wing section and the struts are semi-streamlined. These parts require only a little sanding.

All these kits contain LAWRENCE SHRINKLESS Model Cement, finished fittings, LAWRENCE Machine Carved Propellers, all other materials necessary, complete drawings and instruction notes.

LAWRENCE FLEDGELING KITS

12-inch wing span . . 45c 18-inch wing span . . 60c
24-inch wing span 85c

LAWRENCE SESQUIPLANE

Wing Span 19¼ inches, finished weight about ½ ounce. COMPLETE KIT, postpaid **90c**

Lawrence Machine Carved Props

cut to most efficient pitch

5″ 5c	8″ 9c
6″ 6c	9″ 11c
7″ 7c	10″ 14c

Special Duration Propellers, 5, 6, 7 and 8-inch only; very light balsa wood; 50% wider blades than standard — double the above prices.

Lawrence Shrinkless Model Cement and Paper Cement

How many times have you wished your cement would not warp your work? Here is what you have been wanting. LAWRENCE SHRINKLESS Model Cement dries fast and will neither warp nor shrink your most delicate work. It does not leave unsightly lumps because it dries down smoothly and is almost invisible. LAWRENCE SHRINKLESS Paper Cement dries slowly to give more working time, and is thinner, but has the same non-shrinking and non-warping properties. Specify which cement you are ordering — Model or Paper.

Large Six-Inch Tube 15c
One-Pint Can $1.00

HERE'S HOW TO ORDER

All Kits Are Priced Postpaid

With orders for Props and Cement, add 10c for each 50c worth to cover packing and postage charges.

Our complete catalogue is in each kit.

Watch our ads in "Model Airplane News" for new models you have been wanting to try — not cheap imitations — but accurate models to scale that look and fly like the original.

No Prop or Cement Orders Under 50c Accepted

LAWRENCE AIRPLANE MODELS, 1221 M LOYOLA, CHICAGO

BIG BARGAIN!

This 50c Double-Gear DOUBLE WINDER ONLY 10¢

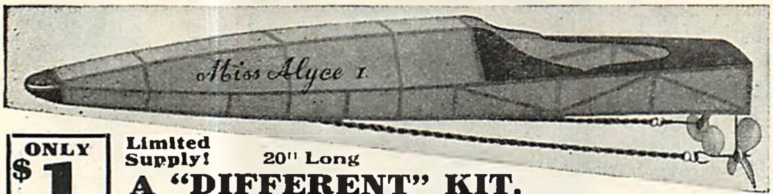
ONLY 250 AT THIS SPECIAL PRICE!

Hurry—while they last, get YOUR big, sturdy "Champeen" **double-winder**—at the unheard-of price of ten cents, provided your order from this ad amounts to at least $1 or more! We make this astounding 10c Offer to acquaint you with our popular line of quality supplies at low prices. The supply of winders is limited, only 250 on hand, so you must act promptly to get yours! **Important!** If supply is exhausted before we get YOUR order, we reserve right to supply you two (2) 9-cylinder, 3" celluloid motors at 10c **instead** of Champeen Winder. (Remember, one winder to a customer at 10c if you also order at least $1 worth of supplies or with the Miss Alyce "Step" Hydroplane! Now hurry! Invest a dollar now, get Winder for only 10c!)

Will Last A Life Time

Drawing at left is about half actual size

And Here's a NEW Kind of Fun — Build This RACING "Step" Hydroplane!



ONLY $1

Limited Supply! 20" Long

A "DIFFERENT" KIT, *and How* — Model Builders Like It!

With each Racing "Step" Hydroplane—you get a double-winder for only 10c! (Only 1 winder at 10c to a customer.) Fellows—this is the first genuine NU-Style Hydroplane Kit to sell at this unheard-of low price of one dollar! Amazing action—she cuts through the water like a knife for 150 to 200 feet—skimming along with saucy nose pointed skyward. It's a twin-screw and weighs but 1½ ounces. And what a TREAT building The Miss Alyce I. That's the big sport. Hurry and get yours now, build it—it is as easy as pie to put together—and do those twin screws **churn** the water! HERE ARE KIT CONTENTS: Printed balsa bulkhead sheet, printed balsa transom sheet, blue dope, yellow and red Jap tissue, propellers printed on aluminum sheets, ready-made prop struts and shafts, rubber motor, hooks, waterproofing dope, sandpaper, noseblock, printed lettering for dressing, waterproof cement, pins, waxed tissue, illustrated instructions, full-sized plan.

EXPERIENCED BUSINESS MEN JOIN HANDS TO SERVE BUSINESSLIKE BUILDERS OF AMERICA!

It had to come! And here it is:—**A Group of Progressive Business Men Have Joined Hands to Create This NEW Kind of Supply Company for the Purpose of Giving YOU not only splendid quality, bargain prices and businesslike service—BUT TO ALSO GUARANTEE Full Satisfaction or Refund Your Money!** If you have not yet experienced the joy of prompt service, real quality at **reasonable** prices—send us your order today! Seize this great bargain Double-Winder at 10c with $1 worth of supplies. Order now on Copyrighted Combination ORDER BLANK AND COUPON. Join the happy B.P.A. gang!

BUY SUPPLIES ON SATISFACTION GUARANTEED PLAN — SAVE TIME, CASH!

BALSA STRIPS 24" Lengths

1/16" square, each.... .01 ....12 for 5c
1/16 x 1/8", each...... 1c ....10 for 5c
3/32" square, each.... 1c .... 9 for 5c
1/16 x 1/4", each...... 1c .... 8 for 5c
1/8" square, each..... 1c .... 8 for 5c
3/32 x 3/16", each.... 1½c.... 8 for 8c
1/8 x 3/16", each..... 1½c.... 8 for 8c
1/8 x 1/4", each...... 2c .... 5 for 7c
1/8 x 3/8", each...... 2c .... 5 for 7c
1/4 x 1/2", each...... 3c .... 5 for 10c
3/8" square, each..... 4c .... 5 for 16c
3/8 x 1/2", each...... 5c .... 5 for 20c
1/2" square, each..... 6c .... 5 for 25c
1 x 1", each.......... 13c .... 4 for 45c
Other sizes to order.

BALSA STRIPS 36" Lengths

1/8" square, each...... 1c .... 6 for 5c
1/8 x 1/4", each...... 2c .... 6 for 10c
3/16" square, each.... 2c .... 5 for 9c
1/4" square, each...... 3c .... 5 for 12c
1/8 x 3/8", each...... 2c .... 5 for 9c

SHEET BALSA

	24"	36"
1/32 x 2"	3c	
1/16 x 2"	4c	5c
1/16 x 3"	6c	
1/16 x 4"	9c	
3/32 x 2"	4½c	6½c
1/8 x 2"	4½c	6½c
3/16 x 2"	6c	9c
1/4 x 2"		11c

PROPELLER BLOCKS

3/8 x ½ x 6", each...... 1c......6 for 4c
1/2 x ¾ x 6", each...... 1c......6 for 5c
9/16 x ⅞ x 7", each.... 2c......6 for 10c
3/4 x 1⅛ x 8", each.... 3c......3 for 8c
7/8 x 1¼ x 8", each.... 4c......3 for 10c
3/4 x 1½ x 8", each.... 5c......3 for 13c
3/4 x 1¼ x 10", each.... 6c......3 for 15c
1 x 1½ x 8", each...... 7c......3 for 18c
1 x 1¼ x 10", each..... 8c......3 for 21c
1 x 1½ x 10", each..... 9c......3 for 24c
1 x 1½ x 12", each.....10c......3 for 27c
1¼ x 1⅝ x 12", each...13c......3 for 35c
2 x 2 x 12", each.......17c......3 for 48c

PLANK BALSA

1 x 3 x 36" .. 33c 2 x 6 x 36" .. 80c
2 x 3 x 36" .. 55c 2 x 6 x 40" .. 95c

JAPANESE TISSUE

White, 19 x 26" .... 4c per sheet 36c per doz.
Red, yellow, green, blue, black, orange, and khaki colored Jap tissue, 20½ x 24" 5c per sheet 48c per doz.

BEST GRADE RUBBER

No. 20 sq. (.045") .... 3 ft. for 1c
1/32 x 1/16" .... 3 ft. for 1c
1/32 x 1/8" .... 3 ft. for 1c

BAMBOO

1/16 x 1/4 x 12"........1c ea., 6c per doz.
1/16 x 1/4 x 15"........1c ea., 8c per doz.
1/16 sq. x 12"........4 for 1c, 36 for 8c

DRI-QWIK CEMENT

Large size tube 10c
Pint 85c

BANANA LIQUID

1 oz. bottle 7c
2 oz. bottle 10c
Pint 60c

ACETONE

2 oz. bottle 10c
Pint 75c

ALUMINUM TUBING

1/16" dia., per ft. 8c
3/32" dia., per ft. 8c
1/8" dia., per ft. 10c
3/16" dia., per ft. 11c
5/16" dia., per ft. 13c

CELLULOID WHEELS

¾" dia., per pair.................... 6c
1" dia., per pair.................... 7c
Above two sizes in black, white, blue, red.
1-3/16" dia.—(Black only) per pair... 8c
1⅜" dia., per pair.................. 11c
1⅞" dia., per pair.................. 16c
Above two sizes in blue, white, black, green, yellow.
3" dia. Jumbo wheels (Black only), per pair........................ 30c

CELLULOID DUMMY MOTORS—9 cyl.

1½" dia. 18c
2" dia. 22c

STREAMLINED WHEEL PANTS

Large size to fit 1⅜" and 1⅞" dia. wheels, pair 29c
Small size to fit ¾" and 1" wheels, pair 15c
N.A.C.A. Cowling, 2" dia., each 14c

DOWEL RODS

1/16" dia., 24" long .... 8 for 5c
1/8" dia., 30" long .... 7 for 5c

THRUST BEARINGS

Small size .... 2c each; per dozen 18c

SHEET ALUMINUM

.006" thick, per sq. ft. 12c
.010" thick, per sq. ft. 18c

CELLULOID SHEETS

4 x 6" 9c

WASHERS

Per doz. 3c

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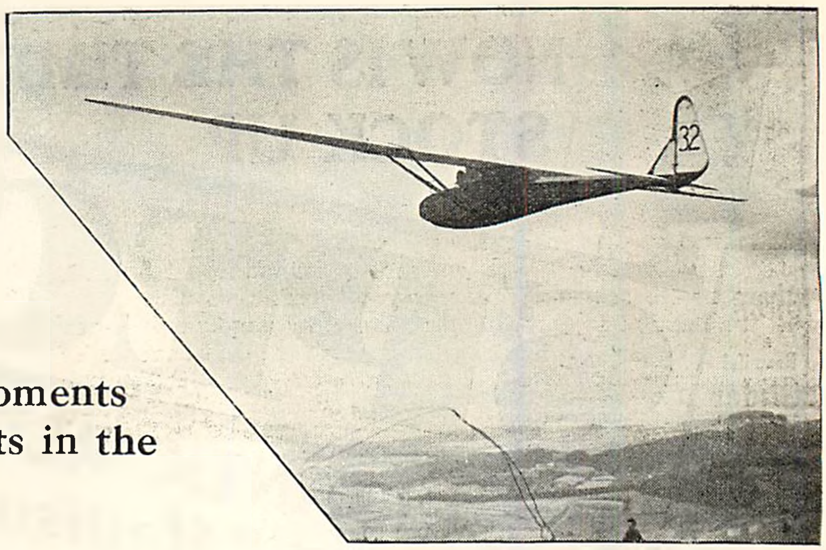
Learning to Soar in Germany



A start in my self-made Francofurtia off the summit of the Wasserkuppe.

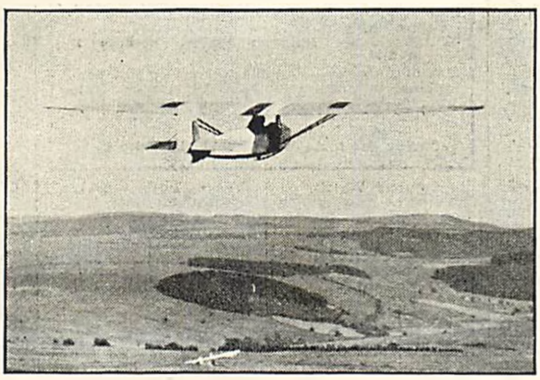
The Story of Some Tense Moments While Battling Air Currents in the Rhön Mountains

By Bernard Flinch

IN October, 1929, I went to join a course on the Wasserkuppe, the center of German soaring flight, to pass my gliding B-exam. I obtained the license fairly quickly, but I felt that gliding, of which I was capable now, was not the ideal; I wanted to soar, to fly without sound over the hills for hours, as long as I wanted to.

As my club in Frankfurt did not possess a machine capable of soaring, I made up my mind to build my own high-efficiency soarer. I chose the "Professor"-type. This machine is known as one of the best high-efficiency soarers and is comparatively easy to build, but requires, all the same, about 3000 hours of work.

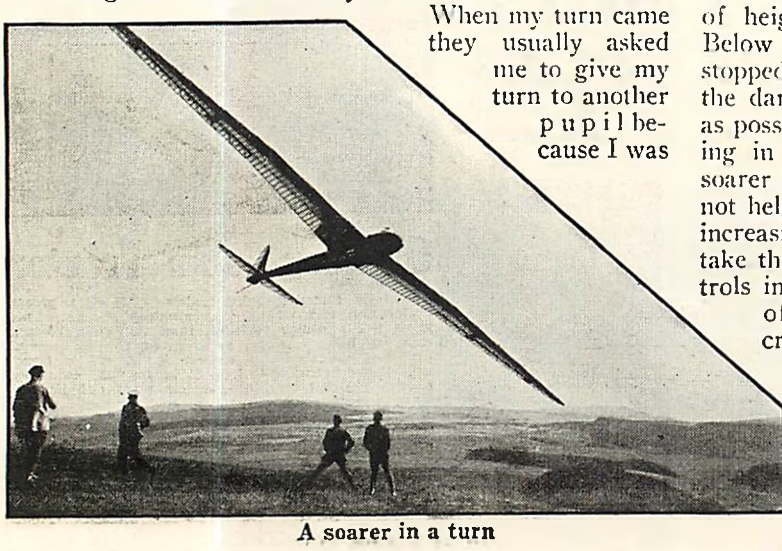
I had saved every penny for 3 years and earned some more by writing articles. But at the end, as the international Rhön competition came nearer and nearer, my father had to help me out so that the machine would be ready in time.



A take-off in the famous trainer "Falke"

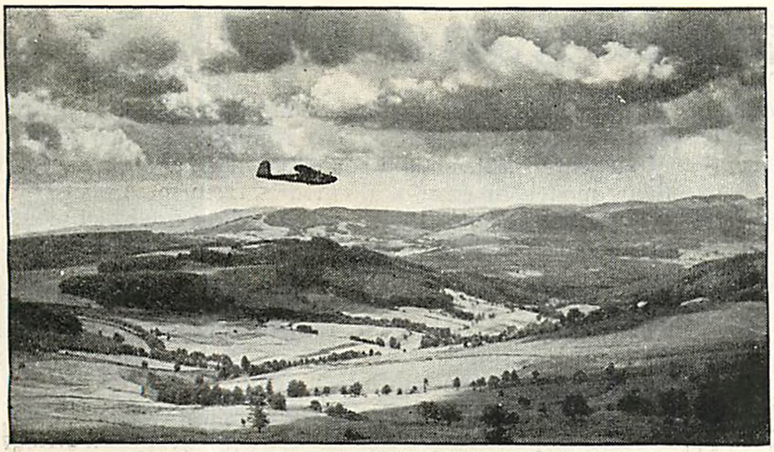
Over Whitsuntide I went up to the Rhön mountains to try for my C-exam. To obtain the "C" you have to fly for at least 5 minutes *above* the starting point in a motorless plane in the presence of two officials.

During the course we very seldom had "C-weather." When my turn came they usually asked me to give my turn to another pupil because I was still so young and would soon have a machine of my own, or else they just passed me by without asking. But at last they gave me a chance. The school at that time used a very bad machine of the utility type. You could only turn her with a great loss of height and when flying slowly, which is necessary in order to achieve a minimum of sinking speed, she hardly answered at all to the controls. In gusty weather this is especially unpleasant. I knew that this flight was my only chance to obtain the "C" before the competition so I went to work very determinedly. But this was of course the worst thing to do. Just before my turn came, a pupil flew for three minutes. If he hadn't made a mistake in a turn he would have succeeded in flying the necessary five minutes.



A soarer in a turn

I LET the starting crew run till the double rubber shock-cord was as thin as a string. Then the machine shot off and attained a good height right in the beginning. Gently I shoved to the end of the slope with the nose of the machine in the wind. After about two minutes I began with the first return curve. Slowly the earth turned below me. Now we flew back again to the starting point. I had plenty of height. The bracing cables hummed in the wind. Below me there was a car driving along the road; it stopped. I could see some white faces clearly against the dark macadam road. Visitors. I flew on as slowly as possible over the slopes and the valleys, gently swinging in the puffs of wind. Then—a sudden gust, the soarer inclined a bit to the side. Counter-control. It did not help. The machine turned further and further with increasing speed. What did the teacher tell us to do, to take the old box out of a spiral or spin? "Put all controls into the turning movement." I did that. The nose of the airplane dropped almost vertically. With increasing speed the slope seemed to come rushing up to me. Keep cool! First she must take on sufficient speed. I still had enough height so I pulled her gently, very gently, out of the vertical dive. The slower the better. Five feet above the ground the soarer again flew horizontally. And then I made a landing as soft as anything, just in front of the road. The time was not

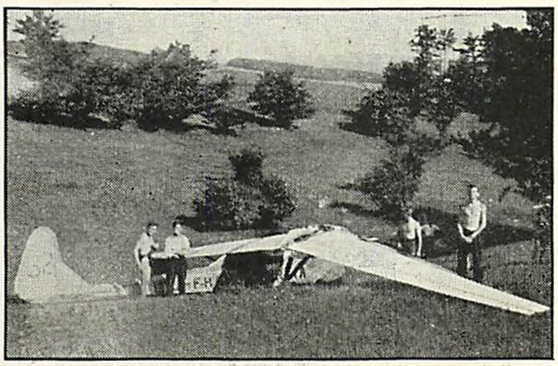


Over the Rhön Valley

quite four minutes. To me, it seemed like an hour.

All possibilities for obtaining the "C" before the competition were now gone. The first-aid officer came chasing along with his rattling box and then, one after the other, the pupils arrived. "Well, pretty good luck this time."

The competition began but my machine was not ready in time. At last she appeared in the camp, dismounted on a special trailer, towed along behind a car. En route the trailer was turned over by a fierce storm, but the only damage was a scratch on the varnish, an inch long. However, during the competition I was only allowed to fly when there was no wind blowing at all and nobody else was in the air, as I hadn't yet obtained my "C." Once I made a glide of about three miles.



The damage after the flight in the 1931 competition

Herr Mayer from Aachen, one of the big guns of soaring flight, damaged his own machine after a very difficult flight so that he was out of the competition. I offered him my "Francofurtia" for the duration of the competition to enable him to defend his chances.

He made several excellent flights on my soarer, winning the first prize for altitude, and on another day succeeded in covering the greatest distance after Herr Kronfeld's record-breaking flight.

As soon as the competition had ended, and no limitations were put on me any more, the wind died down totally. Nevertheless, I completed several flights from the summit to get some training in steep turns, which are not so easy with soarers of big span, because the masses (weights of parts) lying on the wing, are far from each other. Then I had to go back to school because the holidays were over.

THE "Francofurtia" stayed in one of the hangars on the Wasserkuppe, till Herr Kronfeld, the famous champion, and my brother and I came up again on a Sunday and pulled her to the start. We had heard per phone that a strong wind was blowing up there and, by Jove, it was a strong one! The wind-speed indicator of the meteorological station went up over 40 miles an hour. Herr Kronfeld first made a flight of about 10 minutes to see if everything was in order. Then I climbed into the cockpit and was strapped tightly to the seat. Some young C-pilots made encouraging remarks about my failing in the attempt.

A quick start and I was in the air making a left-hand turn directly towards a single tree at the end of the slope. It was terribly gusty and I was being jerked up and down spasmodically. Then a gust tried to turn me over sideways. Once I was just hanging in the shoulder straps, the next moment I feared the seat might break through the bottom.

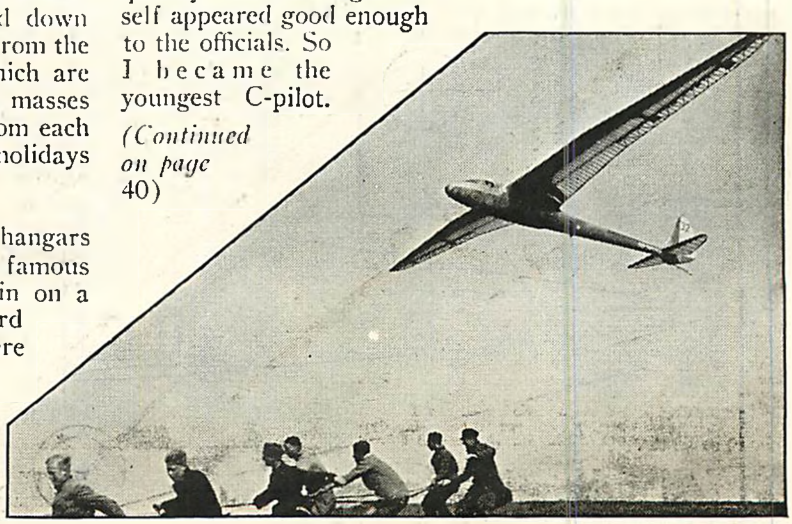
During the first rounds I was decidedly dizzy. After a time I got a bit used to it and felt freer, but I still had to take great care, especially in the turns, as it was so gusty and the machine followed so slowly around the longitudinal axis. I looked down at the onlookers. There were about 200 of them. Suddenly they began to wave their hands and I heard short yells. Five minutes had passed, the conditions were fulfilled. I tipped my soarer to one side and then to the other to show them that I had understood.

Then "we" flew on, without a sound. Through the good streamlines, no eddies were produced. By an invisible force I was pushed upwards and downwards, from side to side. It was a continuous fight with the elements. The lifting powers need to be conquered. It is wonderful to know one can master a soarer in spite of the storm, making it circle upwards, way up above the earth.

After about a quarter of an hour, a red rocket was shot up before me. I had to land. Five other C-candidates were waiting their turn and it was already late in the afternoon, so as quickly as possible I followed the command. Down wind, with great speed my machine came to land. Now a return curve so as to land into the wind. I was already pretty low, only about five feet high. The turn was almost finished. In my hurry I did not think of the 56-foot long low wings and the left wingtip touched the ground! A crash! The machine turns 180° and smashed nose first into the earth. The storm turned me over on my back and head down. I hung in the straps, my feet dangling in the open air. The front part of the fuselage had broken off. I climbed out and looked at the mess: some work for the coming winter!

But I got my C-certificate all the same, as the crash was rather a result of my following the landing signal too quickly and the flight itself appeared good enough to the officials. So I became the youngest C-pilot.

(Continued on page 40)



Off to a good start

The German Roland D. II

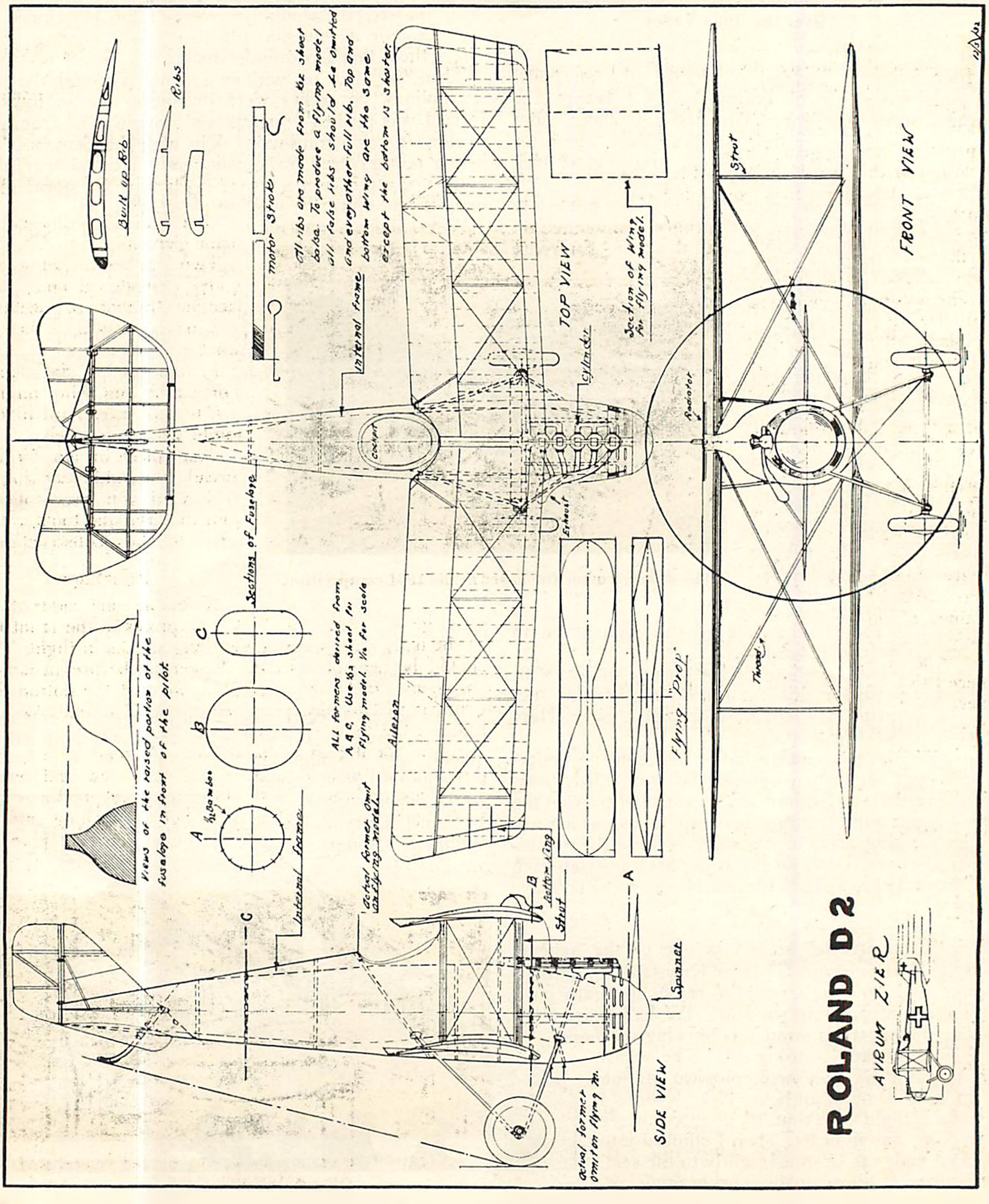
THIS is one of the beautifully designed German ships which appeared at the Front in March, 1917. Its clean lines and monocoque construction compare favorably with many ships of the present day.

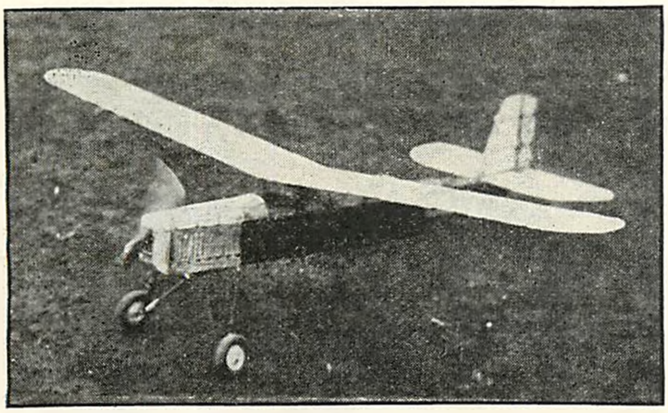
It was manufactured by the Luft Fahreng Gesellchaft (L.F.G.) at Adlershof, successors of the old German Wright Aeroplane Company. This should not be confused with the (L.V.G.).

The fuselage is constructed entirely of plywood, covered with fabric, and has an oval section tapering to a vertical knife edge at the stern post. Span of upper wing, 29 feet 2 inches. Span of lower wing, 27 feet 8 inches. The weight is 1823 pounds. Wing area, 248 1/3 square feet. The load carried is 7.35 pounds per square foot. Model enthusiasts should be able to make either excellent flying models or exact scale models from these plans.

Attention is called to the fact that these are exact plans of the full-size ship, which give the details necessary for a model builder to construct a detailed scale model. The only exception is the propeller, which is designed as a flying "prop" for those who may *desire to build a flying* model of this ship.

These plans are made to a scale of:—3/16 inches equals one foot.





The finished model shows flight qualities and sturdiness. The spring landing gear is a feature

A "Parasol" That You Can Fly

Here Are Plans to Build a High Performance "Parasol" Model That Will Give Flight Satisfaction

By Jack Clark

MANY model builders have sought in vain for plans of a sturdy model plane that would give consistent performance and would be similar to a real plane in appearance. Test flights of this ship indicate that it is the one model flyers have been looking for. The spreading landing gear, hinged rudder and adjustable wing design of this sturdy high performance parasol ship make it a model with which you will have a great deal of sport.

The total weight averages about three ounces. The duration varies from 45 to 60 seconds. The accompanying plans are full-size. In either the article or plans, all parts referred to are understood to be of medium hard balsa unless specified otherwise.

You will need the following material to build this model:

General Material List

3 pieces balsa, 1/16 x 1/16 x 36. Cowl stringers, wing, etc.

4 pieces balsa, 1/16 x 1/8 x 36. Body, stabilizer, wing, etc.

1 piece balsa, 1/16 x 3/16 x 36. Stabilizer spar and rib stock.

1 piece balsa, 1/16 x 1/4 x 36. Main spar on wing.

6 pieces balsa, 1/8 x 1/8 x 36. Body and wing stock.

1 piece balsa, 1/8 x 1/8 x 3 1/16. Rudder bottom piece.

1 piece balsa, 3/32 x 3/32 x 2 1/4. Wing setting piece.

1 piece balsa, 1/8 x 1/4 x 30. Motor-stick web, etc.

1 piece balsa, 1/8 x 2 x 4. For nose block cover, webs and front cowl former.

1 piece balsa, 1/2 x 5/8 x 4 1/2. For built-up nose block.

1 piece balsa, 3/4 x 1 x 9 1/4. Propeller blank.

1 piece balsa, 1/32 x 3 x 30. For all parts specified 1/32 sheet.

1 piece balsa, 1/16 x 2 1/2 x 18. For all parts specified 1/16 sheet.

1 piece pine, 1/16 x 1/8 x 2 1/2. For axle guide stock.

1 piece pine, 1/16 x 1/4 x 23 5/8. Motor-stick flange.

1 piece pine, 1/8 x 3/8 x 5/8. Bearing block.

6 pieces bamboo, 1/16 x 1/4 x 15. For all parts specified bamboo.

45 inches of No. 10 (.024) music wire. For fittings, cans, etc.

12 1/2 inches of No. 12 (.029) music wire. For axle.

1 piece No. 34 gauge sheet aluminum, 1/4 x 1 1/4. For fittings.

1 piece No. 30 gauge sheet aluminum, 1/4 x 10. For fittings.

1 piece bicycle spoke, 1/16 diameter x 3 1/8. For propeller shaft.

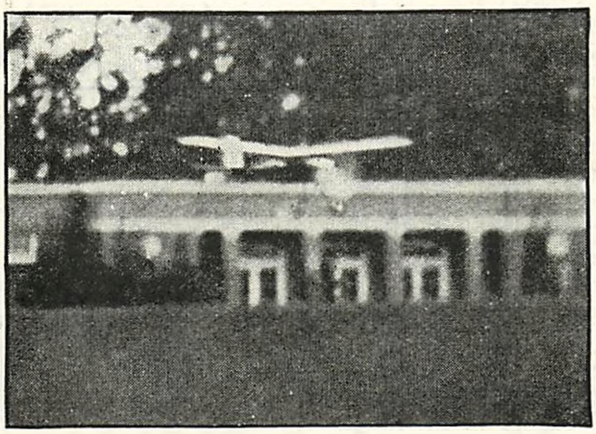
3 No. 5 brass bearings, or 3 pieces of 3/32 outside diameter x 1/2 long brass tubing.

2 pieces brass tubing, 3/32 outside diameter x 3/32 long.

3 No. 2-0 dress snaps.

1 piece fine silk, 5 1/2 x 7. For reinforcing front of body.

2 sheets "Superfine" tissue, 18 x 24.



This model thrills with its steady flight

One ounce of colorless airplane cement.

Two ounces of wing dope (50% nitrate dope, 50% lacquer thinner or acetone).

2 balsa wheels, 2-inch diameter.

15 feet of 1/8 flat rubber. For motor and wing binding.

Fine silk thread for binding joints where specified.

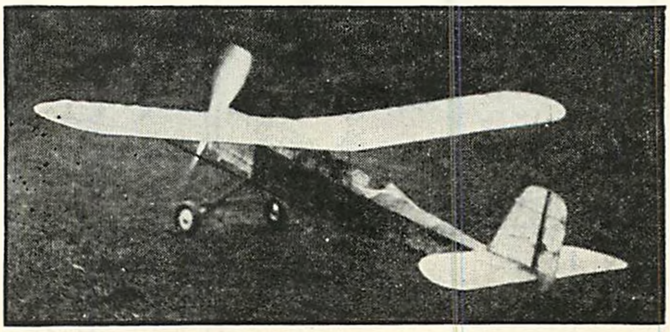
Small piece of No. 40 linen thread. For rudder control, etc.

Now, if you have collected your material and tools, we are ready to start construction.

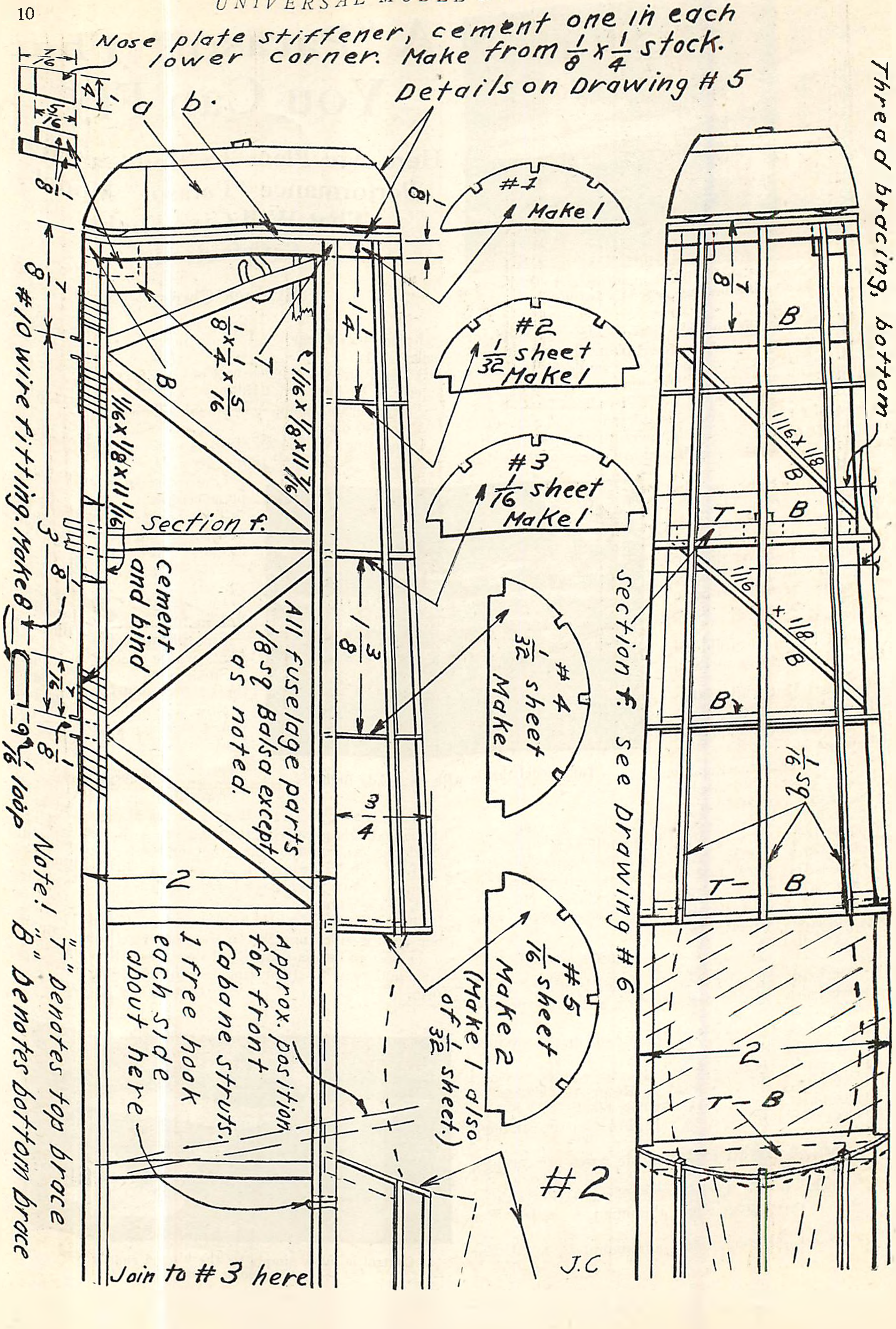
Fuselage

Assemble one side of the fuselage at a time. The 1/16 x 1/8 pieces in the front half of the body aid greatly in resisting shocks in flight. They should be cemented to the longerons before placing in the form. On Drawing No. 3, note that the bottom longeron is in two pieces, reinforced with a small 1/8 x 1/4 block at the joint.

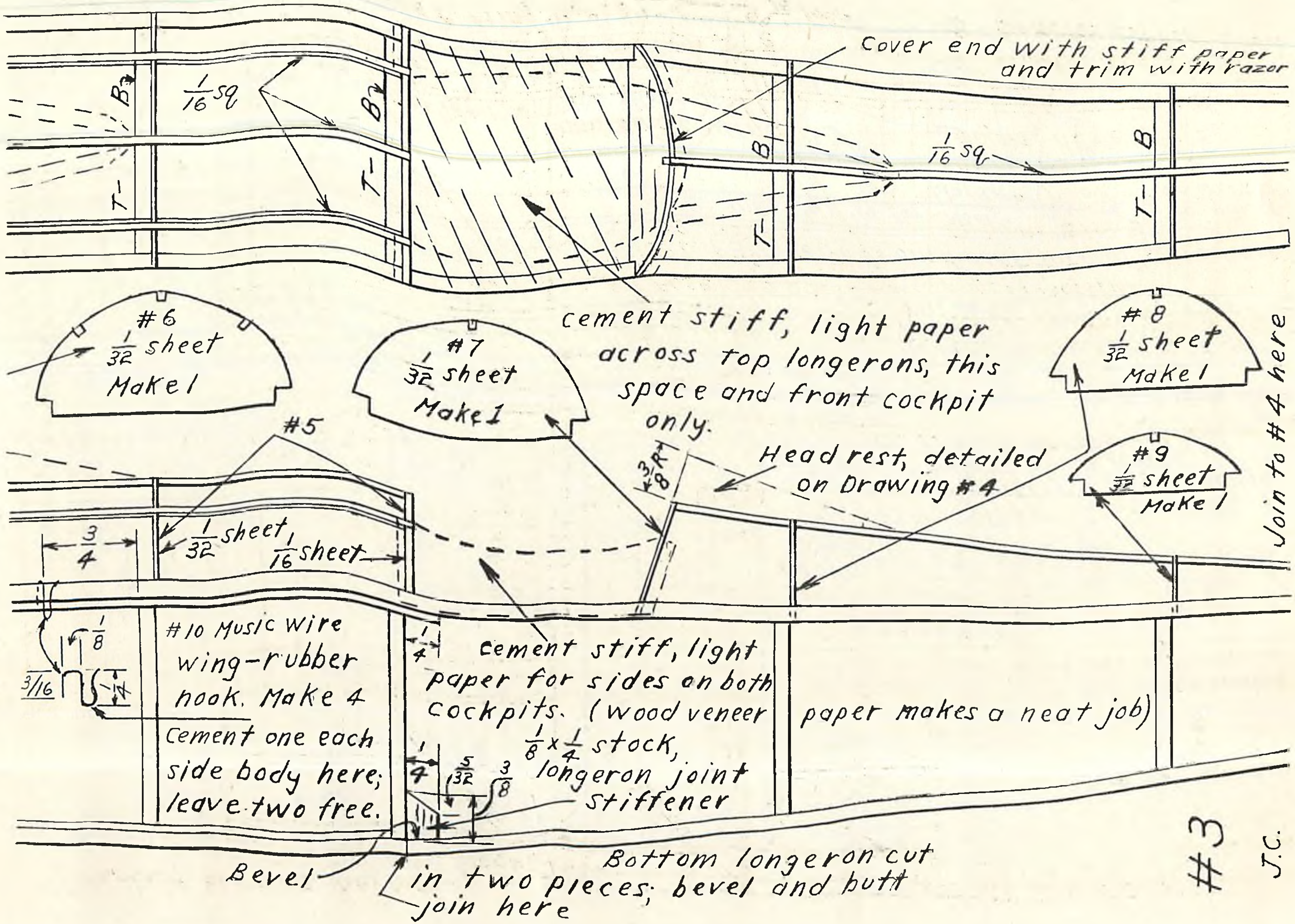
Allow about half an hour for each body side to dry, then set the sides upright on the plan view and cement in the bottom braces. You will have to wet the longerons, front and rear, to soften them before bending into the form. (*Continued on page* 18)

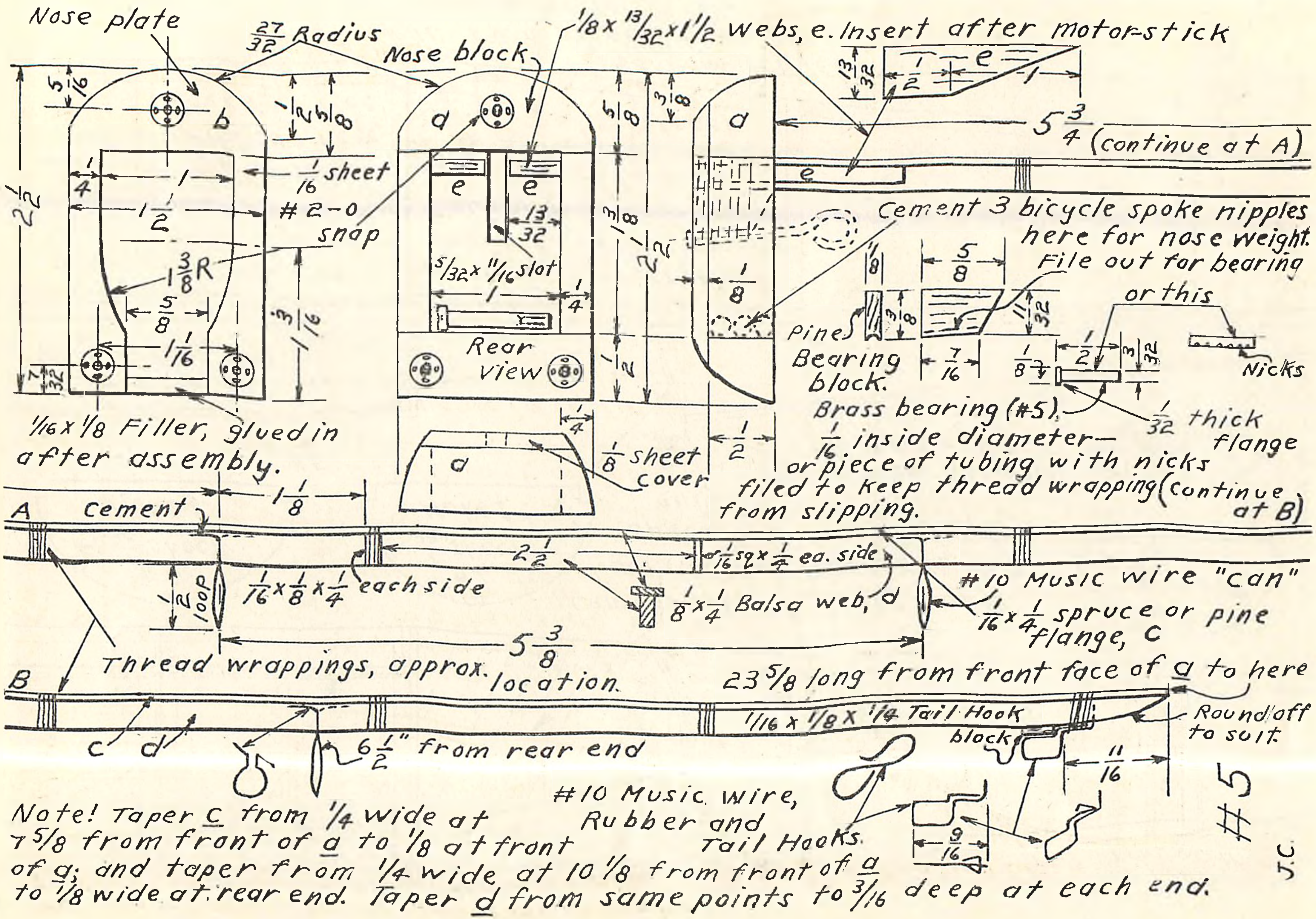


Control is made simple by the hinged rudder and adjustable wing

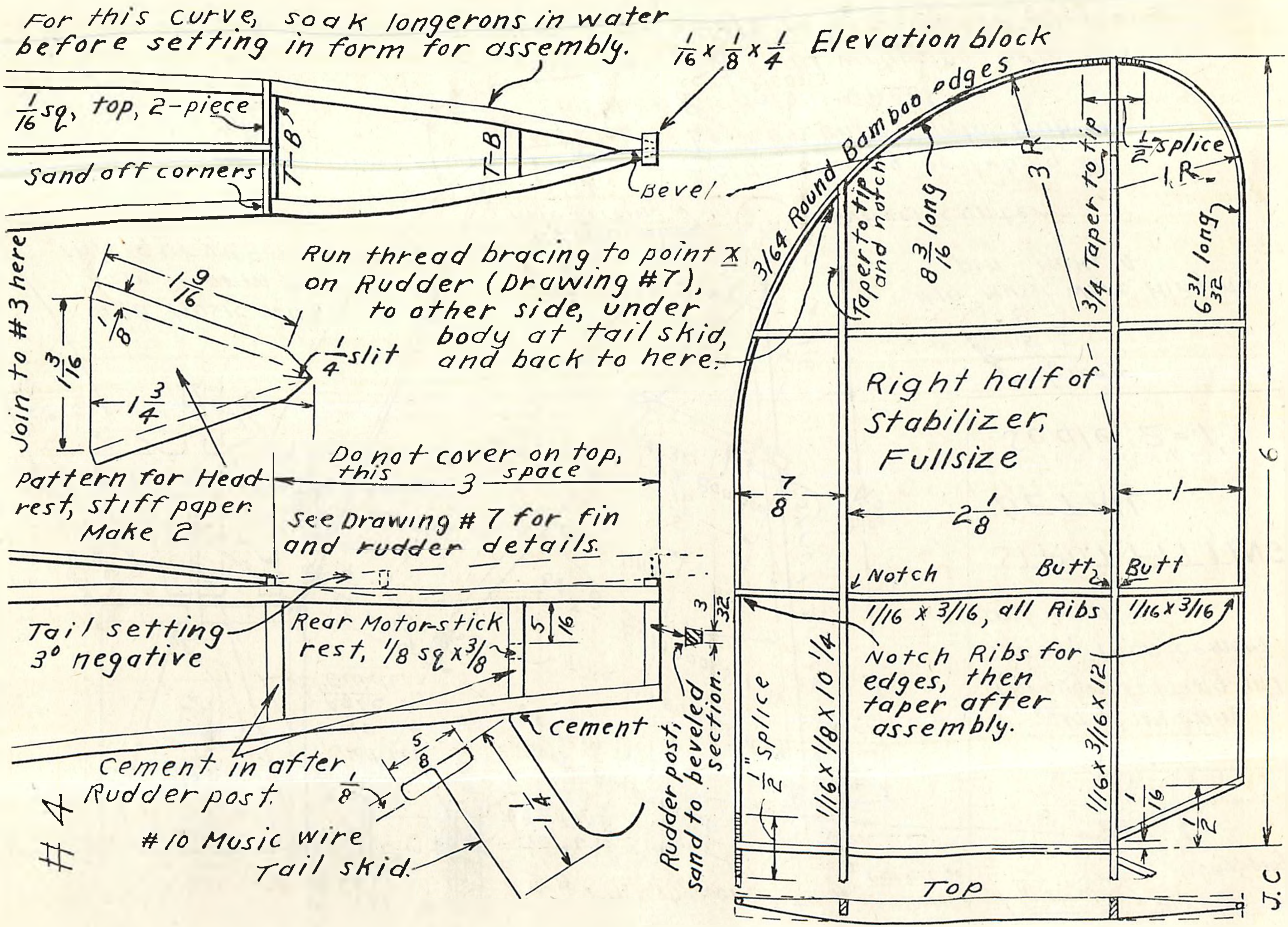


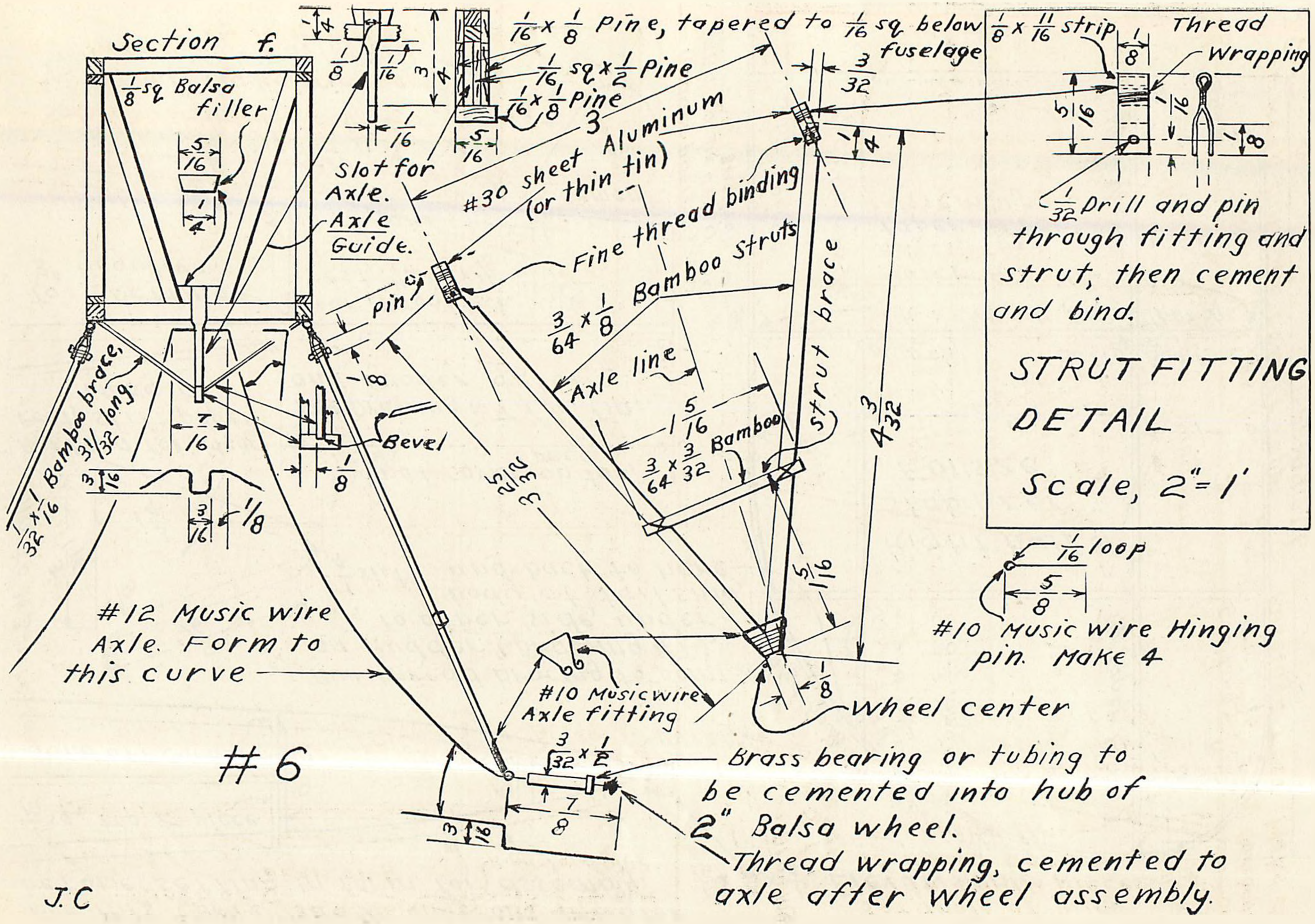
Nose plate stiffener, cement one in each lower corner. Make from 1/8 x 1/4 stock.
Details on Drawing #5
a
b.
#1 Make 1
#2 1/32 sheet Make 1
#3 1/16 sheet Make 1
#4 1/32 sheet Make 1
#5 1/16 sheet Make 2 (Make 1 also of 1/32 sheet.)
1/8 x 1/4 x 5/16
1/16 x 1/8 x 11 7/16
1/16 x 1/8 x 11 1/16
Section f.
Cement and bind
#10 Wire fitting. Make 8
9/16 loop
All fuselage parts 1/8 sq Balsa except as noted.
Approx. position for front Cabane struts.
1 free hook each side about here
Join to #3 here
Note! "T" denotes top brace "B" denotes bottom brace
Thread bracing, bottom
Section f. see Drawing #6
1/16 x 1/8
1/16 sq
T-B
#2
J.C


Cover end with stiff paper and trim with razor
1/16 sq
B
T-
1/16 sq
#6
1/32 sheet
Make 1
#7
1/32 sheet
Make 1
cement stiff, light paper across top longerons, this space and front cockpit only.
#8
1/32 sheet
Make 1
Join to #4 here
#5
Head rest, detailed on Drawing #4
3/8 R
#9
1/32 sheet
Make 1
3/4
1/32 sheet,
1/16 sheet
#10 Music Wire wing-rubber hook. Make 4
1/8
3/16
1/4
Cement one each side body here; leave two free.
1/4
cement stiff, light paper for sides on both cockpits. (wood veneer paper makes a neat job)
1/8 x 1/4 stock, longeron joint stiffener
1/4
5/32
3/8
Bevel
Bottom longeron cut in two pieces; bevel and butt join here
#3
J.C.

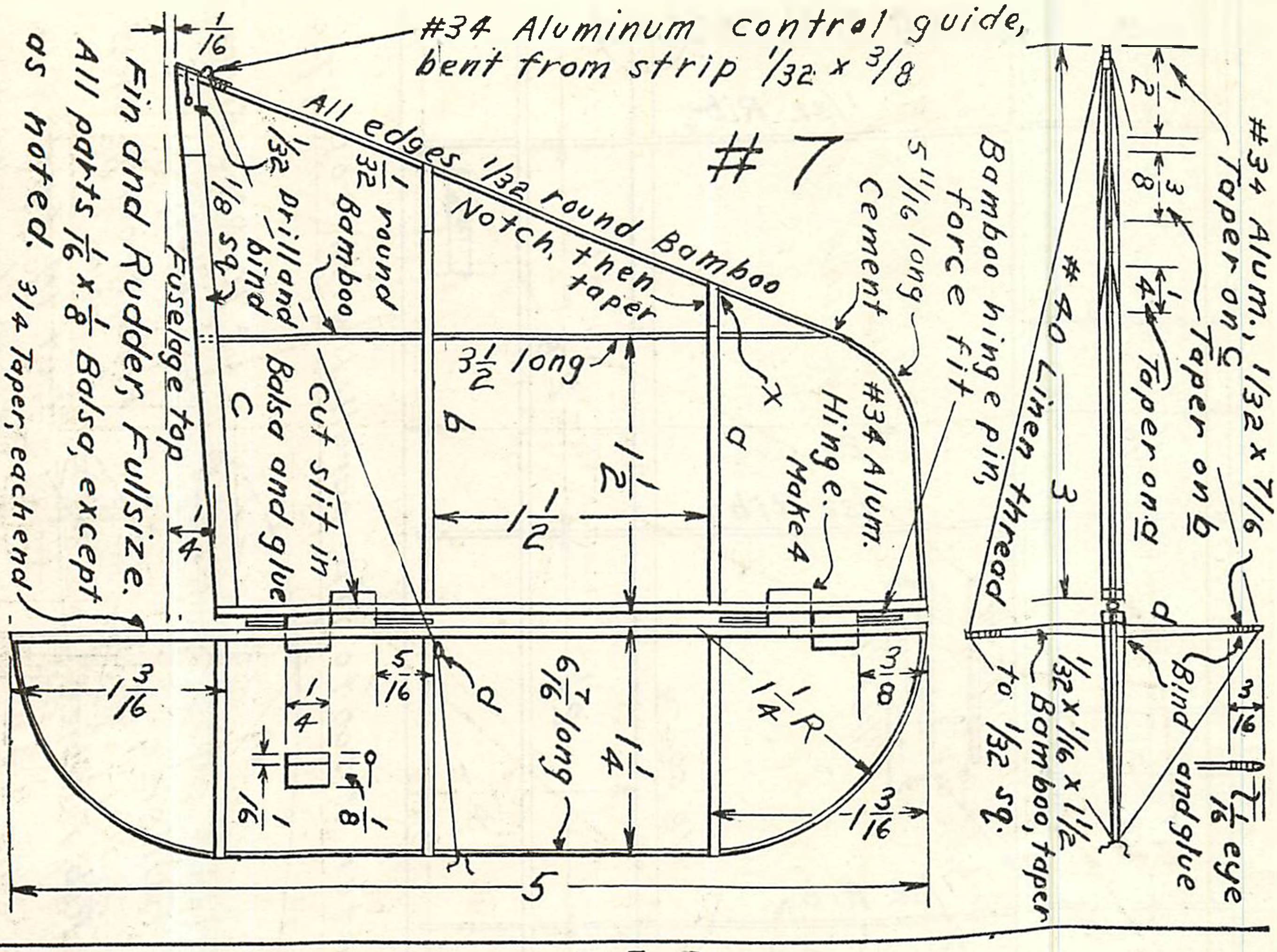


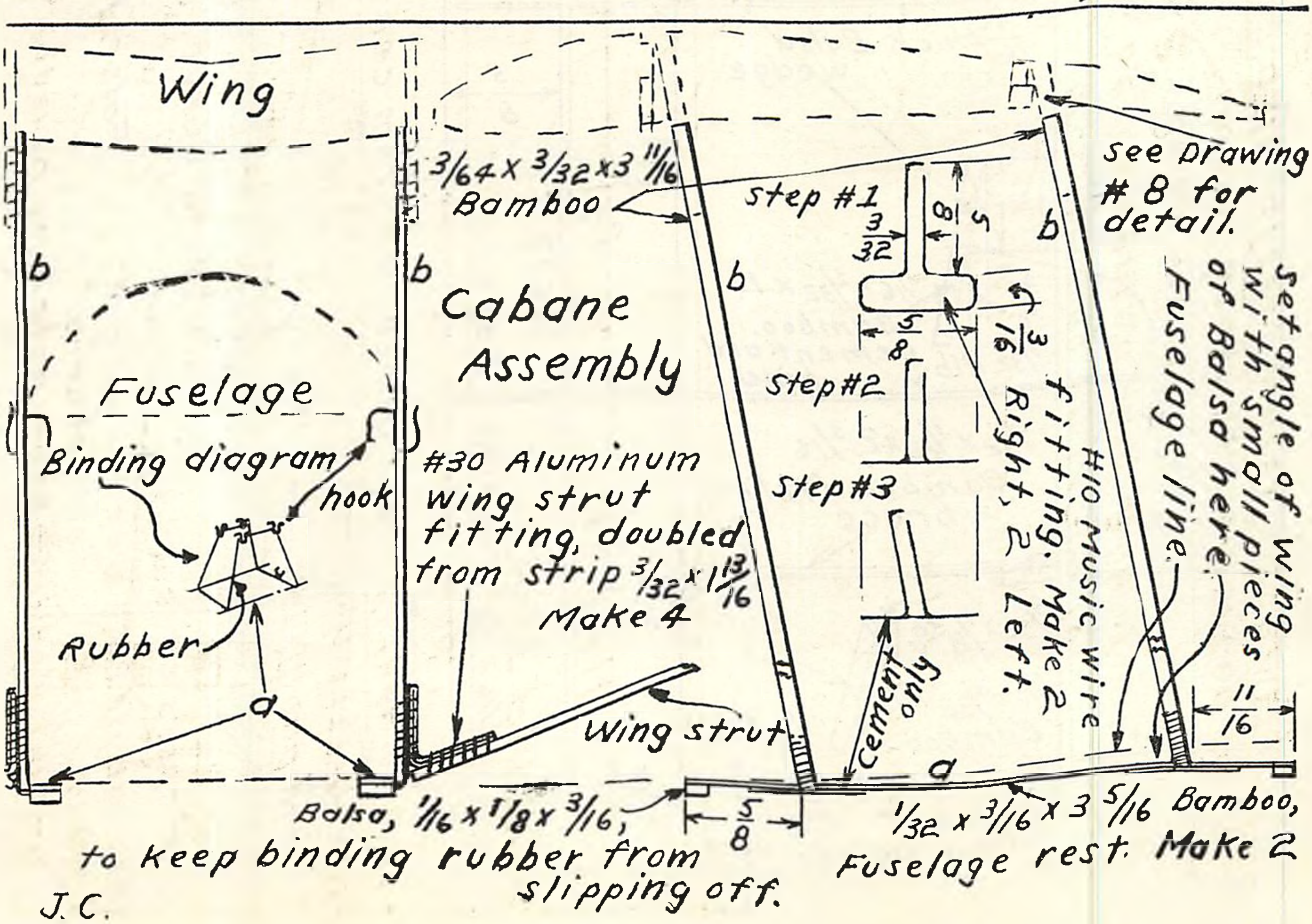
Nose plate
27/32 Radius
Nose block
1/8 x 13/32 x 1 1/2 webs, e. Insert after motor-stick
5 3/4 (continue at A)
1/16 sheet
#2-0 snap
1 3/8 R
Rear view
5/32 x 11/16 slot
Cement 3 bicycle spoke nipples here for nose weight.
File out for bearing
or this
Nicks
Pine Bearing block.
Brass bearing (#5).
1/16 inside diameter—
or piece of tubing with nicks filed to keep thread wrapping from slipping.
(continue at B)
1/32 thick flange
1/16 x 1/8 Filler, glued in after assembly.
1/8 sheet cover
A
cement
1/16 x 1/8 x 1/4 each side
1/16 sq x 1/4 ea. side
1/8 x 1/4 Balsa web, d
#10 Music wire "can"
1/16 x 1/4 spruce or pine flange, C
1/2 loop
Thread wrappings, approx. location.
23 5/8 long from front face of a to here
B
1/16 x 1/8 x 1/4 Tail Hook block
Round off to suit.
c
d
6 1/2" from rear end
#10 Music wire, Rubber and Tail Hooks.
#5
J.C.
Note! Taper C from 1/4 wide at 7 5/8 from front of a to 1/8 at front of a; and taper from 1/4 wide at 10 1/8 from front of a to 1/8 wide at rear end. Taper d from same points to 3/16 deep at each end.

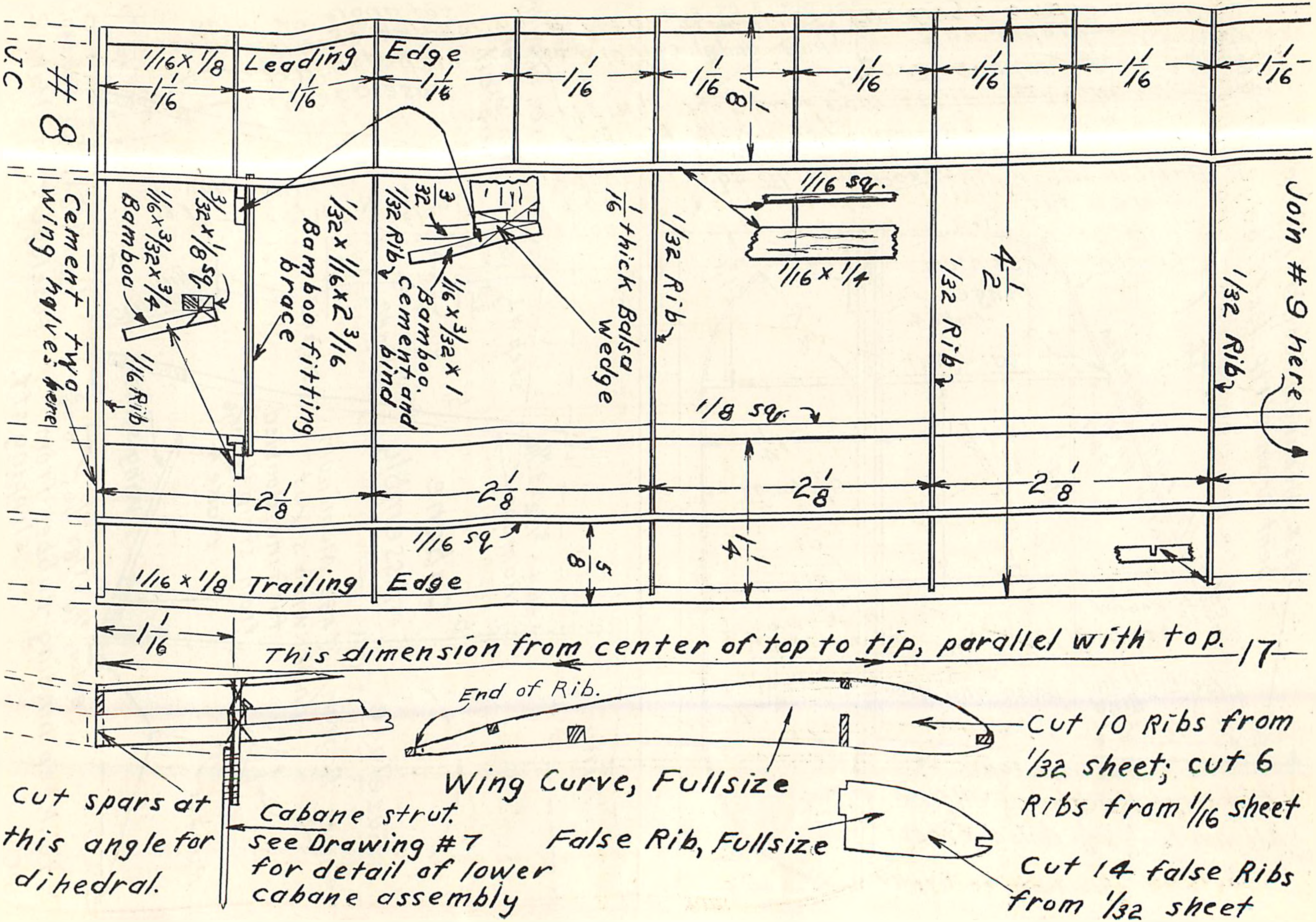

For this curve, soak longerons in water before setting in form for assembly.
1/16 x 1/8 x 1/4 Elevation block
1/16 sq, top, 2-piece
Sand off corners
T-B
T-B
Bevel
Run thread bracing to point x on Rudder (Drawing #7), to other side, under body at tail skid, and back to here.
Join to #3 here
1 9/16
1/8
1 3/16
1/4 slit
1 3/4
Pattern for Head rest, stiff paper. Make 2
Do not cover on top, this 3 space
See Drawing #7 for fin and rudder details.
Tail setting 3° negative
Rear Motor-stick rest, 1/8 sq x 3/8
5/16
3/32
Rudder post, sand to beveled section.
cement
Cement in after Rudder post.
5/8
1/8
1/4
#10 Music wire Tail skid.
#4
3/64 Round Bamboo edges
Taper to tip and notch
8 3/16 long
3 R
3/4 Taper to tip
1/2 splice
1 R
6 31/32 long
6
Right half of Stabilizer, Fullsize
7/8
2 1/8
1
Notch
Butt
Butt
1/16 x 3/16, all Ribs
1/16 x 3/16
Notch Ribs for edges, then taper after assembly.
1/2" splice
1/16 x 1/8 x 10 1/4
1/16 x 3/16 x 12
1/16
1/2
Top
J.C



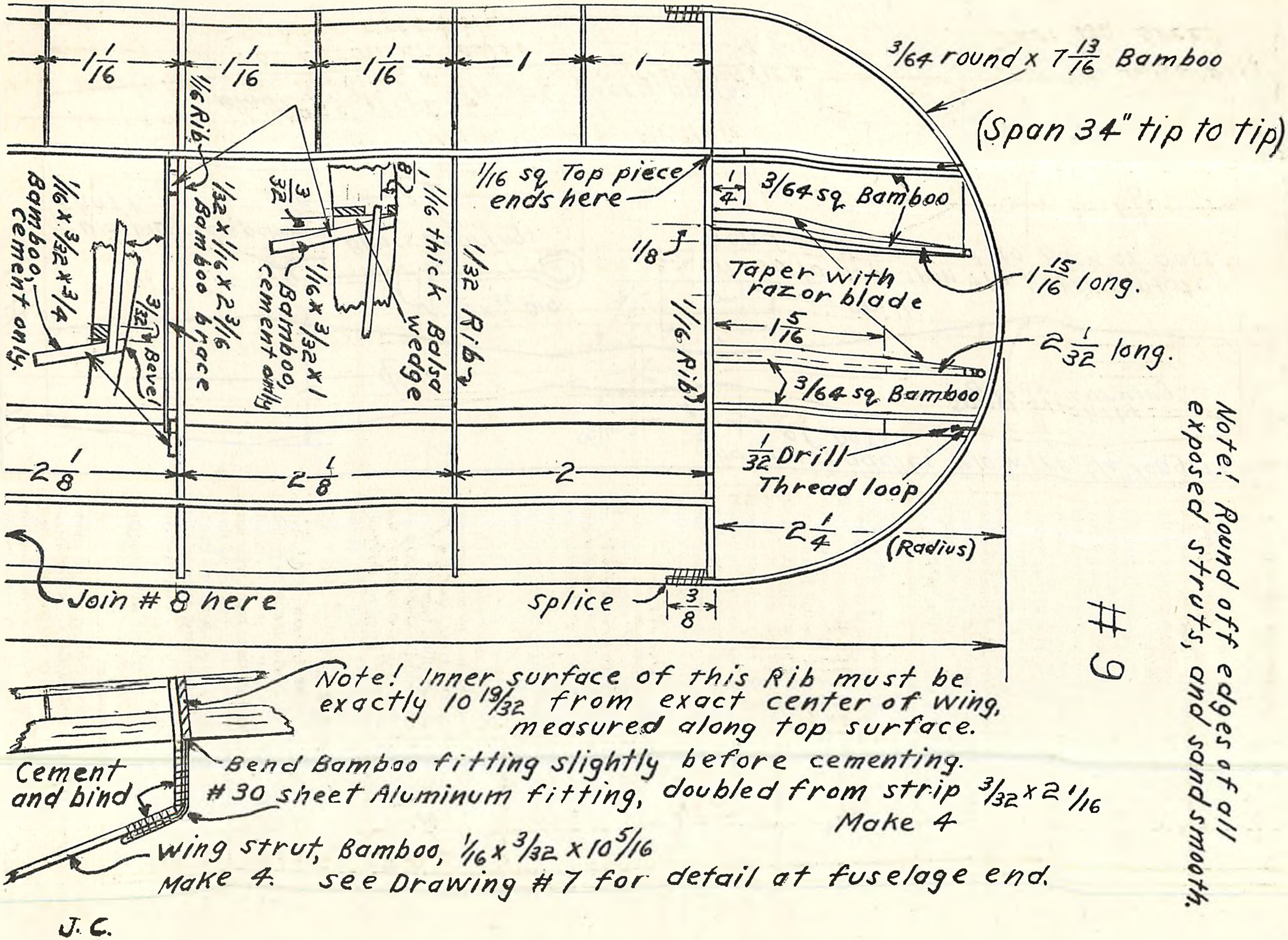
Section f.
1/8 sq. Balsa filler
5/16
1/4
Axle Guide.
Slot for Axle.
1/16 x 1/8 Pine, tapered to 1/16 sq. below fuselage
1/16 sq. x 1/2 Pine
1/16 x 1/8 Pine
3
#30 sheet Aluminum (or thin tin)
Fine thread binding
Bamboo Struts
3/64 x 1/8 Bamboo
Axle line
1 5/16
3/64 x 3/32 Bamboo
Strut brace
4 3/32
3/32
1/4
pin
1/8
Bevel
7/16
3/16
1/8
1/32 x 1/16 Bamboo brace, 3 1/32 long.
3 25/32
5/16
#12 Music wire Axle. Form to this curve
#10 Music wire Axle fitting
3/32 x 1/2
7/8
Wheel center
Brass bearing or tubing to be cemented into hub of 2" Balsa wheel.
Thread wrapping, cemented to axle after wheel assembly.
#6
J.C
1/8 x 11/16 strip
Thread Wrapping
1/32 Drill and pin through fitting and strut, then cement and bind.
STRUT FITTING DETAIL
Scale, 2" = 1'
1/16 loop
5/8
#10 Music wire Hinging pin. Make 4


#7
#34 Aluminum control guide, bent from strip 1/32 x 3/8
All edges 1/32 round Bamboo
Notch, then taper
1/32 round Bamboo
1/32 Drill and bind
1/8 sq.
Cut slit in Balsa and glue
Fuselage top
Fin and Rudder, Fullsize.
All parts 1/16 x 1/8 Balsa, except as noted.
3/4 Taper, each end
5 11/16 long
Cement
#34 Alum. Hinge. Make 4
Bamboo hinge pin, force fit
3 1/2 long
1 1/2
1 1/4
6 7/16 long
1 1/4 R
1 3/16
5
#34 Alum., 1/32 x 7/16
Taper on c
Taper on b
Taper on a
#40 Linen thread
1/32 x 1/16 x 1 1/2 Bamboo, taper to 1/32 sq.
Bind and glue
1/16 eye


Wing
Fuselage
Binding diagram
hook
Rubber
Cabane Assembly
3/64 x 3/32 x 3 11/16 Bamboo
#30 Aluminum wing strut fitting, doubled from strip 3/32 x 1 13/16 Make 4
Wing strut
Step #1
Step #2
Step #3
Right, 2 Left.
#10 Music wire fitting. Make 2
Cement only
See Drawing #8 for detail.
Set angle of wing with small pieces of Balsa here.
Fuselage line.
Balsa, 1/16 x 1/8 x 3/16, to keep binding rubber from slipping off.
1/32 x 3/16 x 3 5/16 Bamboo, Fuselage rest. Make 2
J.C.



J.C.
8
1/16 x 1/8 Leading Edge
1 1/16
1/8
1/16 sq.
1/16 x 1/4
Join # 9 here
3/32 x 1/8 sq.
1/16 x 3/32 x 3/4 Bamboo
1/32 x 1/16 x 2 3/16 Bamboo fitting brace
3/32
1/32 Rib
1/16 x 3/32 x 1 Bamboo. cement and bind
1/16 thick Balsa wedge
1/32 Rib
4 1/2
Cement two wing halves here
1/16 Rib
1/8 sq.
2 1/8
1/16 sq
5/8
1 1/4
1/16 x 1/8 Trailing Edge
This dimension from center of top to tip, parallel with top. 17
End of Rib.
Wing Curve, Fullsize
Cut 10 Ribs from 1/32 sheet; cut 6 Ribs from 1/16 sheet
Cut spars at this angle for dihedral.
Cabane strut. see Drawing #7 for detail of lower cabane assembly
False Rib, Fullsize
Cut 14 false Ribs from 1/32 sheet



3/64 round x 7 13/16 Bamboo
(Span 34" tip to tip)
1 1/16
1 1/16
1 1/16
1
1
1/16 Rib
1/16 x 3/32 x 3/4 Bamboo, cement only.
3/32 Bevel
1/32 x 1/16 x 2 3/16 Bamboo brace
3/32
1/8
1/16 x 3/32 x 1 Bamboo, cement only
1/16 thick Balsa wedge
1/32 Rib
1/16 sq. Top piece ends here
1/4
3/64 sq. Bamboo
1/8
Taper with razor blade
1 15/16 long.
1/16 Rib
1 5/16
2 1/32 long.
3/64 sq. Bamboo
1/32 Drill
Thread loop
2 1/8
2 1/8
2
2 1/4
(Radius)
Join #8 here
Splice
3/8
#9
Note! Round off edges of all exposed struts, and sand smooth.
Note! Inner surface of this Rib must be exactly 10 19/32 from exact center of wing, measured along top surface.
Bend Bamboo fitting slightly before cementing.
Cement and bind
#30 sheet Aluminum fitting, doubled from strip 3/32 x 2 1/16
Make 4
wing strut, Bamboo, 1/16 x 3/32 x 10 5/16
Make 4. see Drawing #7 for detail at fuselage end.
J. C.

A "Parasol" That You Can Fly

(Continued from page 9)

After assembling all top and bottom cross-bars, refer to drawing No. 5 and cut out the nose plate, *b*, from 1/16 sheet. Cement on the knobbed flat halves of three No. 2-0 dress snaps, as shown. Cement the nose plate to the front of the body, getting it squared up.

Cut to size and bevel off the two diagonals and the filler piece shown at section *f* on drawing No. 6. Assemble these in the second section back (section *f*, drawing No. 2), being careful to get the pieces exactly centered. Cut out and assemble the pine axle guide pieces as shown on drawing No. 6, but do not make or glue in place yet the 1/32 x 1/6 bamboo braces or the bottom pine piece.

Next make and assemble the top cowling formers numbered from 1 to 9 on drawings No. 2 and 3 and then glue in the 1/16 square stringers. Observe the two 1/16 square pieces each side of the rear end of the back stringer, drawing No. 4. The leading edge of the stabilizer fits flush against these.

Bend to shape all metal fittings, attach, and then cover the fuselage. First, cut the piece of silk into three strips slightly over two inches wide. With a light coat of cement or wing dope along the edges of the frame-work, stick the three pieces over the first two panels, one strip on each side and one on the bottom. Cut small holes in the bottom strip so it will fit over the protruding axle guide pieces. Apply one coat of light dope and when dry cover this over again and the rest of the sides and bottom with "Superfine" tissue strips. Cover each side and the bottom separately. Then cover the top, all except the cockpit spaces and the last space where the stabilizer goes. Small pieces of cellophane serve well for windshields if desired on the ship.

Motor-Stick Unit

From the ½ x ⅝ x 4½ piece in the material list, cut two pieces ¼ x ½ x 1⅜, one piece ½ square x 1½ and one piece ½ x ⅝ x 1½. From the ⅛ x 2 x 4 piece, prepare also the cover piece 1¼ x 2⅛. Glue all these parts together in a box shape and cut the slot in the front cover. This forms the nose block, *a*, drawing No. 5. Carve and sand the edges and corners to the form shown. Cement on the other halves of the dress snaps.

Next build up the T-section motor-stick with the ⅛ x ¼ balsa and the 1/16 x ¼ pine pieces, applying a good coat of cement between the pieces. Taper each piece as noted on the plan before cementing together. [Note: The downward angle that the propeller shaft makes with the motor-stick is very close to 5 degrees, and has been found by experiment to be the best setting for this model in order to combine steady power flight with perfect glide.]

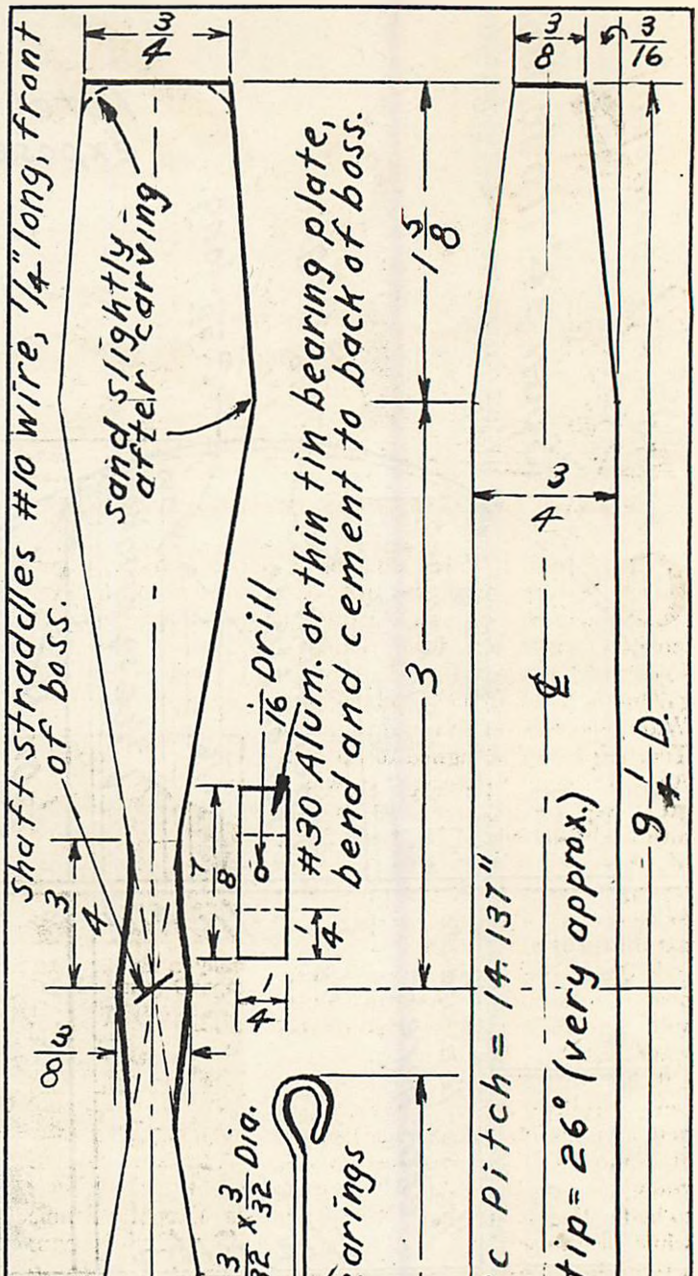
Landing Gear

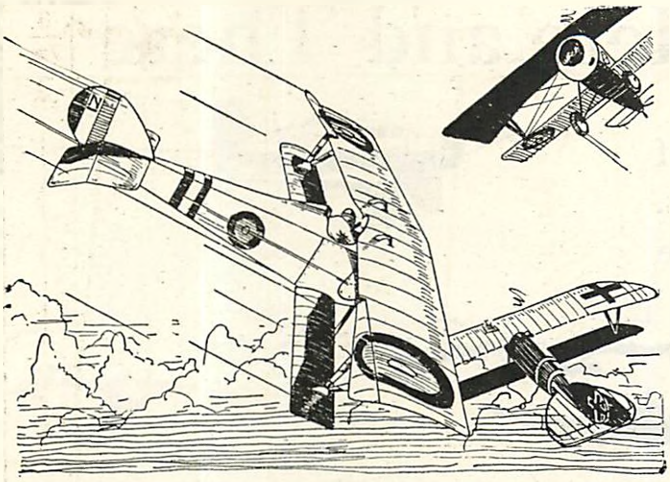
Although there is some work in making this type of under-carriage, you will be delighted with its realistic spreading action. Drawing No. 6 gives the details. Assemble the two V-sides so that both will have the glossy side of the bamboo out. It is best to jig these Vees—that is, drive pins around the drawing or a tracing and set the V-sides in this form to dry, after beveling and cementing together the lower ends. In this way you will get each side exactly alike.

A coat of airplane dope on the wheels will strengthen them considerably.

Empennage

The empennage—that is, the stabilizer, fin and rudder—is the next step. Refer to drawing No. 4 for details, showing the right half full-size of the stabilizer. It is well to trace this plan off in such a manner that you have a pattern of the complete tail, both sides. *(Cont. on pg. 39)*





Roosevelt dives to the attack. (By Albert Weinstein)

Quentin Roosevelt "Over There"

A Vivid Story of How a Great Son of a Great Man Fought and Died While Flying for His Country

By F. Condé Ott

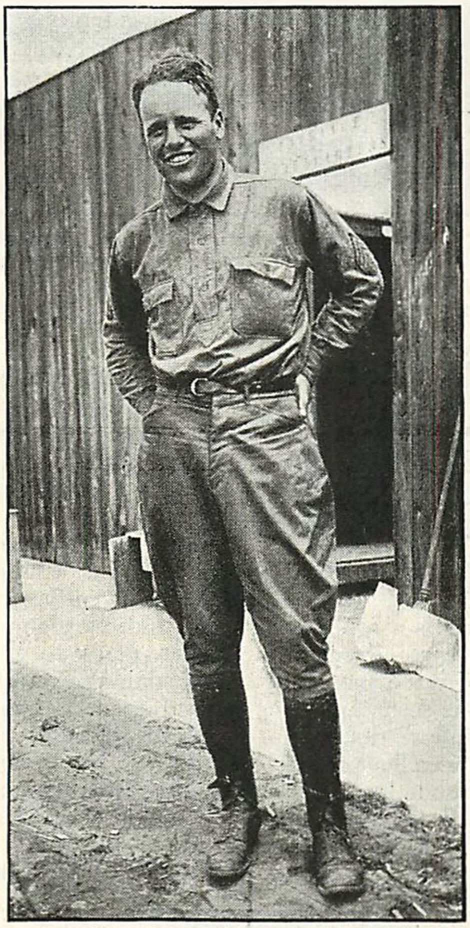
ON June 1, 1918, a young American officer, eager to carry on in the steps of an illustrious forbear, achieved a long-awaited ambition. First Lieutenant Quentin Roosevelt, son of the famous Theodore Roosevelt, former President of the United States and gallant hero of many conflicts in the Spanish-American War, reported for flying duty at the Toul Airdrome, assigned to the 95th Aero Pursuit Squadron. It was a great day for "Quent," as he was intimately known to his wide circle of friends. For months he had been trying to reach the front lines, only to have myriad obstacles of official nature thrust in his way.

With flying instructions completed at Issoudun, Quentin Roosevelt's entire company moved forward toward the scene of action. Official orders kept Quentin at camp, retained as an instructor for new arrivals. While serving here he did much to endear himself to his young charges by constantly striving to better their conditions. But all the while he himself yearned for more active duty. Finally his continued pleas for transfer were heeded and he arrived at Toul.

Just at this time it happened that there was not much war activity in this particular region and so, on June 27, the squadron received orders to move on to Touquin in the Château Thierry sector. Here conditions were more to the liking of the virile young Americans who had come so far to seek action in the Great War. A host of duties awaited them.

The Pursuit Group to which young Roosevelt was attached was detailed to serve as a protecting wing to the photographic and observation planes that daily scoured the countryside of their region, usually flying at an altitude of about 5000 to 6000 meters.

When on such missions, it was the primary duty of the pursuit ships to clear the skies of all foreign planes in the area being traversed by the Allied observers. This was a herculean task, as the Germans had concentrated a vast fleet of planes thereabouts and the Americans were frequently outnumbered from three to five to one. On top of this pleasant occupation, the pursuit group was also burdened with the responsibilities of defending the entire region which reached from Dormans to Faurolles, from the depredations of enemy airmen. The latter, which included the famous Baron von Richthofen's flying circus, came over frequently to do a bit of observing on their own account and occasionally indulged in a bit of "strafing" of the infantry in the Allied trenches.



Quentin Roosevelt as an instructor in France

So the duties of Quentin Roosevelt and his comrades of the air were varied. Fortunately their ships compared favorably with those of the Boches. While the latter were flying Fokker D-7's, the Americans toured the smoke-laden air in Type 28 Nieuports, motored with nine-cylinder rotary engines and equipped with a pair of Vickers machine guns that fired directly through the propellers. Here, at least, the foe held no advantage.

DURING the first week in July, Lieutenant Roosevelt achieved his first victory. It was officially witnessed and credited and earned for him the Croix de Guerre with palm. Rather strange and amusing circumstances surrounded this conquest and "Quent" was the victim of no end of good-natured banter about it. Yet the experience was in itself a peculiar one and might have ended disastrously for the American, had his cool courage and ready wit failed him in the emergency.

Young Roosevelt's squadron was flying along on patrol one morning at an altitude of about five to six hundred meters. The sky was fairly cloudy and the visibility none too good. Thus when the group made a sudden left turn through a particularly large and dense mass of fleecy vapors, Quentin, far out on the extreme right side of the formation, lost contact with them in the baffling, soupy atmosphere. It seemed but a moment's work to catch up with them, but the elements were against him. He searched hither and yon for sight of his companions, as occasional breaks in the misty skies offered him a *(Continued on page 42)*

AIR WAYS—Here and There

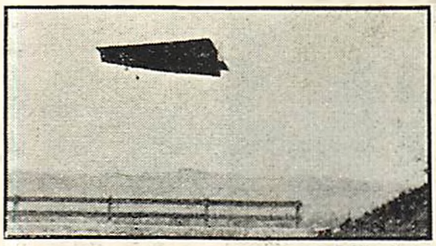
Get Busy and "Air Your Ways" of Building and Flying Model Planes. In This Column, Space Will be Devoted to the Activities of our Readers. Let Others Know What You Are Doing

A Northrop Mail Plane streaking across snow-covered Ohio. (By Robert Sweet)

THIS month we are able to present to you some pictures of exceedingly fine models, built by readers from various parts of the country. Many young men are taking advantage of the opportunity which we are rendering in this column to give valuable ideas to other readers. This helps to establish a co-operation and a brotherhood among the young men who are aeronautically inclined. The value of such a brotherhood is that new ideas and general information on aviation are more or less organized to such an extent that they may be used universally by boys throughout the country.

Contributions from Robert W. McKee of 702 Ridge Avenue, Zanesville, Ohio, are shown in Pictures No. 1 and No. 2. The first picture shows one of the latest Northrop mail planes. This is a solid scale model in which the details have been carefully carried out. It is more than the usual "hunk" of wood that many young men call a solid scale model. In the second picture, a Fokker and a Spad show some very fine workmanship.

Picture No. 4. A new and radical airplane built by Roy Scroggs of Eugene, Oregon.

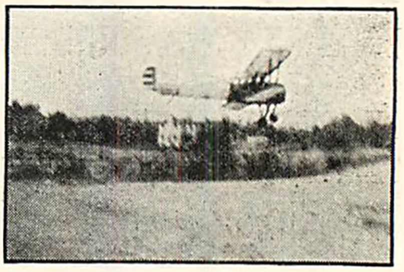


Picture No. 5. One of Roy Scroggs' large experimental gliders in flight

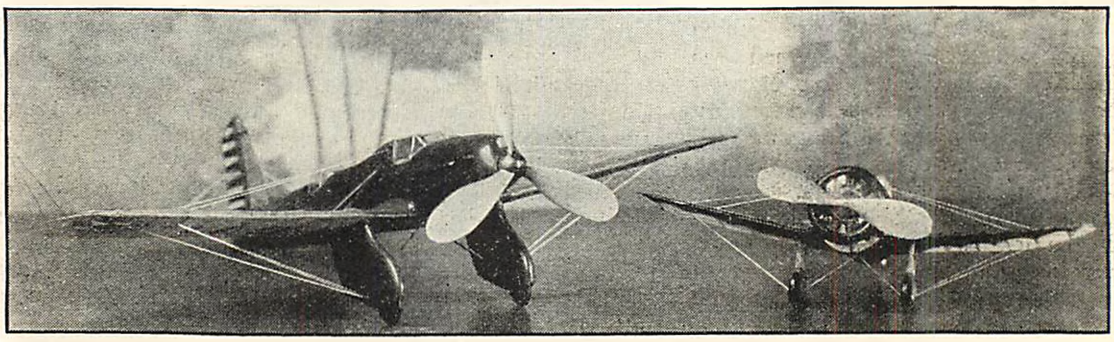
Picture No. 3 shows two more very excellent models, a Curtiss A-8 Attack and a Gee-Bee, built by Glen E. Courtwright of 861 South State Street, Lincoln, Illinois. Courtwright says that both these ships were made from plans in this magazine and are good flyers. The Gee-Bee, however, is quite fast and slightly tricky. It has a 15″ wing spread. He also submits a very helpful idea that will prove valuable to model builders. Here it is, as follows:

A cylinder head may be made by wrapping a cork with string, painting it with two coats of ambroid and then painting it black. Let the ambroid and paint dry thoroughly, after which pick out the cork from the center. You will have a shell made of thread and ambroid, which may be used as a cylinder on your model. This method is very unique and by means of it you can make a dummy motor which is extremely light. This type of motor is on the Gee-Bee model.

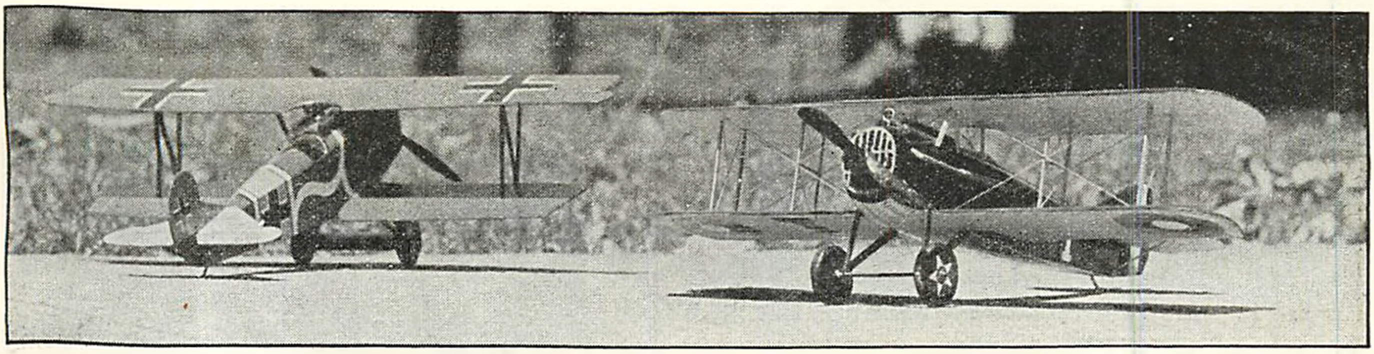
THERE is a gentleman in Eugene, Oregon, by the name of Roy B. Scroggs, "P.O. Box 465," who has been experimenting with a new type of airplane. In fact, the machine is an elaboration on the darts that we occasionally launch around the schoolroom during unfortunate lulls in class routine. Picture No. 4 shows the large machine, powered with a gas engine, and its inventor with his hands on the propeller, ready to give it a spin. We understand from Scroggs that the machine was built as an experiment without the expectation of perfect flights. In building this machine, he



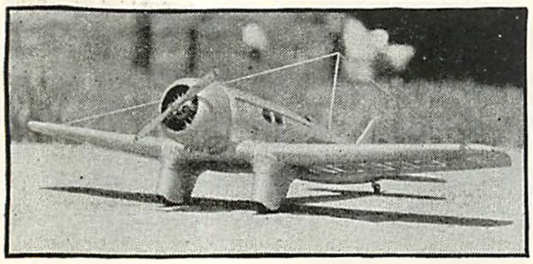
Picture No. 6. A Nieuport No. 28 in flight, built from plans in this magazine, by Pattee of Pueblo, Colo.



Picture No. 3. A Curtiss A-8 and a Gee-Bee. Both are flying scale models by a clever builder, Glen E. Courtwright of Lincoln, Ill.



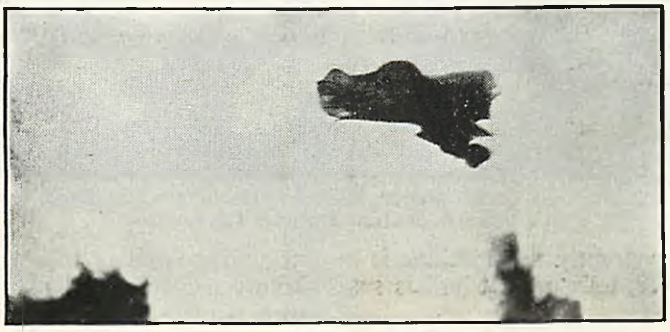
Picture No. 2. A solid scale Spad and Fokker D-7 of fine workmanship, by Robert W. McKee



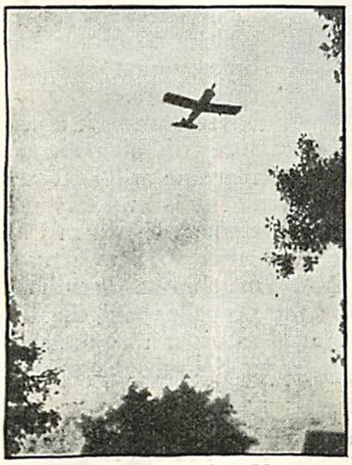
Picture No. 1. A solid scale Northrop, beautifully made by Robert W. McKee, Zanesville, Ohio.

wished to determine what other features would be required to bring it up to perfection. I understand that his experiments have been fairly successful. The thing which inspired Scroggs to build the large machine was the success which he attained in flying models of this type. One of the first ones to be constructed was in 1910.

Picture No. 5 shows an exceedingly large model glider of this type, which has been launched from the top of a hill. It is 5 feet long. We feel sure that Scroggs would be glad to tell more about the machine to those readers who might be interested enough to write to him.



Picture No. 9. Ken Ernst's Gee-Bee tears off a little speed



Picture No. 7. Irving Neittich suspends his model by threads to test it

Picture No. 8. Henry Hughes and his 9-foot compressed air model

Picture No. 6 shows a Nieuport No. 28, built by Jim Pattee, 509 West 16th Street, Pueblo, Colo. He says it is a very successful flying model, costing about $2.00 to complete. The accompanying picture certainly demonstrates its flying quality. Since July, Pattee tells us that he has built 13 different models. We cannot help but wonder, after seeing the amount of research that many of our young men are doing throughout the country, how long it will be before some of our staid and non-progressive airplane designers will lose their jobs. In a few years these young men will set a pretty fast pace in the aeronautical field, we are sure.

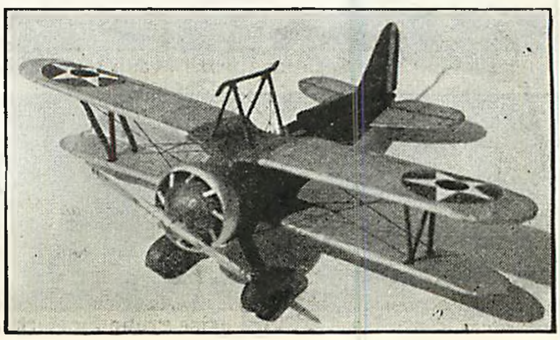
The important point about the development of model aviation is that it is teaching young men to think and not merely to acquire a memorized knowledge of standardized ideas regarding aeronautics which pass out of date as the science progresses.

Picture No. 7 shows an experimental model built by Irving Neittich of 844 44th Street, Brooklyn, New York. Apparently it is flying along beautifully. However, Neittich tells us that it is suspended in mid-air by means of threads. He proceeded to do this not merely to make it easy for him to take this photograph, but in order to test the model's flying qualities when a steady wind was blowing. This method proved quite successful, for he was able to balance the ship correctly before a trial flight was made. In this way he avoided possible crackups through proper balance and adjustment.

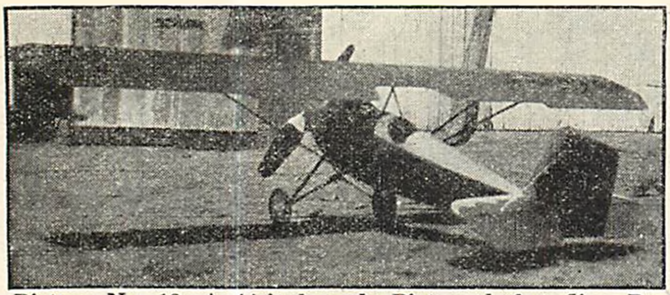
Picture No. 12. An S.E.5 gets up in the world. By Wilbur Wormuth

HERE is an idea that might interest some of our readers. Picture No. 8 shows Henry S. Hughes of 2215 Oh Street, Sacramento, California, with his 9′ compressed air model. The wing cord is 12″. Recently it made a flight of 1 minute, 14 seconds, on 90 pounds pressure. The power plant is a three-cylinder Hoosier motor, with a 30″ tank. A complete movie record was taken of this flight by Mr. Doyal at the time.

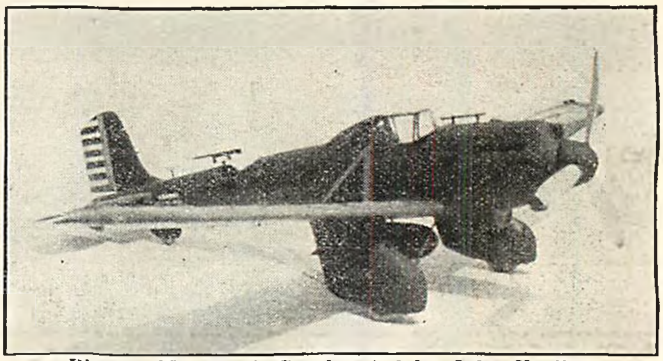
Here we have an unusual picture, No. 9. It shows a Gee-Bee Supersportster tearing through space. Readers



Picture No. 11. An F.9-C.2 Fighter by E. R. Conover. A neat ship.



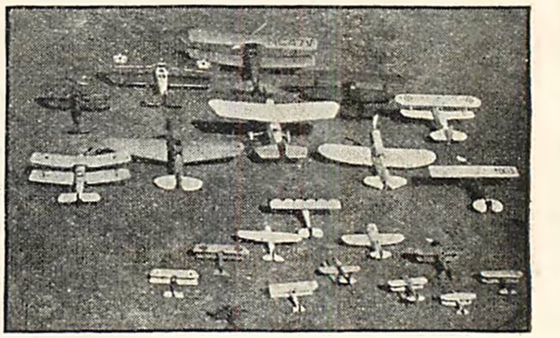
Picture No. 13. A 44-inch scale Pietenpol that flies. By Arthur Schwartz



Picture No. 10. A Curtiss A-8 by John Voelker

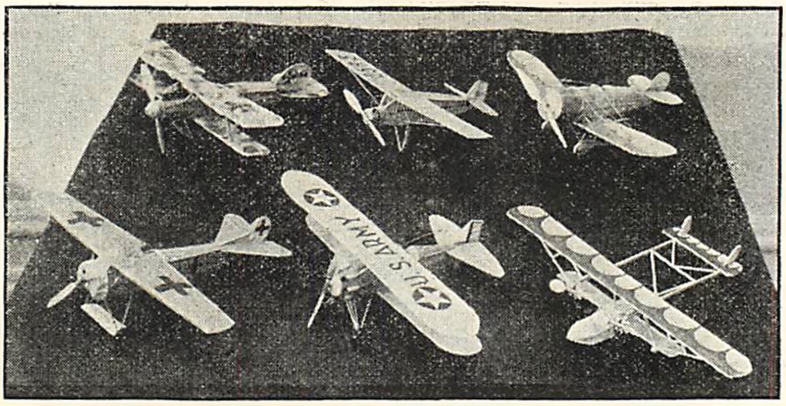
who have built models of the Gee-Bee will realize that it is difficult to fly this ship, let alone get a picture of it in flight. The machine was built by Kenneth Ernst of 706 North DeQuincy Street, Indianapolis, Indiana.

John G. Voelker of 923 East Chase Street, Baltimore, Maryland, is responsible for the ship shown in Picture No. 10. It is a Curtiss A-8 Attack plane, which won first prize at a scale model contest held by the National Air Legion at Baltimore. If the readers will examine this picture, they will see that all details have been carefully carried out. The model has a wing spread of 26" and the controls operate tail surfaces and ailerons from the front cockpit. The bomb can be released from the rear cockpit. Voelker worked two months to complete this ship.



Picture No. 20. A group of trim craft built by Harold F. Maschin, expert builder of Westfield, Mass.

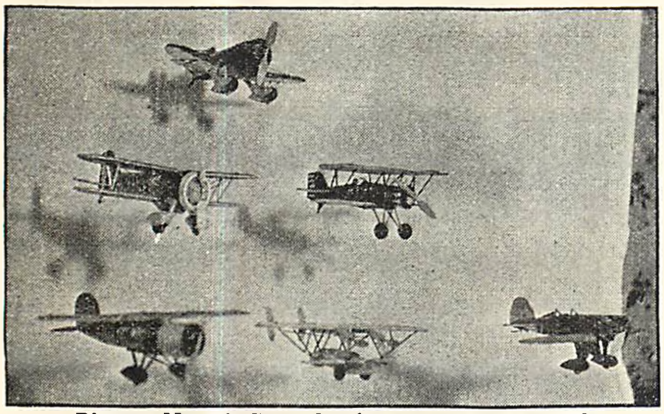
An old friend, E. R. Conover, Jr., of 23 Croton Avenue, Tarrytown, New York, has sent us Picture No. 11 of his F.9C.2 Fighter. Conover is an old hand at model building and, as readers may see, this model has been constructed in great detail.



Picture No. 15. These planes built by Herbert Hirschland won first prize in National Model Co. contest

Wilbur Wormuth of Cobleskille, New York, has sent us Picture No. 12 of his S.E.5. Apparently this machine is in free flight. Wormuth, however, tells us that he has suspended this machine in mid-air by means of threads, as the picture taken of it in actual flight was blurred. Though this flight picture has been "faked," this machine will fly beautifully. This ship is one of 45 models of every type which Wormuth has built within the last three years.

Here we have a picture of a make of machine which has never appeared in this magazine and it is probably unknown to many readers. It is a Pietenpol, shown in Picture No. 13. This was built by Arthur F. Schwartz of Kiowa, Kansas, R. R. No. 2-A. This ship has been built carefully to scale except for the propeller and chassis, which have been slightly changed in order that the ship might be flown with power. Even the ribs have been spaced properly as on the large ship. It has a span of 44".

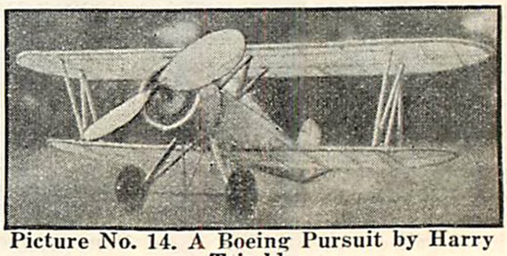


Picture No. 16. Second prize group by Carl Piltz

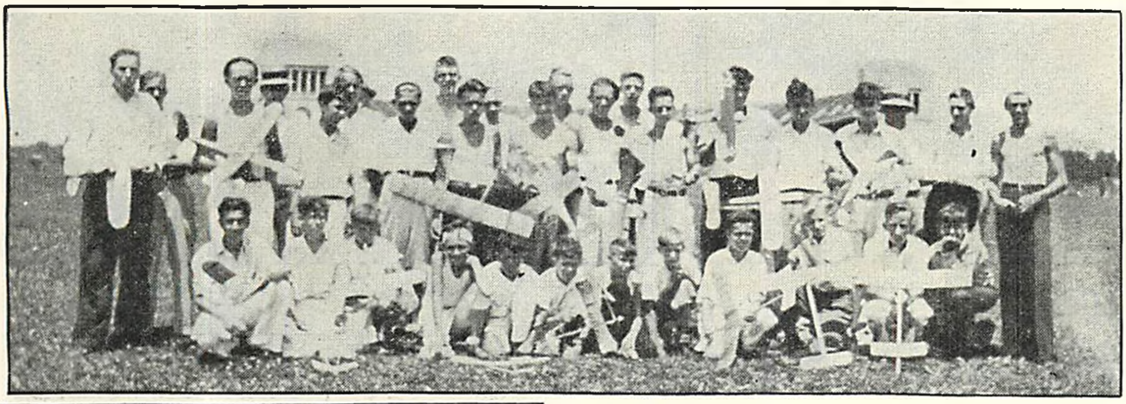
PICTURE No. 14 shows a Boeing Pursuit ship that was built by Harry Trimble of 9-B Forsyth Avenue, Fort Riley, Kansas. He tells us that it has been made exactly twice the size of the three-view layout published in a past issue of our magazine. This picture shows that Trimble has employed some careful workmanship in the construction of this model.

Herbert Hirschland of Kenilworth Road, Harrison, New York, is the builder of the planes shown in Picture No. 15. This picture won first prize for him in the Na-

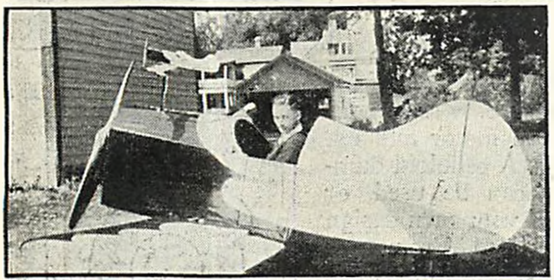
Picture No. 17. Third prize group by Herbert E. Van Patton



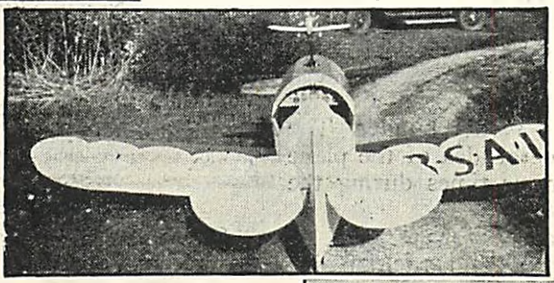
Picture No. 14. A Boeing Pursuit by Harry Trimble



Contestants at a recent model meet of C. S. M. E. members at Cleveland



Picture No. 18. A Pilot Trainer constructed by group of boys of Westfield, Mass.



Picture No. 19. Rear view of Trainer. Harold Maschin directed its construction

tional Model Airplane Company's recent contest. It was required that he build six ships from plans furnished by this company and then photograph them in such a way that the details and quality of his workmanship would show to good advantage. Hirschland has done an exceptionally fine job, as can be seen. The planes have about a 12″ wing span. This small size makes it difficult to accomplish a neat-looking job.

Carl Piltz of 542 Rosedale Street, Pittsburgh, Pa., won second prize with Picture No. 16.

Third place was won by Herbert E. Van Patton of Avoca, New York, with Picture No. 17.

CLUB NEWS

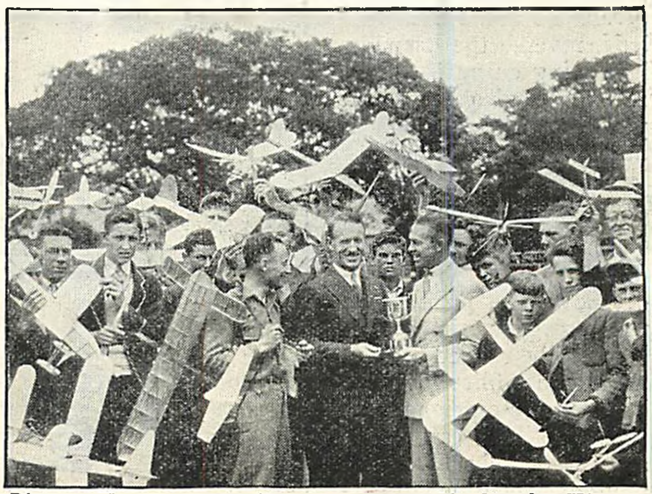
IN Westfield, Mass., there is a group of young men belonging to one of the scout troops which has directed aeronautical activities in a very unusual direction. During the last three years it has been their custom to have an aviation booth at the Eastern States Exposition. This year, as their project, they built an airplane ground trainer. Most of the boys have built models for several years and wished to do something different.

Pictures No. 18 and No. 19 show how different is the work of these boys. These young men are able to receive a certain amount of training as pilots by the use of this machine. The would-be pilot sits in the cockpit and operates the controls. The small model on the top of the trainer indicates the effect of the pilot's maneuvers. It will act just like a large ship when the controls are operated. The idea is to keep the model on a level keel, in normal flying position.

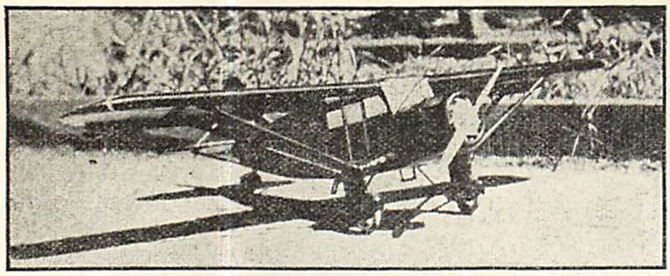
This trainer was built during the summer vacation by the boys of the troop, who were able to complete it in two and one-half months at a cost of $12.00. It has a wing span of 17′ and an overall length of 11′. The wings and fuselage are constructed of wood, the wings being detachable, which allows it to be moved conveniently. The small model, which indicates the action of the controls is equipped with an electric motor taken from an automobile horn. In the cockpit is a transformer, representing the throttle, *(Continued on page 46)*

Picture No. 21. Searles of Australia launches "Winnie"

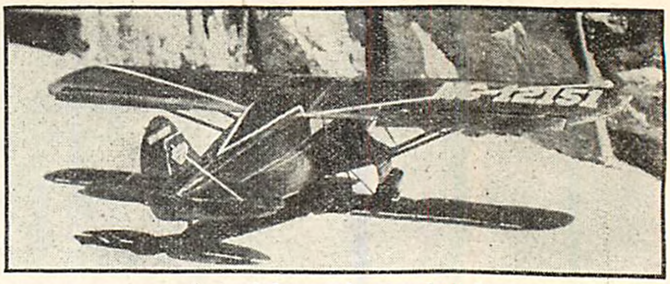
Picture No. 22. Australia boasts of "Hydros," too



Picture No. 23. Australian boys honor Sir Charles Kingsford Smith



The finished model, Stinson "R"



A model or a large plane?

Building the Stinson "R"

These Instructions to Build a Solid Scale Model of One of the Latest Commercial Planes, Provides An Enjoyable Pastime

By Burton Kemp

THE Stinson Model R is one of today's modern planes that is used extensively. Its clean-cut, racy lines should appeal to the model builder. The assembly view will give you a general idea of the plane and should be referred to at various times during the construction.

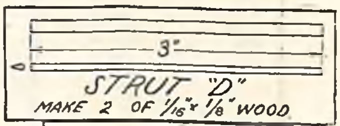
The plans given here are for a solid scale model of this fine ship. However, the ingenious model builder may use these drawings to build a detailed scale or flying scale model by supplying the details of the frame structure within the wings, fuselage and tail surfaces, to suit his taste. Drawings which are primarily for solid scale models thus may serve several purposes.

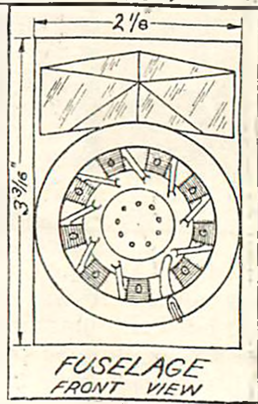
Wings

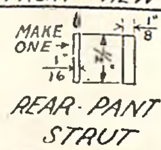
The wing is shown in drawing No. 2. Note that part is not shown, but the full length dimension is given. To make the other half, reverse the drawing. The wing curve is shown in No. 3 also the exact point at which the wing is attached to the fuselage.

Fuselage

The fuselage shown in drawings No. 3 and No. 4, shows the position of the outrigger pictured in No. 5. The shaded portion shows the fillet position between the outrigger and fuselage. This can be of any plastic substance. The point at which the tail surfaces and supporting struts are attached is also shown. The front view of the fuselage in No. 6 shows the detail of the motor and exhaust pipes. A celluloid dummy motor can be used, or cylinders of your own design can be provided. From each cylinder an exhaust pipe leads to the exhaust ring around the center of the engine. Another pipe leads from this out through a hole in the cowling, which it is advisable to purchase.



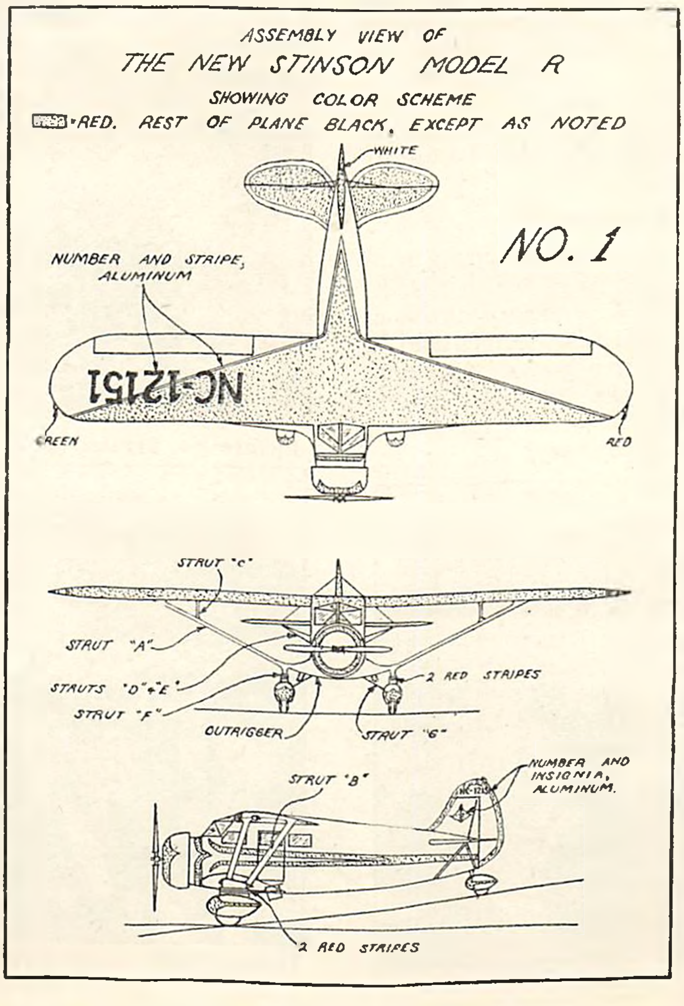




Scale-½=1

Tail Surfaces

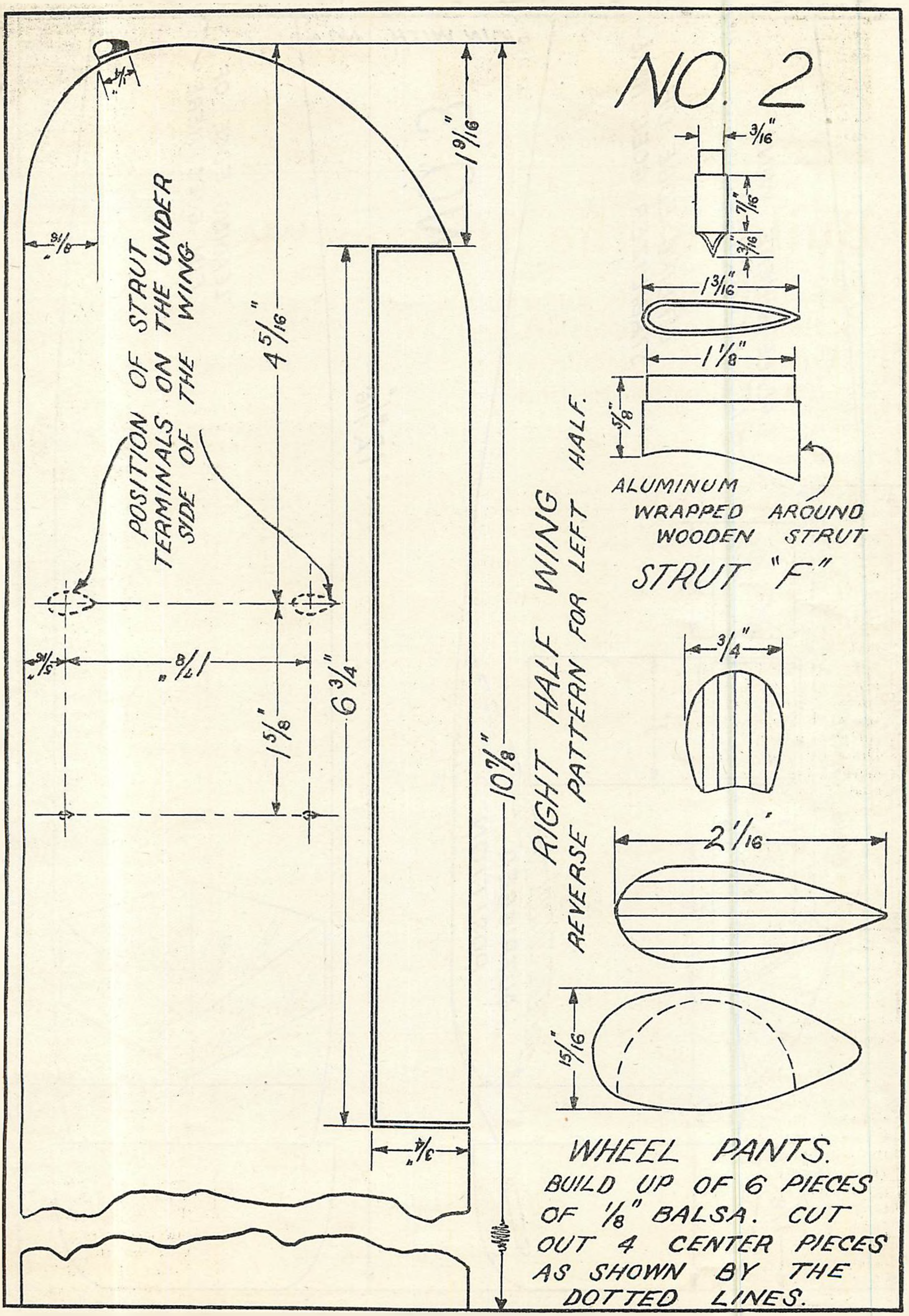
The tail surfaces are shown in No. 4. They are made of thin wood, streamlined to the shape shown. To form the other half of the stabilizer, reverse the pattern.

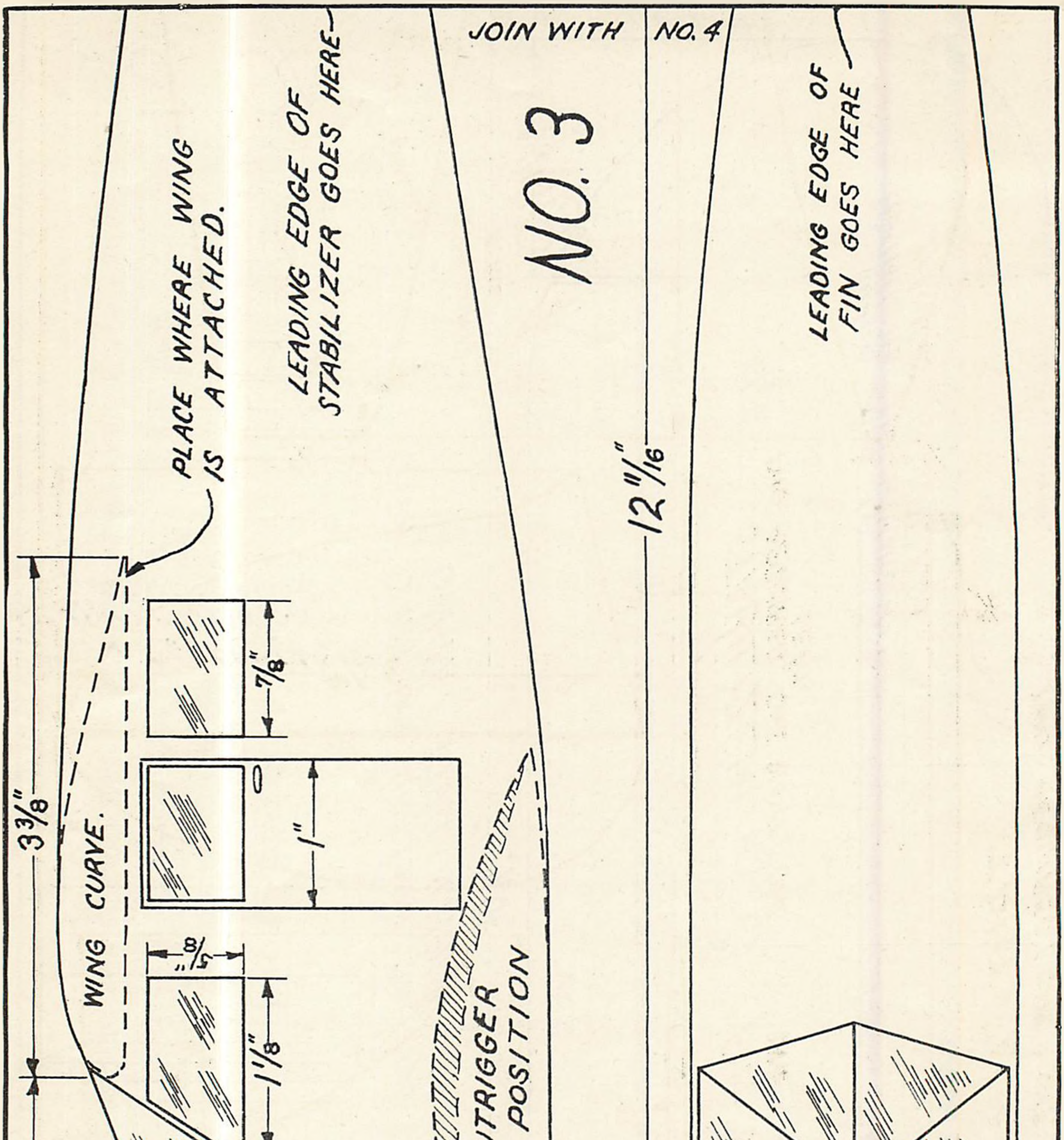


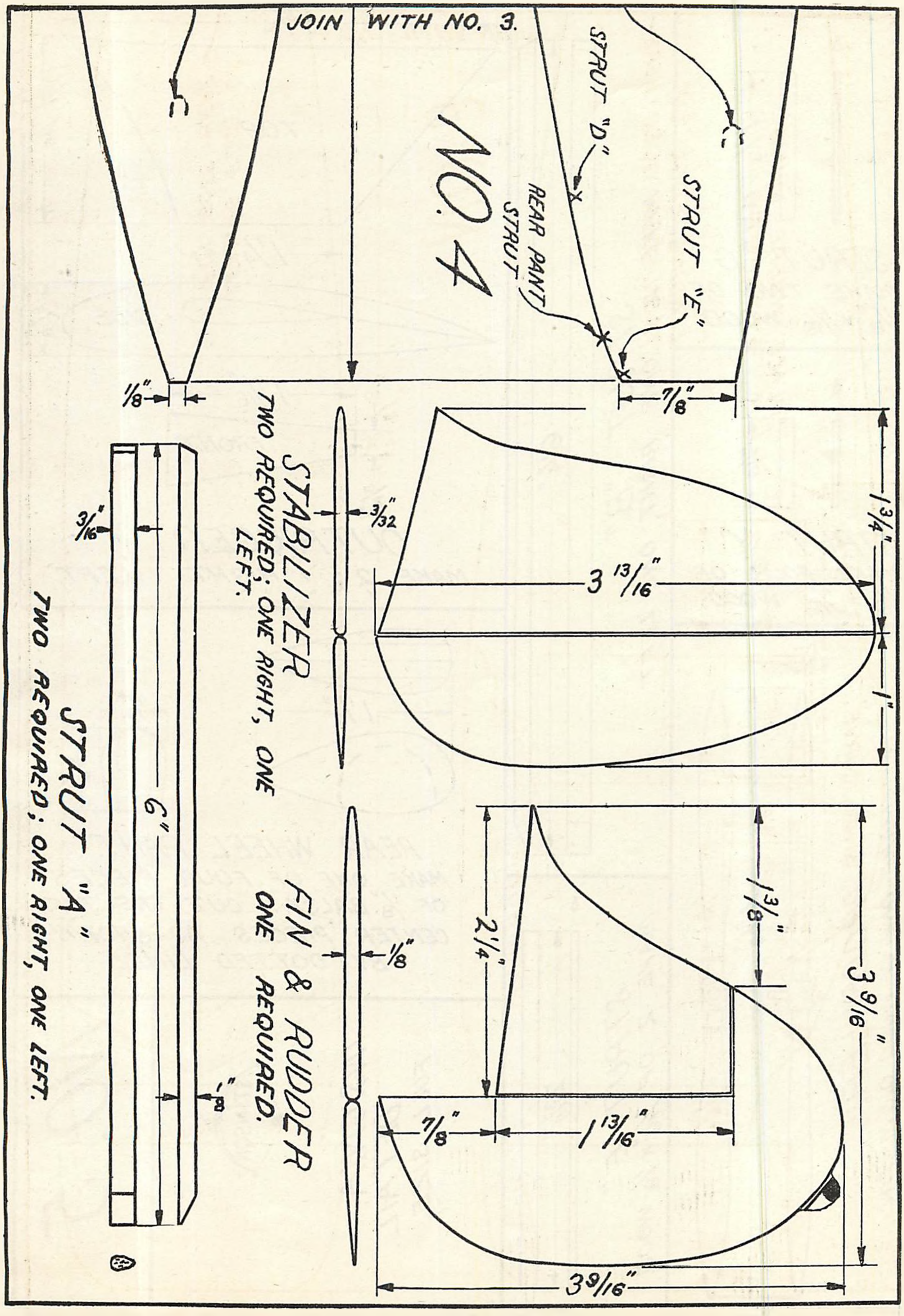
Struts

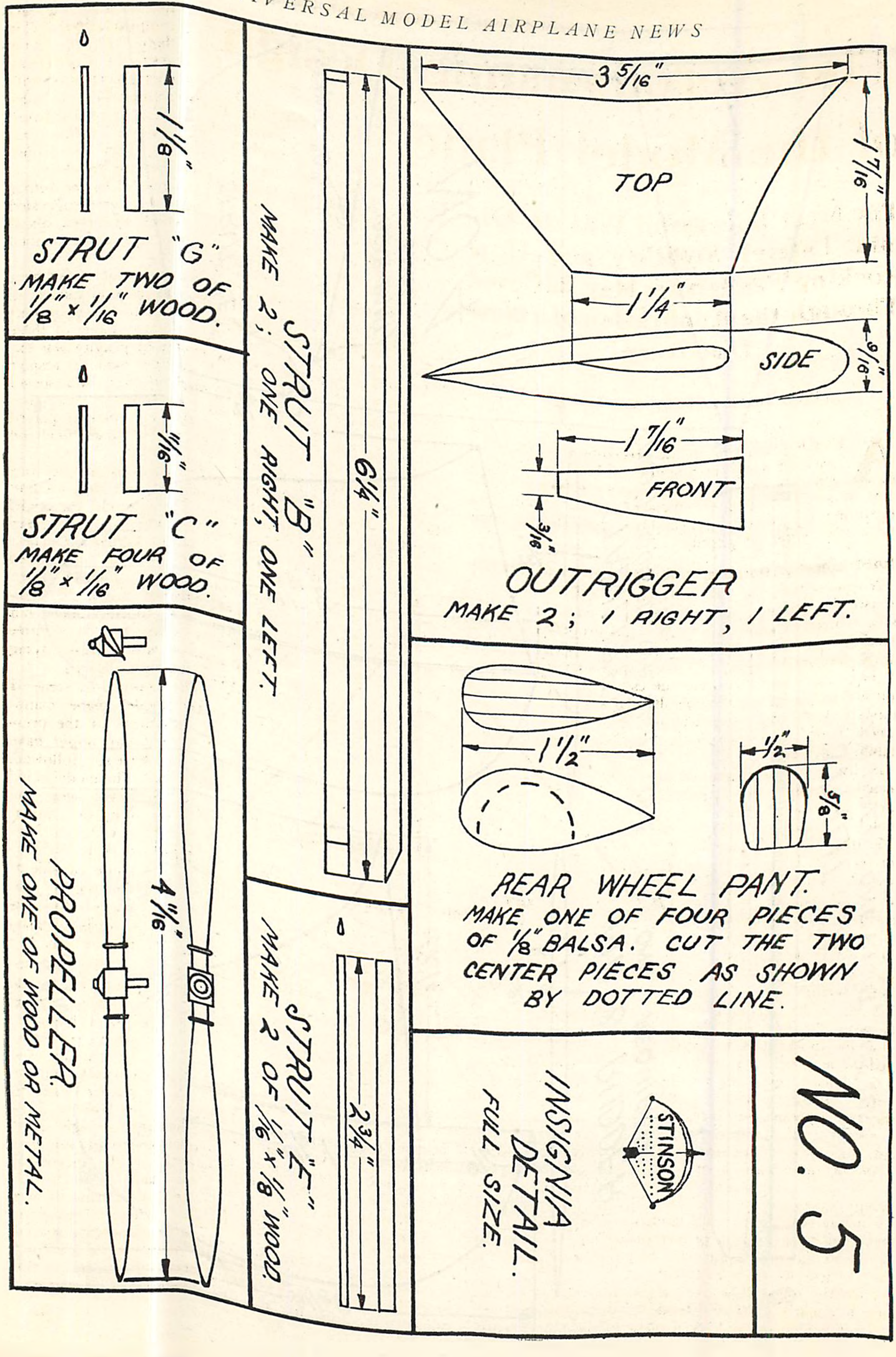
NOW we come to the struts. They should be made of hardwood, as balsa in these small sizes does not contain the desired strength. Struts "A" and "B," shown in No. 4 and No. 5 respectively, connect at the points shown on the wing and at the tip of the outrigger. Strut "C" connects the wing and struts "A" and "B" at the points shown in the wing drawing. Strut "G", No. 5, connects the fuselage and wheel pant at the rear end of strut "F". Strut "F" in No. 2 is made of wood with a piece of thin aluminum wrapped around a portion of it, as shown in the drawing. This is to simulate the shock-absorbing landing gear on the real plane. Struts "D" and "E", No.

(Continued on page 48)


NO. 2
3/16"
7/16"
3/16"
1 3/16"
1 1/8"
5/8"
ALUMINUM WRAPPED AROUND WOODEN STRUT
STRUT "F"
3/4"
2 1/16"
15/16"
WHEEL PANTS.
BUILD UP OF 6 PIECES OF 1/8" BALSA. CUT OUT 4 CENTER PIECES AS SHOWN BY THE DOTTED LINES.
RIGHT HALF WING
REVERSE PATTERN FOR LEFT HALF.
POSITION OF STRUT TERMINALS ON THE UNDER SIDE OF THE WING
1 9/16"
4 5/16"
6 3/4
1 5/8"
1 7/8"
10 7/8"


JOIN WITH NO. 4
NO. 3
PLACE WHERE WING IS ATTACHED.
LEADING EDGE OF STABILIZER GOES HERE
LEADING EDGE OF FIN GOES HERE
12 11/16"
3 3/8"
2 13/16"
1 1/8"
2 5/16"
7/8"
1"
1 1/8"
WING CURVE.
OUTRIGGER POSITION


JOIN WITH NO. 3.
NO. 4
STRUT "D"
STRUT "E"
REAR PANT STRUT
1/8"
7/8"
1 3/4"
3 13/16"
1"
3/32"
STABILIZER
TWO REQUIRED; ONE RIGHT, ONE LEFT.
3 9/16"
1 3/8"
2 1/4"
7/8"
1 13/16"
3 9/16"
1/8"
FIN & RUDDER
ONE REQUIRED.
3/16"
6"
STRUT "A"
TWO REQUIRED; ONE RIGHT, ONE LEFT.


1 1/8"
STRUT "G"
MAKE TWO OF 1/8" x 1/16" WOOD.
11/16"
STRUT "C"
MAKE FOUR OF 1/8" x 1/16" WOOD.
4 11/16"
PROPELLER.
MAKE ONE OF WOOD OR METAL.
6 1/4"
STRUT "B"
MAKE 2; ONE RIGHT, ONE LEFT.
2 3/4"
STRUT "E"
MAKE 2 OF 1/16" x 1/8" WOOD.
3 5/16"
TOP
1 7/16"
1 1/4"
SIDE
9/16"
1 7/16"
FRONT
3/16"
OUTRIGGER
MAKE 2; 1 RIGHT, 1 LEFT.
1 1/2"
1/2"
5/8"
REAR WHEEL PANT.
MAKE ONE OF FOUR PIECES OF 1/8" BALSA. CUT THE TWO CENTER PIECES AS SHOWN BY DOTTED LINE.
STINSON
INSIGNIA DETAIL.
FULL SIZE.
NO. 5

The Aerodynamic Design of the Model Plane

The Most Successful Way to Obtain Lateral Stability and How Rocking Tendencies May Be Cured Through the Application of a New Discovery

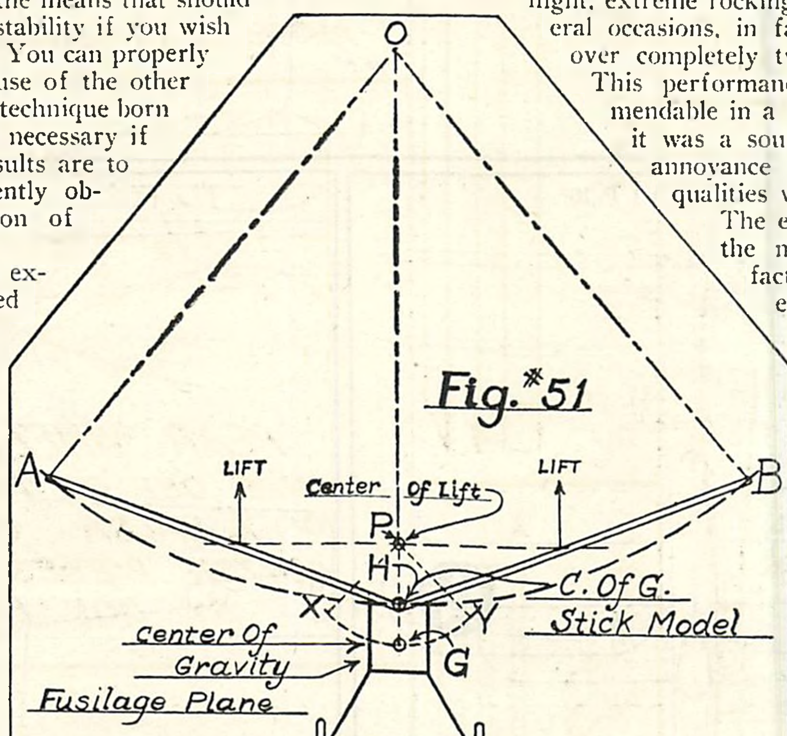
By Charles Hampson Grant

AFTER discussing in the preceding issues various ways of using the dihedral angle to insure lateral stability in our model planes, we come to the most important and most efficient method of all. This constitutes the correct application of the dihedral angle and a low center of gravity.

Dihedral in Conjunction with Low Center of Gravity

Whenever possible, this is the means that should be used for attaining lateral stability if you wish to be assured of good results. You can properly stabilize your model by the use of the other means described herein, but a technique born of long experience is usually necessary if you are to be certain the results are to compare with those consistently obtained from this combination of stability factors.

In this case, as might be expected, stability is acquired partly by means of the low center of gravity and partly from the dihedral. The inter-reaction between these two is also a contributing factor. If a model is to be designed with the center of gravity low, (1/30) or about (3.3) per cent of the span or more, below the center section of the wing, it is not necessary to give the wing as much dihedral as if the dihedral is to be used alone. The wing with less dihedral will have greater lifting power or efficiency without a sacrifice of stability. This is exceedingly important if both efficiency and stability are desired.



Another advantage is one which may also be applied to full scale planes and has been discovered entirely through experiments made with Flying Model Planes. It is a fact that the rocking tendency of a plane may be eliminated by creating a proper proportion between the amount of dihedral angle used and the distance of the center of gravity from the center of lift.

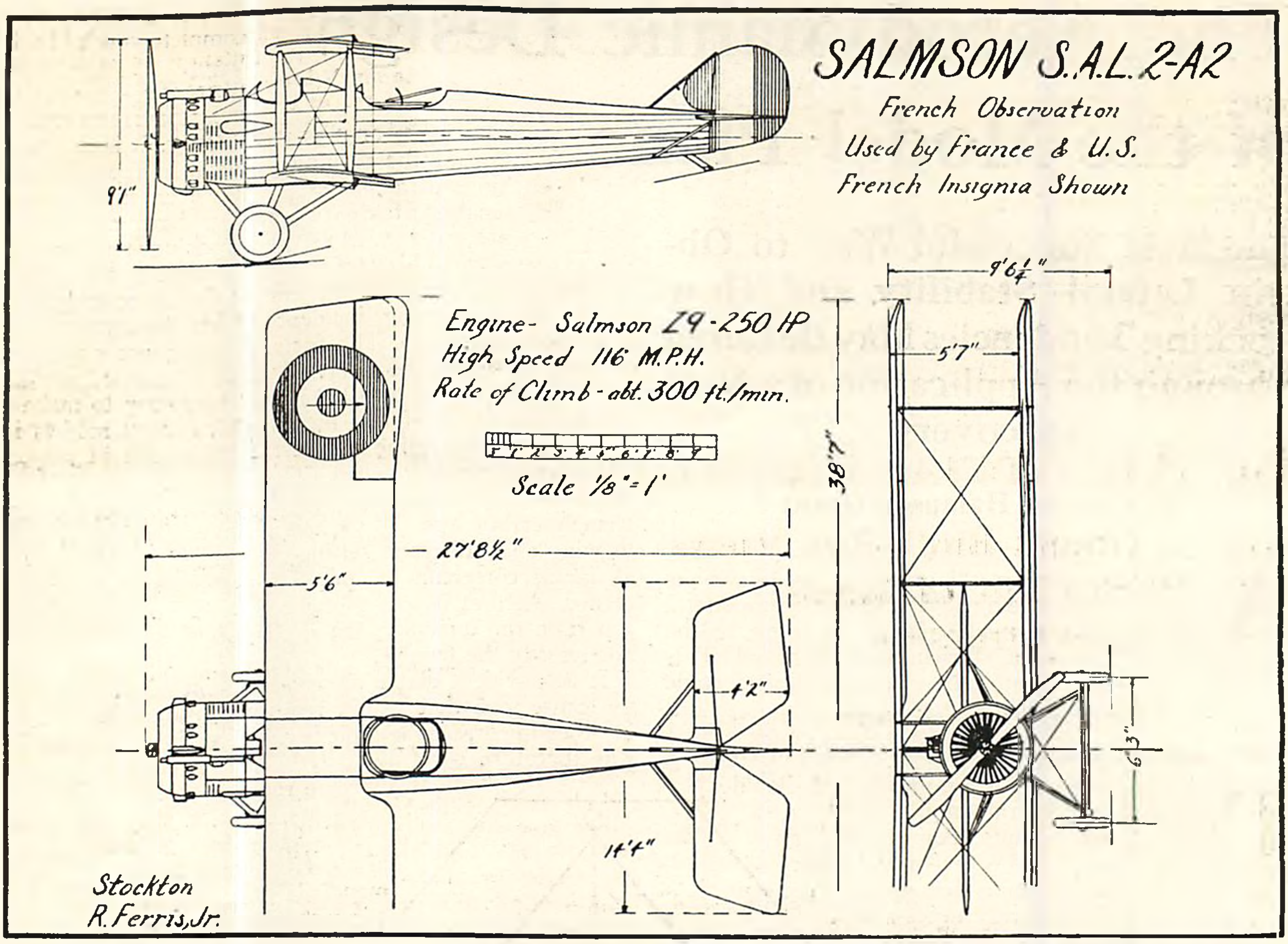
When the dihedral is used alone as a means of stability, it imparts a rocking tendency to the machine. In fact, it is not uncommon for a plane to rock so violently that it will roll over completely while in flight. If the LOW WEIGHT - DIHEDRAL COMBINATION IS PROPERLY USED THIS IS IMPOSSIBLE. It is the solution of the rocking problem in regard to all kinds of airplanes. If, however, in this combination, these two factors have not proper RELATIVE VALUES, the rocking tendency is AUGMENTED. This fact was discovered by the author through a series of experiments that were suggested by an interesting incident which occurred about twelve years ago. The facts, perhaps, are explained best by telling the story.

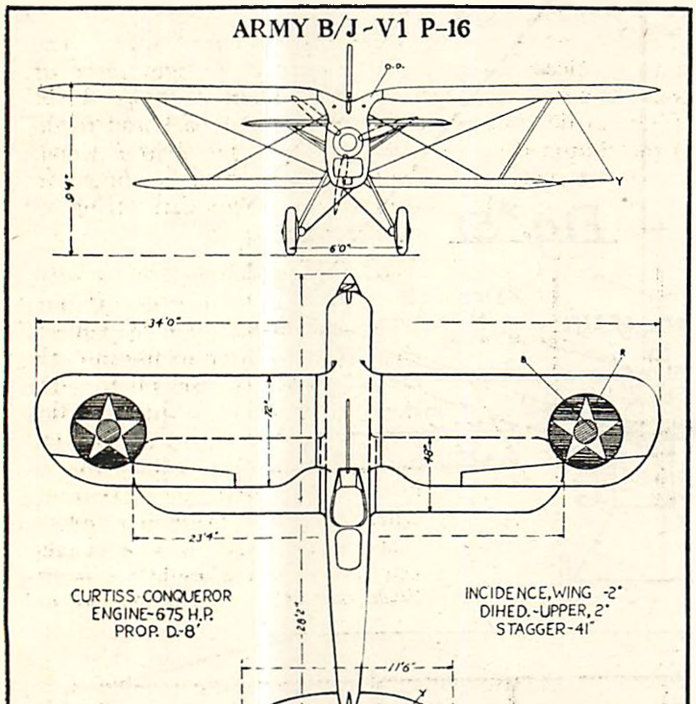
In the spring of 1919 it was necessary to make a large number of test flights with several models in order to determine the best form to use in respect to ease of manufacture. The flights of one of these ships with a dihedral and low center of gravity was extremely erratic and the various changes made in respect to wing and tail plane setting had no effect whatsoever as far as correcting its peculiar performance was concerned. At first it was thought that air currents played a part in the difficulty, but a change of flying field did not remedy the trouble.

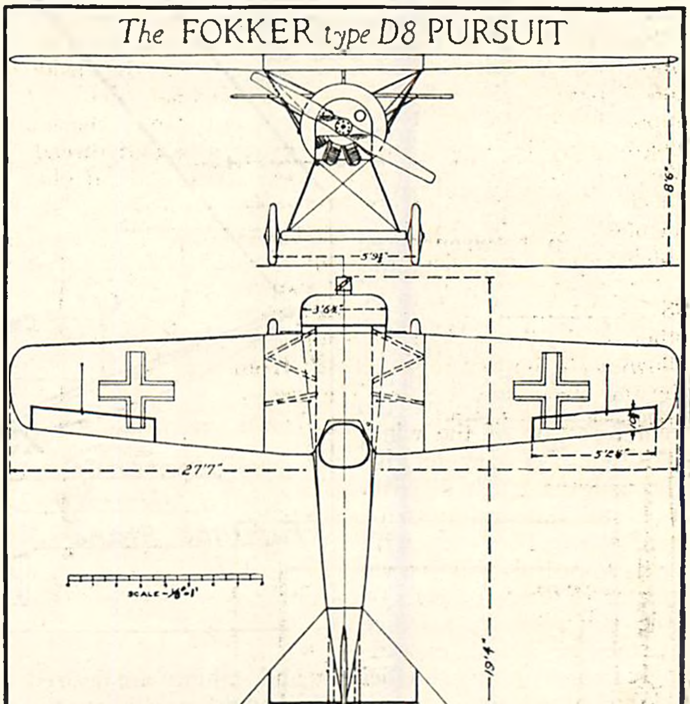
It was evident that some elusive point of stability was the cause, one that would require considerable thought in order to correct the difficulty. The action of the model was therefore carefully noted. During each and every flight, extreme rocking occurred. On several occasions, in fact, the ship rolled over completely two or three times. This performance might be commendable in a stunting model, but it was a source of considerable annoyance when steady flying qualities were desired.

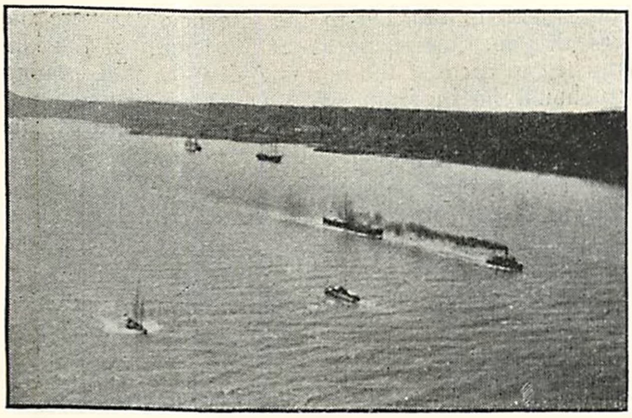
The example of some of the model plane manufacturers of the present day *might* have been followed. The model could have been put out and advertised as a wonderful stunt plane, capable of doing all the tricks, for the simple reason that it was impossible to induce it to do anything else. This, however, would not satisfy our aroused curiosity and the sincere desire to determine the fundamental causes of the trouble. Persistence in studying the problem brought to light what was a very important point in model design and one that may prove to be extremely valuable in the successful operation and stability of full scale planes.

After the first series of flights with this plane, it was set aside in one corner of the shop where it remained untouched for several days, before time could be spared for further flights. It was finally taken out for a second series of tests to verify several theories concerning the causes of the difficulty. The first *(Continued on page 43)*

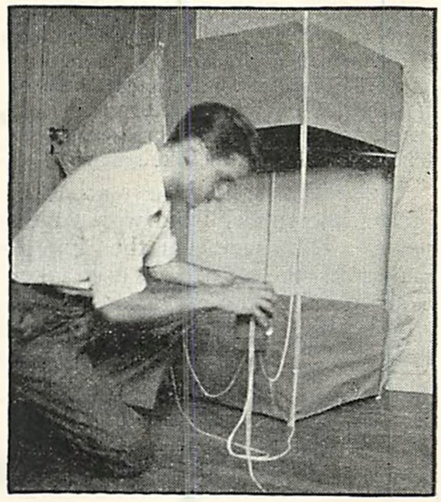

SALMSON S.A.L. 2-A2
French Observation
Used by France & U.S.
French Insignia Shown
Engine- Salmson Z9-250 HP
High Speed 116 M.P.H.
Rate of Climb - abt. 300 ft./min.
Scale 1/8" = 1'
9'1"
9'6¼"
5'7"
38'7"
27'8½"
5'6"
4'2"
6'3"
14'4"
Stockton
R. Ferris, Jr.


ARMY B/J-V1 P-16
9'4"
6'0"
34'0"
23'4"
CURTISS CONQUEROR
ENGINE-675 H.P.
PROP. D.-8'
INCIDENCE, WING -2°
DIHED.-UPPER, 2°
STAGGER-41"
28'2"
11'6"
SCALE


The FOKKER type D8 PURSUIT
8'6"
5'9½"
3'6½"
27'7"
5'2½"
19'4"
4'11"
9'8
FOK·DVIII
ALTHOUGH THE DVIII DID NOT COME OUT UNTIL SEPTEMBER OF 1918, IT NEVERTHELESS SAW SOME SERVICE AT THE FRONT. IT USED A 110 H.P. OBERUSEL. SPEED-115 M.P.H. - CIELING 22000'



An aerial view of the Hudson River taken from a kite



Attaching the camera to the kite in preparation for a "shot"

Be An Aerial Photographer

How to Obtain Bird's-Eye Views With a Kite of Simple Construction

By Lawrence Kranis

THE thrill of taking aerial photographs, which exists in all camera owners, was strongly felt by the author when using a kite to carry the camera aloft.

The kite chosen was a square box with wings because this type is very steady in the air and has greater lifting power than any other.

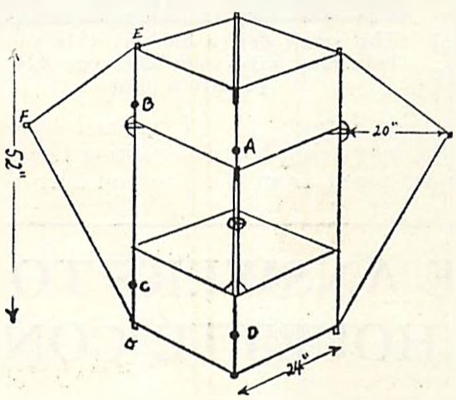
For the required wood, an apple box was used. Any ¼″ wood will do, but 4 pieces, 52″-1″-¼″, for the inside and 4 pieces, 35″-½″-¼″, for the diagonal sticks. If impossible to get the long strips in one piece, shorter lengths may be joined together, using glue and thread. Measure down on each end of these strips 8″ and glue on chips of wood to receive the cross members. On the diagonal strips, cut notches to fit the chips on the uprights.

Cut two strips of strong paper, 98″ x 14″, and lay them over each other on the floor. Fold them together, allowing the bottom to project 2″ from the top sheet, and crease. The center crease is then brought to the shorter end and creased again. Finish by creasing the 2″ strip. Unfold and four creases 24″ apart will appear, marking the positions for the uprights. Lay the two sheets on the floor as shown in Figure 3 and glue the strips to the paper in front of the crease. Follow Figure 3 carefully.

When the four strips are glued and the paper ends are glued the result will be a perfect square. As soon as the glue has dried, insert the cross members, fitting into the notches and tying them together where the two sticks cross. When disassembling, the cross sticks are removed and all rolled into a compact bundle.

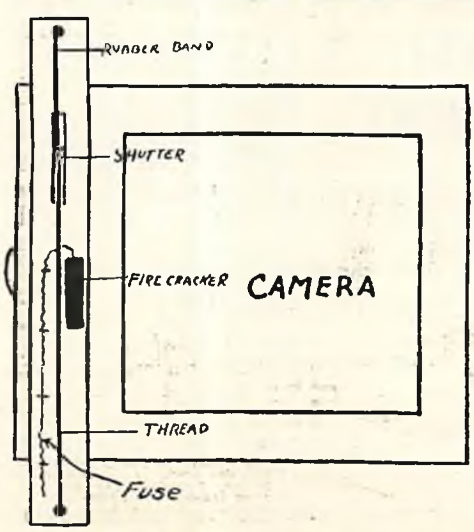
The final stick, which supports the wings, is cut next, 74″-½″-¼″. This is then tied as shown in Figure 1. The frame for the paper is made by bringing a string from points E to F to G, repeating on the other side. Cut two sheets of paper to fit this outline and glue into place. This completes the kite.

The camera used is an ordinary box camera. The shutter release is shown in Figure 2. A light piece of board from a cigar box is taken, about 7″ long. A slit is then made to allow the shutter to move back and forth. If the shutter does not reach the top of the strip of wood, a strip of metal is soldered on. The stick is affixed to the camera, either with string or rubber bands.

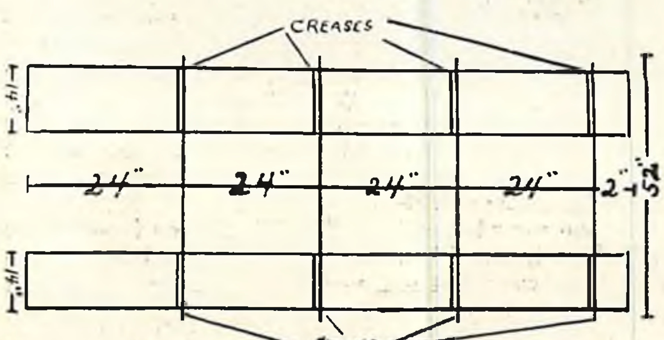


PLACE a thumb-tack or light brad on both ends of the stick as shown. Tie a rubber band from shutter to thumb-tack and a thread on the other side. When the string is broken, the rubber band works the shutter, taking the picture. The string is broken at a predetermined time, with a time fuse made as follows:

Mix together one teaspoon of saltpeter and three and one-half of water. Soak some light string in this mixture



These plans of kite and camera operating device will afford you several pleasant hours in your workshop



thoroughly and put out to dry. When dry, test a piece for the burning time. It usually burns at a rate of 1½" a minute, so if three minutes are desired to get the kite aloft to take a picture, use 4½" of fuse. The selected length of fuse is attached to the board with light brads, tied to the string to be broken, then inserted into a small firecracker. The apparatus works thusly. The fuse is lit and the kite sent up.

When the light fuse reaches the string, the string breaks, the rubber band works the shutter and takes the picture. The firecracker then explodes and the kite flyer knows that the picture has been taken, for a puff of smoke is given off by the explosion.

The kite is then drawn in and the camera reset for the next "shot."

The camera is attached to the kite bridle, where the strings all join. One string about the length of the kite is attached to each of the points A-B-C-D. The joining point should be in front of A-D, at about the point marked X in Figure 1. The camera is attached at this point and the string proper is then attached.

To get the proper point for the camera, a box about the weight of the camera is used. After adjustments are made and the kite carries the box satisfactorily, the box is replaced with the camera.

Do not let the first picture discourage you, for practice makes perfect.

Good News for Pilots

By John Gibson

A DEVICE has been perfected which, it is claimed, will eliminate fifty per cent of the accidents sustained in "blind flying." As a majority of crashes occur when the pilot is forced by poor visibility to rely upon his instrument board for direction, this invention is regarded as the step which will overcome the hazard which has so much retarded the progress of aviation.

The device is so constructed that it registers the exact flying position of a plane at all times, and in relation to any angle, up, down, or sideways. So sensitive is the apparatus that the plane's slightest tilt is instantly and accurately indicated. It consists of two gauges which are operated and controlled by counterbalanced and gyroscopic disks. The face or dial of one gauge indicates the degrees of ascent or descent. The other dial shows the angle of banking or horizontal tilt. The upper half of each dial is colored red and indicates the plane's position when it is flying at a greater than 90-degree angle, or upside down.

The small device held by this young lady may save your life some day, if you are a pilot

The twin gauges are mounted on the instrument board at right angles to each other. Hot air piped from the plane's exhaust continuously passes through all working parts of the device and insures instant recording and hair's breadth accuracy.

Even the layman can imagine the great advantage this instrument will give the pilot who is flying blind in a fog. Imagine yourself in rough, mountainous country. You run into a dense fog native to such country. If you can keep the machine properly balanced and on a straight course, you can reach home. Without this device, it is impossible to determine whether or not you are flying in a level position, or turning, spiraling or otherwise departing from a straight course, which deviation may smash you to bits against a mountain peak.

Flying Family on the Air

HERE'S a radio program that should be of interest to every young aviation enthusiast. Every Monday, Wednesday and Friday at 5:30 P.M., Eastern Standard Time, the Flying Family broadcasts thrilling experiences of their flight to Greenland. George Hutchinson, Blanche, his wife, and the two children, Kathryn and little Janet Lee, all appear in person on this exciting new program sponsored by Cocomalt. It comes to you over WEAF and associated N.B.C. stations.

HERE ARE THE ANSWERS TO THE NOVEMBER SILHOUETTE CONTEST

WONDER of wonders; an air-minded young man wins the Silhouette Contest for the third time. We would like to see different boys from various parts of the country win this contest each month, but, in all fairness, we have to give the first prize again to Mr. William A. Wooding of 53 Marion Street, Brookline, Mass. His answers were by far the most accurate. In fact, no one else approached him in giving the number of correct answers that he did.

Second award goes to Arthur K. Ulber of 1844 East 27th Street, Brooklyn, New York. He had several incorrect answers, but it seems this month that the planes were extremely difficult to name.

Mr. John E. Sherry of 55 Haddon Street, Bridgeport, Conn., wins the third award.

We take great pleasure in giving these awards to these young men.

You will want to know the correct answers, so we will list them for you.

1. Keystone LB-7. 2 P&W Hornet R-1690 525 HP. 4 place
2. Alaxander Eaglerock. OX-5 90 HP. 3 place
3. Boeing FB-6. Wasp 420 HP. 1 place
4. Boeing FB-1. Packard Vee 500 HP Watercooled. 1 place
5. Curtiss XP6-A. Curtiss V-1570 600 HP surface radiators. 1 place
6. Heath Baby Bullet. Bristol Cherub 32 HP 2 cyl. opp. 1 place
8. Gallaudet Light Bomber. Liberty 400 HP. Prop encircled fuselage aft of wings. 2 place
9. Pitcairn Autogiro. Kinner B-5. 2 place
10. Boeing Parasol XF. Wasp 500 HP. 1 place *(Cont. on pg. 44)*

Build Your Own Radial Engine

Complete Building Instructions and Plans for a Powerful Compressed Air Engine that Will Open Up a New Field for Your Adventures in Model Aviation

By Major H. W. Landis, E.M.E.

IT appears that many of our rubber motor model builders are graduating into the class of builders who are dabbling with real model power plants of the compressed air and gasoline engine type. Therefore, in order to keep them busy and happy, we are supplying herein plans for one of the neatest little compressed air engines that ever turned a prop. A three-cylinder radial engine that is compact and powerful.

Many advantages are offered in the three-cylinder model radial engine over the two-cylinder opposed engine described by the writer in an earlier issue.

While the two-cylinder engine is satisfactory and meets every requirement any model enthusiast could desire in performance, the three-cylinder motor can and will give much more in power and speed, also in appearance it is just like one of its big brothers.

One of the major features is in the valves. While the two-cylinder engine had only one valve that served the dual purpose of intake and exhaust, the three-cylinder motor has two, the inlet valve, shown clearly at the rear side of the engine in sketch No. 42, its position indicated by note referring to it, and the exhaust valve also in drawing No. 42 on the forward side of the motor, also indicated clearly by note. These rotary valves also act as the bearings for the motor.

Obtaining material for the construction of this motor is very simple. Almost any hardware or sporting goods store will have everything needed.

The pistons and cylinders are formed from fishing rod ferrules, easily obtained from any hardware store at slight cost. These ferrules slide one within the other and form a tight sliding fit, the ferrule fitting to the inside to be used as a piston and the outside (ferrule) the cylinder.

These ferrules are half-inch diameter, seamless drawn brass and are about twelve-thousandths of an inch thick, bringing the weight to a minimum.

Three sets of these ferrules are required and a complete set is illustrated in drawings No. 17, No. 18 and No. 19. Three large ones and three small ones.

Pistons of a small motor must slide very easily within their cylinder walls to avoid friction and quick wear. This easy sliding fit is produced by "lapping in" the pistons to the cylinder walls with a thin mixture of "Bon Ami" and water (caution: do NOT use emery or carborundum powders, as the very finest qualities of these are much too severe for the very close but easy sliding fit necessary).

Many very fine valve grinding compounds are on the market, but none of these are suited for even the roughest of "lapping," as the coarse abrasives would destroy the fit entirely. The process of "lapping in" is shown in sketch No. 19.

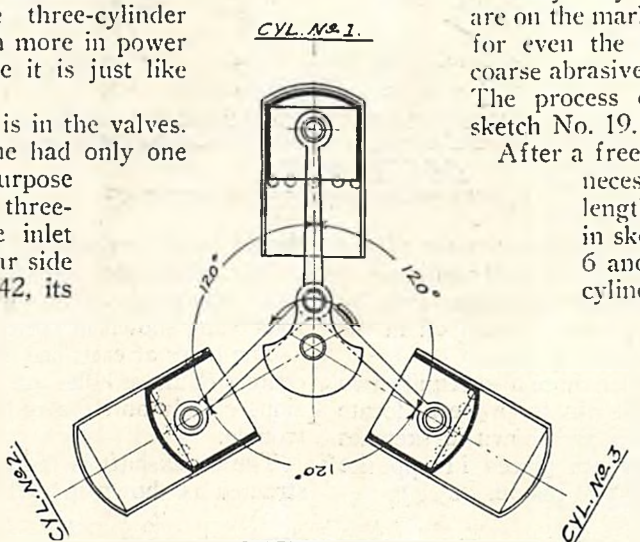
After a free sliding fit is obtained it is only necessary to cut the outer tubes to length for the cylinders as indicated in sketches No. 3, No. 4, No. 5, No. 6 and No. 22. The heads for these cylinders are formed from 1/64" sheet brass as shown in sketch No. 20 and soldered to the ends of the cylinders as in sketch No. 22.

From the inside tubes, which have been lapped into the cylinder walls, cut lengths as shown in drawings No. 7, No. 8, No. 9, No. 10, No. 11 and No. 12. These are all views of the pistons.

Remove all burrs and rough edges with a magneto point or finger-nail file and smooth the edges with crocus paper.

THE pistons are now drilled in the proper place as shown in sketch No. 12 with a ⅛" diameter drill as shown in views No. 7 to No. 11, inclusive, to receive the wrist pins that are shown fully in sketch No. 13.

The wrist pins are passed



SKETCH No 1
SHOWING GENERAL LAYOUT OF THREE CYLINDER MODEL AIRCRAFT ENGINE.
POSITIONS OF CYLINDERS, PISTONS, CONNECTING RODS, WRIST PINS CRANK PIN AND CRANK SHAFT. LOOKING ON MOTOR FRONT.

LIST OF TOOLS

- One 6 inch Machinist's Scale.
- One Hand Drill.
- One ⅛" Drill Bit for Metal.
- One 1/16" Drill Bit for Metal.
- One 3 oz. Soldering Copper (electric pref.).
- One 8 oz. Machinist's Ball Peen Hammer.
- One 6 inch Fine Cut Triangular File.
- One 6 inch Fine Cut Flat File.
- One Pair 5 inch Flat Nose Pliers.
- One Jeweler's Hack Saw (desirable).
- One Small Centre Punch.
- One 6 inch Half Round Smooth Cut File.
- One Scriber.
- One Pair of 6 inch Tin Shears.
- One Pair of 4 inch Dividers.
- One No. 30 Drill Bit for Metal.
- One No. 32 Drill Bit for Metal.
- One 3/32" Drill Bit for Metal.

LIST OF MATERIAL REQUIRED

- 3 Sets of ½" Fishing Rod Ferrules. Sketches 17, 18 and 19. Note—Cylinder and Piston Stock.
- 1 Can of Bon Ami—Lapping Material.
- 2 Oz. Wire Solder.
- 12 Sq. inches of 1/64" Thick Sheet Brass. Same 1/32" Thick.
- 1 Can Solder Flux.
- 1—6"x6"x2" Thick Soft Pine Wood Block.
- 6" of ⅛" Thin Wall Brass Tubing.
- 1 Piece Aluminum Sheet 2½"x2½"x 1/32" Thick.
- 2 Sets of ⅜" Fishing Rod Ferrules.
- 12" of 3/32" Thick Wall Brass Tubing.
- 4" of ⅜" Aluminum Rod.
- 4" of 3/16" Thin Wall Aluminum Tubing.

NOTE

Material Ordered in Excess of That Required.

....

....

....

through the side of the pistons and the spacer tubes shown in sketches No. 14, No. 15 and No. 16, inclusive, are assembled along with the connecting rod shown in sketch No. 21 and slipped on to the wrist pin, the pin secured to both sides of the piston by a slight amount of solder.

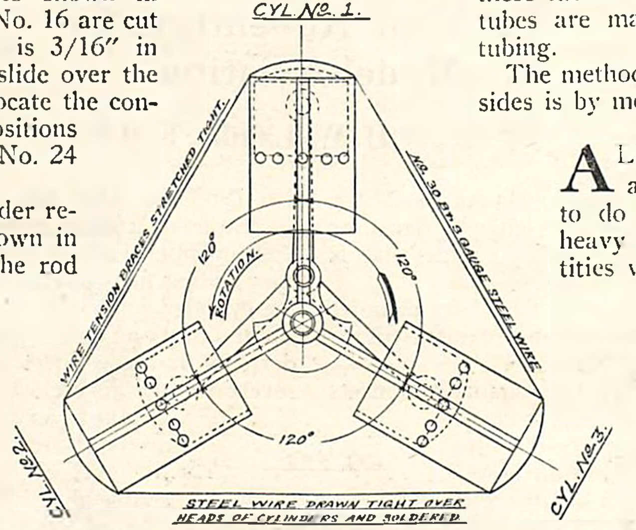
The wrist pins shown in sketch No. 13 are, of course, all the same length for all of the pistons and they are made of ⅛″ thin wall brass tubing.

The aluminum spacer tubes shown in drawings No. 14, No. 15 and No. 16 are cut from aluminum tubing which is 3/16″ in diameter. These spacer tubes slide over the wrist pin tubes and serve to locate the connecting rods in their proper positions as shown in sketches No. 23, No. 24 and No. 25.

Piston for number one cylinder requires two spacer tubes as shown in sketch No. 14. These locate the rod in the center of the piston as shown in drawing No. 23.

The piston for number two cylinder requires two spacer tubes, one as shown in sketch No. 15, and one as shown in sketch No. 16. These spacer tubes are of slightly different lengths as shown in the drawings, and cause the rod to be slightly offset from its center position. At first sight this offset in the position of the rods seems to be detrimental to the functioning of the engine, but in practice it works out very well and is much easier to construct than to offset the rods themselves by bending, which method was previously described in the two-cylinder opposed model aircraft engine.

The pistons for cylinder number three also require two spacer tubes placed on its wrist pin to properly locate connecting rod. The spacer tubes are shown in sketches No. 15, and No. 16, only they are placed in opposite positions to those in tl. number two piston.



GENERAL ARRANGEMENT OF THREE CYLINDER RADIAL AIRCRAFT ENGINE SHOWING SUPPLY + EXHAUST PIPES ALSO ROTARY VALVES.

SKETCH No. 2.

LOOKING ON FRONT SIDE OF MOTOR.

The exhaust and inlet pipes are now attached to the cylinders as shown in sketch No. 42 and sketch No. 2. The exhaust pipes are shown in sketch No. 34 and the inlet pipes in drawing No. 33. The curvatures in these pipes are formed by cold, bending them to the dimensions shown in the aforementioned drawings.

Cut the lengths to suit, being sure that the piston skirt at the bottom center of the stroke does not bind against these tubes. The material from which these tubes are made is 3/32″ thin wall brass tubing.

The method of attachment to the cylinder sides is by means of sweat soldering.

ALWAYS be sure to use as small an amount of solder as possible to do a first-class job. Solder is a heavy substance and if used in quantities will increase the weight of the finished engine to a considerable degree and weight is to be avoided as much as possible in all model aircraft work, to reach the maximum of efficiency and yet have a first-class job.

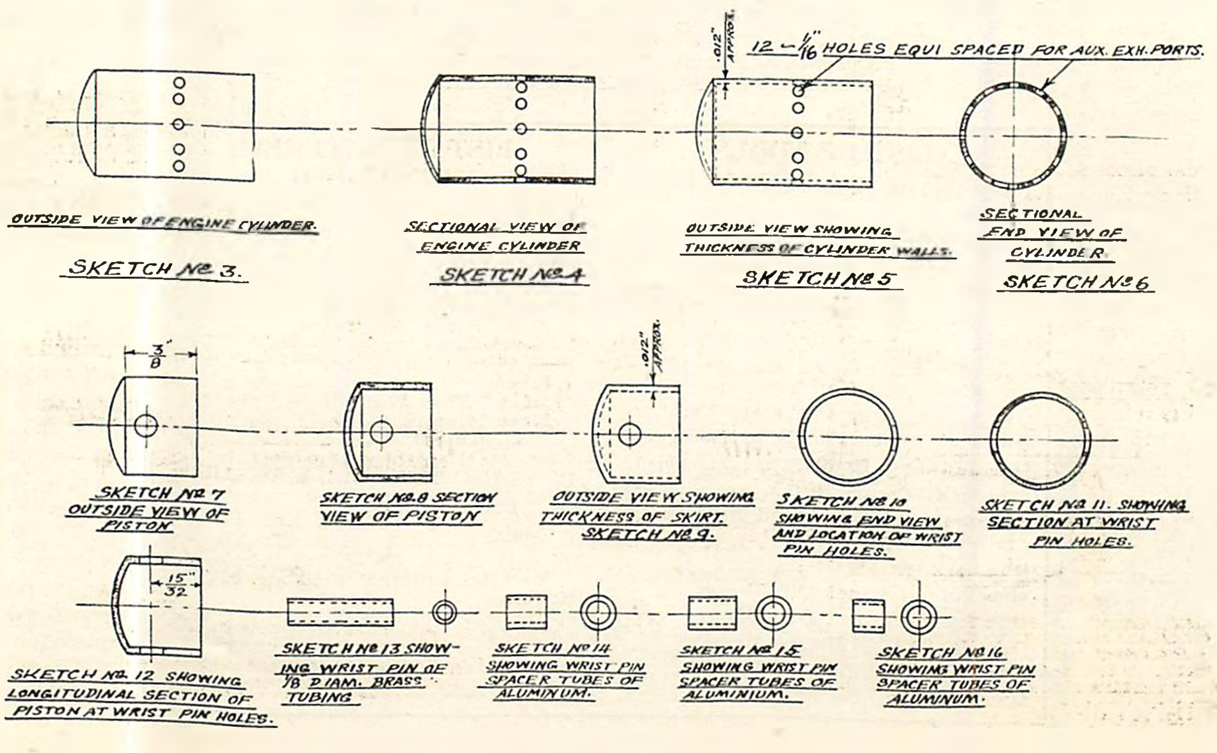
The A. N. specifications do not allow any strength to a soldered joint, but as soldering is a very convenient method of assembly, it is permissible to use it on model aircraft engines and should prove entirely satisfactory on this type of work.

The connecting rods are cut from 1/32″ thick hard rolled aluminum or duraluminum sheeting and filed, these rods being shown in sketch No. 21

The holes at each end are drilled with a ⅛″ drill. The centers of these holes are 1¾″ apart. Hold these dimensions closely and the rods will come along without any trouble.

The crankshaft is the next unit to consider. It is constructed as shown in sketch No. 27 from the two crank

DETAILS OF 3 CYLINDER AIRCRAFT ENGINE.



webs, sketches No. 26, No. 26-A and No. 27-A, crank pin No. 28. Rear side of the crankshaft is viewed in sketch No. 29 and the forward end is shown in drawing No. 30.

The crank webs are cut from 1/32" thickness sheet brass. It is best to clamp these, one upon the other, laying out for the shaft holes and the crank pin holes, and drill the holes for these pieces through both webs at the same time. This method assists in keeping the whole shaft assembly in alignment.

Place both crank webs upon a piece of 1/8" brass tubing and separate them the length of the crank pin.

The connecting rods, with their pistons, may now be placed upon the crank pin and the crank pin carefully soldered in the holes provided for it in the crank web.

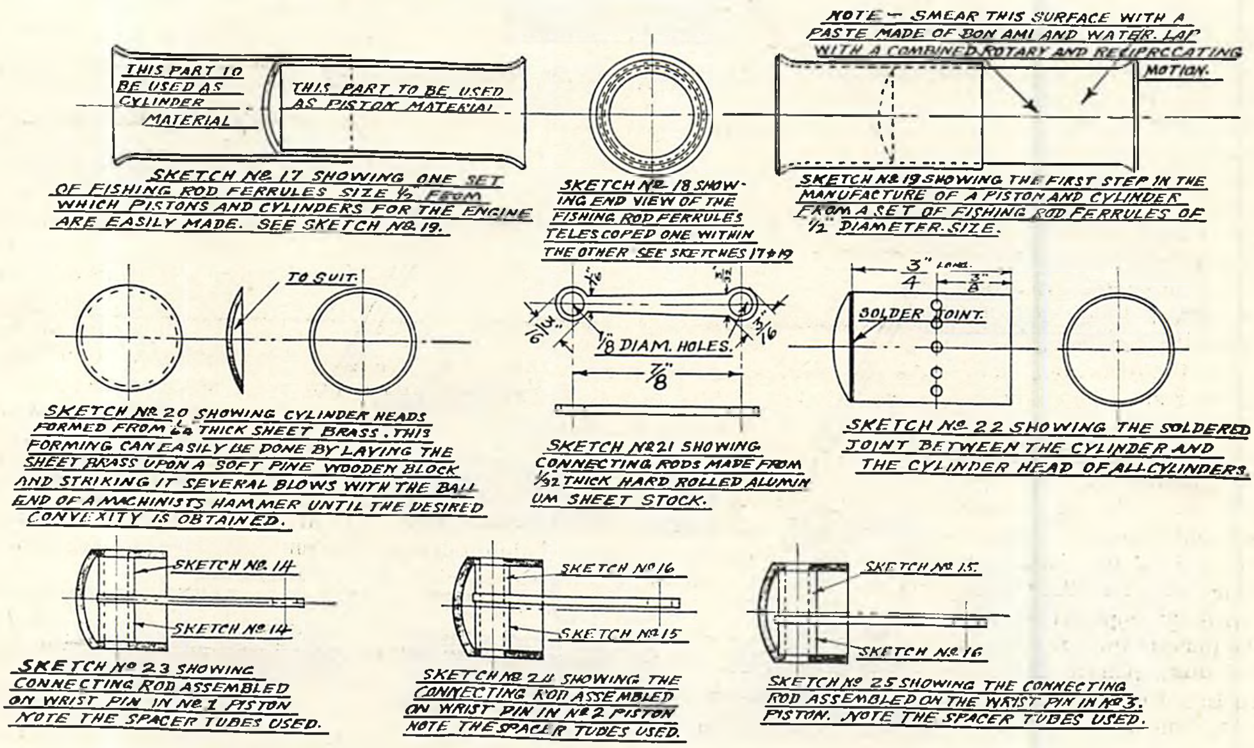
The crankshaft in reality is not made from the two pieces shown in sketches No. 29 and No. 30, but a length of 1/8" tubing is passed through the central hole in each crank web.

The crank webs are separated so as to be in alignment and soldered to the shaft tube.

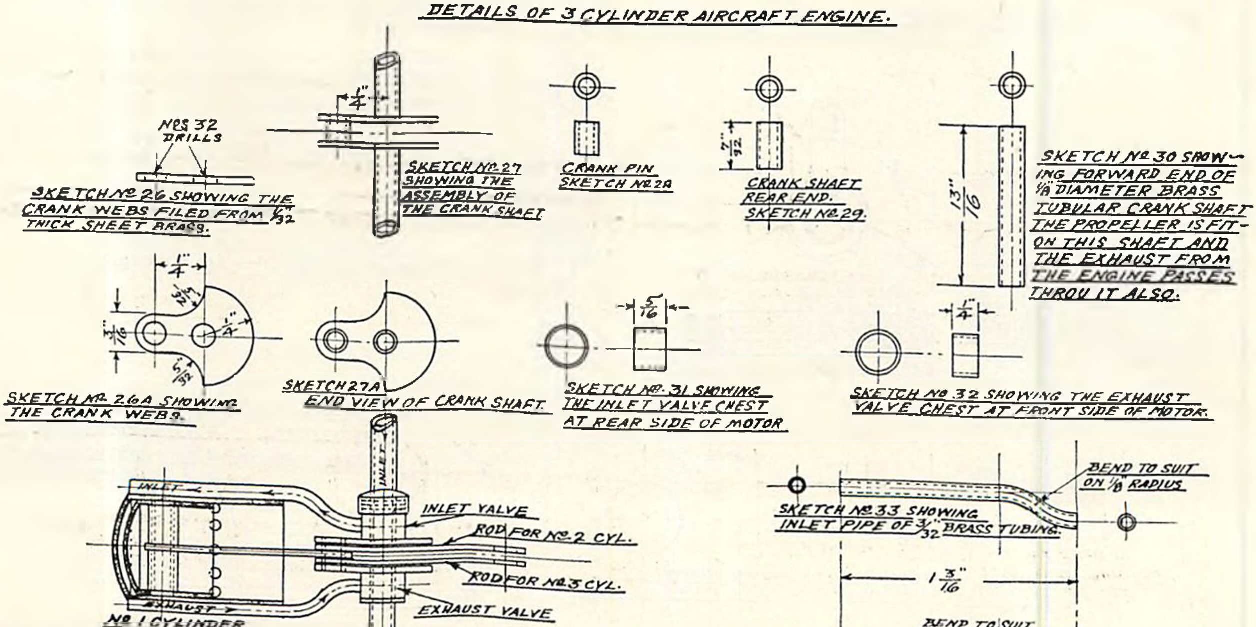
The portion of this tube between the crank webs is now cut away by means of a fine toothed hack saw or jeweler's hack saw. The crankshaft is now complete, with its connecting rods in place, and all that remains to be done is to cut off the shaft tubes to their proper lengths. These lengths are shown in sketch No. 27.

The inlet valve barrel is that portion of the inlet valve

DETAILS OF 3 CYLINDER AIRCRAFT ENGINE.



DETAILS OF 3 CYLINDER AIRCRAFT ENGINE.



SKETCH No. 42 SHOWING THE LAY-OUT OF No. 1 CYLINDER WITH RELATION TO THE CRANK SHAFT, INLET AND EXHAUST VALVES ALSO THE POSITIONS ON THE CRANK PIN OF THE CONNECTING RODS FOR CYLINDERS No. 2 AND 3 ARE CLEARLY SHOWN.

which is rotated by the rear end of the crankshaft.

It is made of a piece of 3/8" aluminum rod, which is drilled to receive the crankshaft and cross-drilled to allow the compressed gas to pass from the hole in the crankshaft to the cylinder inlet pipes. This inlet valve barrel is shown in sketches No. 46 and No. 47.

The fit on the crankshaft must be a tight press fit so that there is no chance of the position of the inlet port changing with reference to the position of the crank pin.

The proper location of the valve port with reference to the crank pin is shown in sketches No. 49 and No. 50.

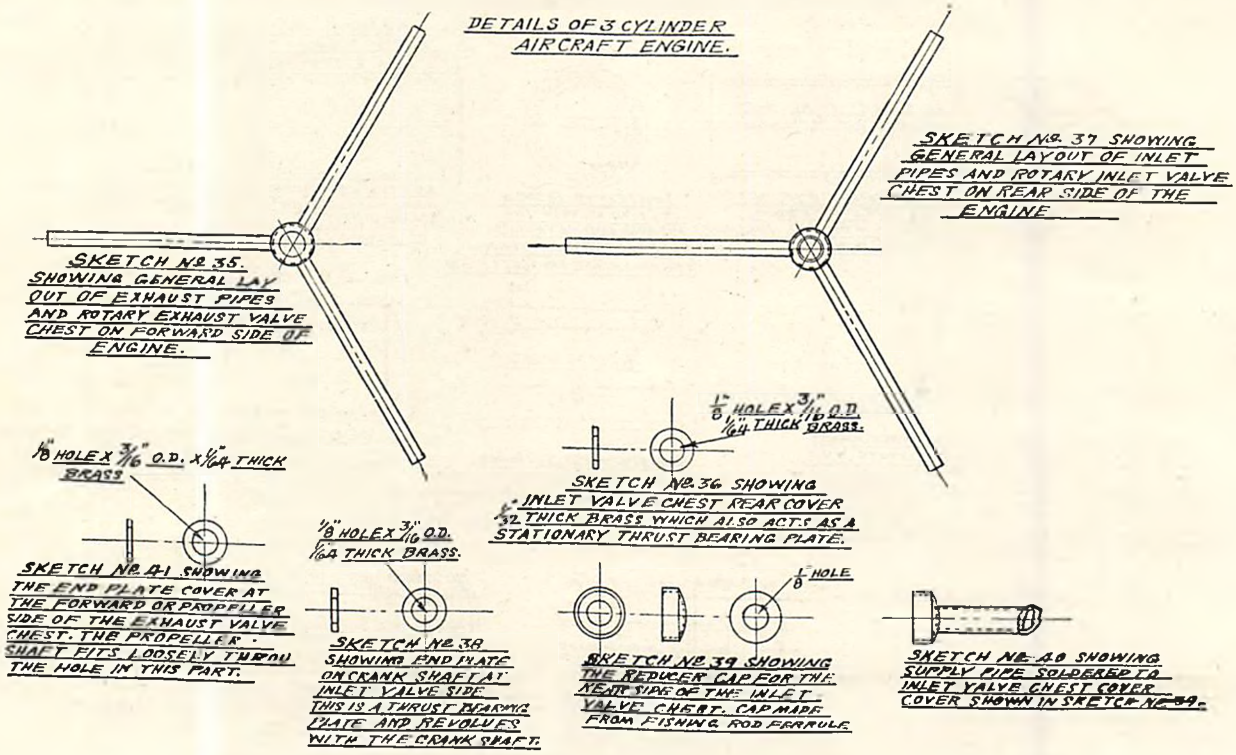
THE valve barrel is now ready to be lapped into the inlet valve chest. This inlet valve chest is shown in sketches No. 43, No. 44 and No. 45. This chest is cut from a piece of 1/4" fishing rod ferrule tubing.

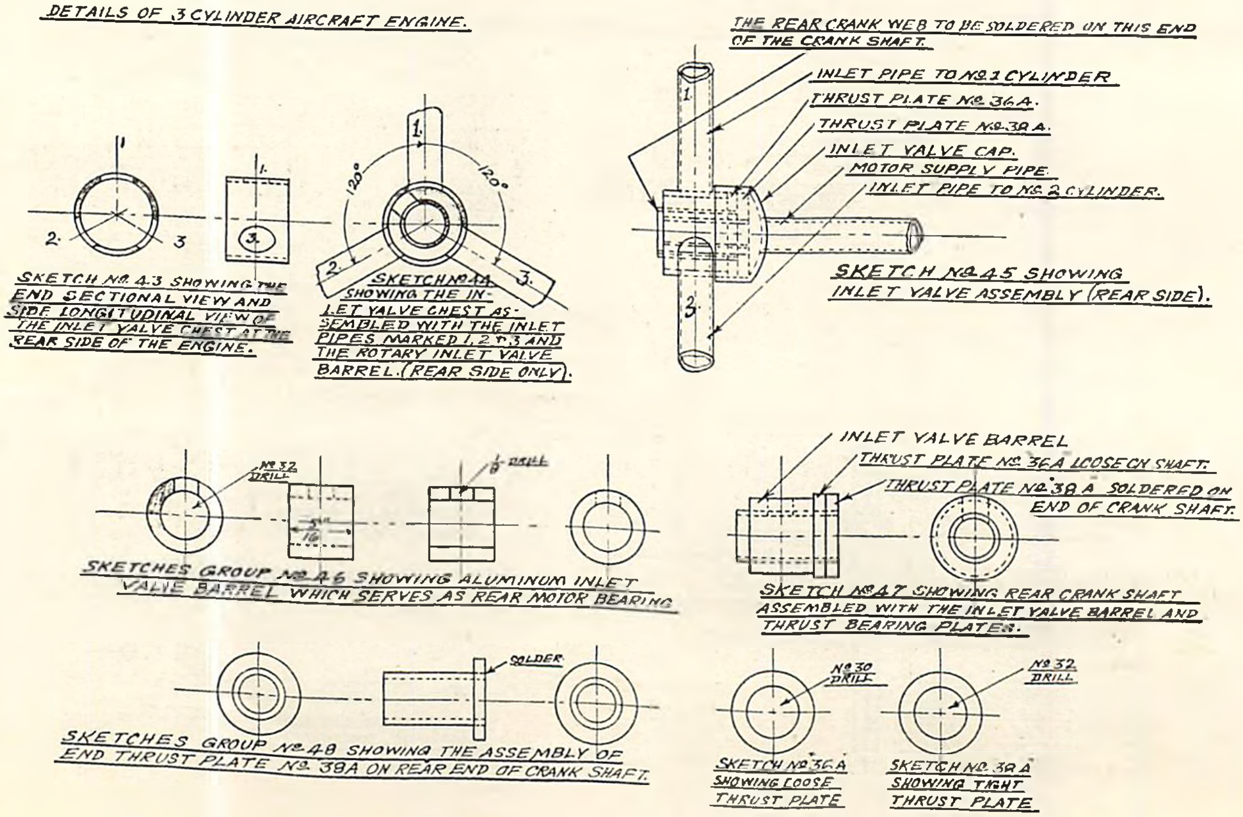
Three 3/32" holes are drilled in this tube and serve as inlet ports and places of attachment of inlet pipes are shown in sketch No. 33 after same have been attached to the cylinders as previously mentioned.

The crankshaft with the inlet valve barrels, also the pistons and cylinders, may now be assembled about the inlet valve chest as shown in sketch No. 2.

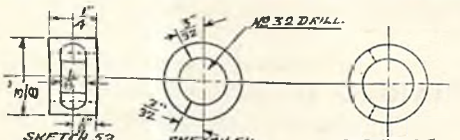
The thrust washer closing the end of the inlet valve chest may now be placed loosely over the crankshaft end at the inlet side and its edge soldered to the edge of the inlet valve chest as shown in drawing No. 47.

A second thrust washer is placed over the crankshaft





and soldered to the end of the shaft as shown in sketches No. 48, No. 47 and No. 45. This forms a bearing surface between these thrust washers and prevents the gas pressure coming through the inlet pipe shown in sketches No. 45 and No. 40 from blowing the whole valve assembly out of the inlet valve chest in a forward direction and jamming up the crank webs.



SKETCH 53 SIDE VIEW — SKETCH 54 END SECTION — SKETCH 55 END VIEW

SKETCHES No 53, 54 & 55 SHOWING THE ALUMINUM EXHAUST VALVE WHICH ACTS ALSO AS THE FORWARD MOTOR BEARING. FOR DIMSIONS OF PORT SEE SKETCH 51

The crank webs have not enough strength of themselves to hold the inlet valve assembly in its chamber. A cap shown in sketches No. 45, No. 39 and No. 40 is placed over the end of the inlet valve chamber as shown in sketch No. 45 and the inlet pipe supplying the compressed gases to the motor is soldered into a hole in the end of the cap as shown in sketch No. 45 and No. 40.

The exhaust side of the engine is the forward side of it. The exhaust gases pass through the propeller shaft and are released to atmosphere directly at the forward side of the hub of the propeller. The practicability of exhausting at this point may be questioned in the mind of the constructor. It is true that there is a slight amount of counter thrust created by causing a stream of gas to be emitted from an orifice in a forward direction, or, in other words, against the line of flight. However, in practice it has been found that the interference cause is so slight as to be in practice entirely negligible. In other words the fact that the exhaust of the motor is in a forward direction does not interfere with the flight of the model plane powered with this motor and to attempt to switch the exhaust in another direction would only add weight and complicate a simple design.

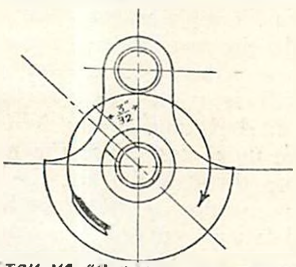
Complications in machinery do not pay, but, on the other hand, there is always much to be gained in simplifying the design of any piece of mechanical apparatus.

THE exhaust valve is now constructed. It is very similar to the inlet valve, excepting the part or opening in its side. This opening is called the exhaust port and allows the expanded gases to escape from the cylinders at the proper time after they have performed the useful work of driving the pistons.

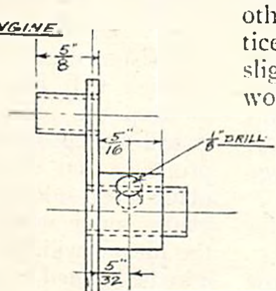
The exhaust valve is made from a piece of 3/8" diameter aluminum rod. A hole is drilled in the center of it, as shown in sketches No. 51 to No. 55, inclusive.

(Continued on page 40)

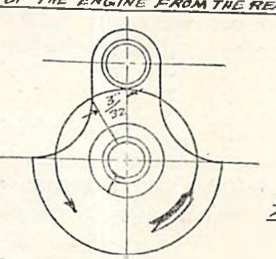
DETAILS OF 3 CYLINDER AIRCRAFT ENGINE



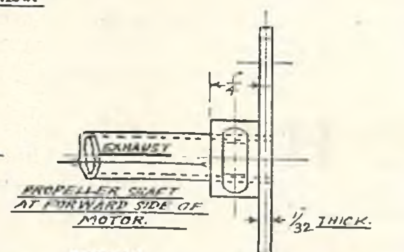
SKETCH No 49 SHOWING THE INLET VALVE TIMING DIAGRAM WHICH DENOTES THE POSITION OF THE VALVE PORT WITH REFERENCE TO THE CRANK PIN. THIS VIEW IS LOOKING TOWARDS THE FRONT SIDE OF THE ENGINE FROM THE REAR



SKETCH No 50 SHOWING THE ASSEMBLY OF THE INLET VALVE, CRANK WEB, REAR END OF CRANK SHAFT AND THE CRANK PIN.

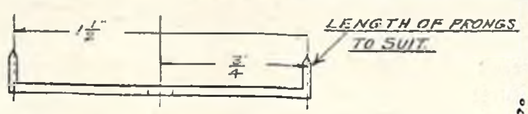


SKETCH No 51 SHOWING POSITION OF THE EXHAUST VALVE WITH REFERENCE TO THE CRANK PIN. VIEW LOOKING FROM FRONT SIDE TOWARD THE REAR.



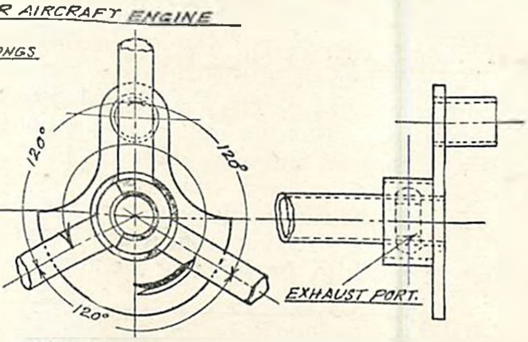
SKETCH No 52 SHOWING FORWARD CRANK WEB PROPELLER SHAFT AND EXHAUST VALVE

DETAILS OF 3 CYLINDER AIRCRAFT ENGINE

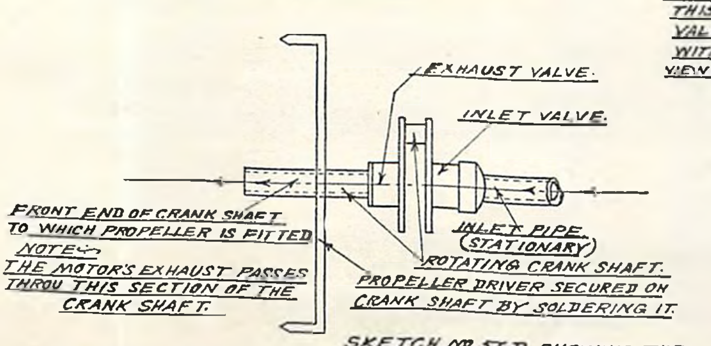


SKETCH No 56 SHOWING PROPELLER DRIVER. THIS IS OF 1/32 THICK SHEET BRASS

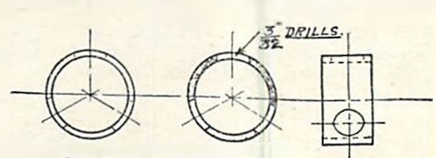
SKETCH No 56A SHOWING PROPELLER DRIVER (FRONT VIEW).



SKETCH No 58 — SKETCH No 58A.
THIS GROUP SHOWS THE TIMING OF THE EXHAUST VALVE AND THE LOCATION OF THE EXHAUST PORT WITH REFERENCE TO THE CRANK PIN. NOTE— THIS VIEW No 58 IS LOOKING ON THE FRONT SIDE OF THE MOTOR.



SKETCH No 56B SHOWING THE ASSEMBLY OF THE PROPELLER DRIVER ON THE FORWARD END OF THE MOTOR CRANK SHAFT. THE OTHER PARTS ARE NOTED TO SHOW THE RELATIVE POSITIONS OF THEM.



SKETCH GROUP No 57 SHOWING THE EXHAUST VALVE CHEST MADE FROM A PIECE OF 3/8 FISHING ROD FERRULE.

Aviation Advisory Board

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

INTEREST in our Advisory Board seems to be growing with leaps and bounds. We have been unprepared to answer in this column all the unusual questions that have been put to us this month. It will be necessary, therefore, to wait for another issue before we can enlarge this section.

I know you are waiting to hear the answers to a lot of these, so here they are.

Robert Montgomery of 109 Lycoming Avenue, Willow Grove, Pa., wishes to know:

Question: Why do we determine the pitch of a propeller independently of the motor power in the case of a model, while in the case of a full-sized machine it is first necessary to build the plane and then design the propeller afterwards?

Answer: In designing a model, the motor power is added after the machine is designed. Enough power is added to operate the propeller efficiently. However, in the case of the full-sized machine, the engine to be used delivers a certain amount of power, which cannot be modified and changed to meet a propeller design. The process must therefore be reversed and the propeller must be designed to absorb the power of the engine and yet fly the machine of a certain weight, at a definite speed. It is possible, however, if you wish to disregard the power of the engine, to design a propeller for a large machine before it is built. The speed and gliding angle may be calculated and the propeller design made in accordance with the data obtained from these calculations.

Addison B. Freeman, Jr., of 50 West Upsal Street, Germantown, Phila., Pa., asks the following questions:

Question: What is torque, and what causes it?

Answer: Torque is the tendency transmitted through the propeller shaft and the rubber motor to turn the machine over in the opposite direction from which the propeller is turning. It is due to the fact that the air causes a resistance on the propeller blades to their passing through it. In other words, the resistance of the air tends to keep the propeller from turning. This tendency to retard the propeller speed is transmitted through the propeller and through the shaft and motor to turn the plane over sideways. The more resistance the propeller blades incur when passing through the air, the greater the torque will be. This resistance of the propeller blade may be likened to the resistance incurred by a wing when it is passing through the air. It is induced by the air in the same manner.

Question: Are the Pratt & Whitney motors (Wasp and Hornet), the best motors in the world?

Answer: These motors are considered by many people at the present time to give the best service of any air-cooled engine in existence.

HERE are some interesting questions from Joe Brooks, c/o Post Office, Savannah, Ga.:

Question: Would it be advisable to put a three-power motor, weighing about 30 to 50 pounds, on a primary glider?

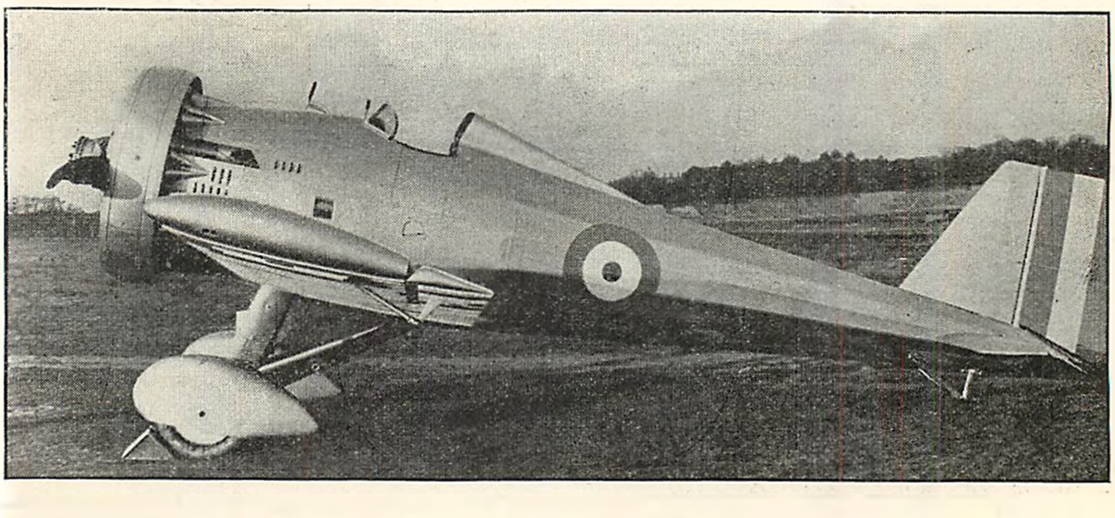
Answer: I should not advise you to do this as three horsepower will be insufficient power to increase the flying qualities of your glider to any extent. I should advise you to add at least ten horsepower. Then, if you have a proper means of launching the machine into flight, this power should be enough to fly the machine in a horizontal position without climb, or with very slight climb.

Question: Where could I obtain such a motor?

Answer: I should advise you to write to some company manufacturing motorcycles and determine whether or not a motor of this type is available.

Question: Where could I obtain plans of instructions to build such a glider?

Answer: If you will *(Continued on page 47)*



Here is the All-Metal Vickers "Jockey" single-seater interceptor fighter. It is armed with two machine guns and capable of flying nearly four miles per minute, seven miles above the ground. The cockpit is electrically warmed. This ship is used to ward off the attack of hostile airplanes and dirigible airships and therefore can sacrifice its load of gasoline in order to have the primary qualities of rapid climb and high ceiling.

A "Parasol" That You Can Fly

(*Continued from page* 18)

Cover all of the top of the tail with "Superfine" and dope with light dope. Weight down lightly around the edges to prevent warping and after 30 minutes cover all of the bottom except each inner panel either side of the middle rib. Now cement the tail to the fuselage, and after it has been squared up and has set, cover the two inner bottom panels, blending the covering neatly against the longerons. Dope the entire bottom surface.

The fin and rudder, drawing No. 7, are made much the same as the tail. After building up and covering the fin and rudder, sand away lightly the paper on the top of the center rib of the stabilizer and cement the fin to it, getting it absolutely in line with the fuselage. Before the glue sets, run a piece of strong silk thread bracing in the manner noted on drawing No. 4, making one complete loop around the leading edge of the fin at point X, drawing No. 7, and at the ends of the stabilizer. Draw the thread just tight enough to strengthen without warping the surfaces. Apply a drop of cement at each point the thread makes contact with tail, fin and body. Hinge on the rudder and thread up the control.

Wing Assembly

The wing assembly comprises wing, wing struts, cabane struts and fuselage rest. The details are given on drawings Nos. 7, 8 and 9.

After building up each wing half, join them with a good coat of cement between the two center ribs and wrap the joint with thread until dry, after which the thread should be removed. Cover the wing with "Superfine" tissue and dope.

Then build up the cabane strut and fuselage rest assembly, drawing No. 7, and attach the cabane struts with thread and glue to the protruding center fittings on the wing, drawing No. 8. Finally cut to size and assemble the wing struts as indicated on drawings Nos. 7 and 9.

The 3/32 square x 2¼ piece under the body at the point shown on drawing No. 7 will give about 3 degrees angle to the wing in relation to the line of the longerons. Thinner or thicker blocks will enable you to experiment with different angles of attack.

Propeller

THE side and plan of the blank is shown on drawing No. 1. It is very important to taper the blank before carving, as shown on the side view, since the efficiency of the propeller depends upon this taper which makes the blades' true pitch.

Carve the blades to about ⅛-inch thick near the boss, tapering to 1/16-inch thick at the tip. Sand the rear faces of the blades (front of the blades on the machine) to a cambered shape. After assembly to the plane, apply cement to the front of the boss and then give the propeller a final careful balancing with fine sandpaper. Apply two coats of dope to the entire propeller, allowing twenty minutes between each coat.

The motor is eight strands of ⅛ flat rubber. The slight propeller torque can be taken care of with a little right rudder. Move the wing back to correct stalling.

Build Your Own Radial Engine

(Continued from page 37)

Cut the length to the dimensions given in sketch No. 53 and cut the port for the exhaust gases as shown in sketch No. 54. Press this valve tightly on the propeller shaft in the relative position to the crank pin as shown in sketch No. 51.

The exhaust valve chest is that part into which the exhaust valve fits. It is made from a piece of ⅜" fishing rod ferrule and the exhaust valve has to be carefully fitted into this chest by means of carefully filing and lapping the aluminum valve to the brass valve chest. Drill for the exhaust pipes coming from the heads of the cylinders and fit and solder these pipes to the exhaust valve chest.

Make a propeller drive hub as shown in sketch No. 56 and solder same to the propeller shaft so that the propeller may be attached to same by means of dope and thread.

Stretch the number 30 B & S gauge steel wire over the heads of the three cylinders as shown in sketch No. 2 and solder it in place. This wire serves as a tension tie member and prevents the cylinders from weaving and tending to be forced away from the direction of the shaft rotation, which would be clockwise, facing the propeller.

The motor revolves its propeller in an anti-clockwise motion facing the propeller. The motor revolves its propeller in anti-clockwise direction when facing the propeller, which is the practice of most American engine manufacturers. The propeller, therefore, must be one of the right-handed variety.

These are easily obtained at any model supply house. It is advised that the diameter of the propeller be between 12" and 14", depending upon the pitch used.

The engine is now complete except for the drilling of the exhaust ports in the cylinder walls as shown in sketches No. 2, No. 42, No. 22, No. 1 and No. 3 to No. 5, inclusive.

The weight of the complete engine is 1¼ ounces (light), complete and ready to fly away.

Learning to Soar in Germany

(Continued from page 7)

The 1931 Rhön Soaring Competition came along towards the end of July. I had entered the training class, as the performance class was quite out of the question for me. Fifty-five performance gliders were at the start. This number was astonishingly high if you stopped to consider the bad financial state of Germany. Most of the types were built by groups of enthusiasts. Hundreds of young men worked together to finance and build a soarer for one man to fly in the competition. Idealism!

My first flight in the competition took place on the west slopes of the Wasserkuppe after supper.

The wind blew, after the clouds had lifted, with a constant speed of 10 miles an hour. A few soarers were already in the air. I started from the highest point of the mountain. Slowly, soundlessly I glided to the deeper slope, then curved with a huge radius so as to lose as little height as possible, and over to the "Pferdskopf," the next mountain. Some people stood there waving their hands to the giant bird above them. I would have liked to return their greetings but I couldn't, being completely faired in; only a small hole for my neck being left in the cover (to reduce air-resistance). The field of upwind was very broad. A wide turn, way over the valley, and back again. That was real, *real* flying! Without a sound I flew, borne by an invisible force over the landscape. Wonderfully smooth, soaring free. But one has to know how to use that force or one will sink down miserably. You cannot describe the feeling, you must do some real soaring yourself to get an impression. As the night was falling we all had to land.

When we had days with low clouds; no flying was possible.

MY most interesting flight took place on the 28th of July, above the west slopes of the Wasserkuppe. At 10 the clouds lifted and the start was opened. It was ideal soaring weather with a westerly wind of 20 miles an hour. The sun was shining and some thick cumulus clouds hung in the sky. These clouds are liked very much by soaring pilots. They are indicators of good rising air currents, moving across country. The moisture in the air is cooled when reaching the more rarefied strata and so condenses and takes on visible forms: the clouds. The thicker and more balled they are the more upwind they indicate. But as soon as they begin to fray out, you won't find any lifting forces below the cumuli. The best ones are those just beginning to form.

I started at 11 o'clock. The air was quite populous again. 14 soarers were flying along the slopes, 3 or 4 of them always behind one of the "big guns." It was very interesting to observe the tactics of some of them.

In one curve my "Francofurtia" did not want to turn. In spite of all my steering she flew straight on, farther and farther out over the plain. Under normal conditions the machine should at least have begun to sink as I came out of the "slope-upwind," But no, she rose! Against all controls she went slowly into a right-hand turn. It was beginning to get uncanny. "If you absolutely want to turn to the right although that ought to lead into the downwind, you shall have your wish," I said to my glider and put the controls into a right-hand turn. She went beautifully around, farther and farther. I had already accomplished a full circle and was rising!

"Should that be . . . ." I looked upwards. Righto, a thick, compact cumulus cloud stood almost above me. I circled on and on, staying under my upwind indicator. It went wonderfully well, up and up, just like a big bird of prey. My variometer steadily showed a rising speed of 8 feet per second. Sometimes a gust struck me and the machine turned again a bit. The other pilots also circled below the cloud. This queer independent turning movement is caused by the luffing tendencies of aircraft, the strongest gustiness is in the center of the cloud upwind, it spreads outward, hits the soarer and through the tendency of the machine to turn into the wind, it continually points its nose into the origin of the gust. And so it's always a good plan to let the performance-soarer do a bit of what she wants, and if you have enough height try to find a stronger field of upwind and utilize the given conditions with the greatest possible skill.

I FLEW back again to the Westslope after having reached a height of 4200 feet, because the wind had driven the cloud—and us with her—way over the Wasserkuppe. Too late I noticed my mistake. I should have, like five other performance pilots, stayed below the cloud and travelled with her across country. But now it was too late.

The wind dropped slowly, until at last only one other pilot and I were still in the air. We sank lower and lower and were already flying "submarine," i. e. below the starting point, for some time. Above the declivity there was still a long slope of pasture to land upon. If we did not land on it we would have had to fly way down the valley and the rest of the day would have been lost on account of the long time-consuming return haul. Finally I flew very low again into the hollow, much too low to be able to land on the meadow above the declivity. The slopes of the gully were partly covered with grass, partly strewn with boulders. I felt no lift at all—no wind.

Suddenly an extraordinarily strong gust tore my left wing up higher and higher and pushed me exactly in the direction of the overhanging rocks. I couldn't bring the soarer around to the left, to the open valley. From the right the rocks seemed to come rushing towards me with increasing speed. In the midst of the fiercest eddies I pulled my soarer with almost vertical bank around to the right, where the grass was, putting her on her nose to gain speed so as to have as much control on the rudders as possible and, just before hitting the ground, I pulled her up. The skid tore the grass, the soarer stood for a moment and began to slide down backwards. With my shoulders I broke the cover of the cockpit away, jumped out and held on with all my might, yelling for help. Soon some people came and helped me to hold on. With a great effort we pulled my brave "Francofurtia," completely intact, up the hill. My rival was now flying on in the freshening wind. The duration of my flight was three hours. On the same afternoon I made another flight of four hours.

THE most interesting day was Saturday, July 25. It was very hot and a south wind was blowing. At 4 p.m. some dark towering clouds appeared in the southwest. Higher and higher they rose as they came nearer. That was the thunderstorm "front" so ardently desired by the pilots of the highest class. Feverishly they got ready. The pilots of the training class quickly brought their birds to safety, so as to be back in time to see the fun. The high efficiency soarers were at the start, but the weather vane still pointed due south. The black wall of clouds came nearer and nearer, livid lightning flashed. Now—a puff of wind from the west. Sharp commands were heard, the first machine was in the air. Then they all wanted to start. The first ones mounted higher and higher to meet the dark clouds. In six minutes twelve soarers had started. Only one, the thirteenth, was taken into the lee of the old inn. She had missed the chance. The others were cruising back and forth before the storm. The later ones didn't get the connection with the upcurrent and had to return to land. Dark masses of cloud kept racing nearer; the rain started pouring down—the soarers were lost to sight.

How would they fare? No one could tell. After a while the first landing reports came in, until finally only Groenhoff and Hirth were still to be heard from. Late at night we heard that Hirth had landed near Halle (105 miles distant) and Groenhoff near Magdeburg (136 miles). They had to land, as darkness had set in.

ON the last day of the competition a southeasterly wind with a maximum speed of only four miles an hour was blowing. A complete course in motor flying up to the A-licence was offered as a prize to the pilot who completed at least five flights of a minimum of five minutes each. I knew that it would be very difficult to fulfill these conditions. Of course, one could fulfill the condition of time flying down into the valley, but then you wouldn't be able to fly five times, because of the return haul.

All the soarers were lying at the start since 8 o'clock, waiting till the sun was higher and would have warmed the valley. By the warming up of the ground (especially rocks, sandfields, cornfields, villages and dry pine woods) the air above it is warmed up, too, and so—lighter than the cold air above, it rises. The thermal upcurrents were strongest between 2 and 3 in the afternoon. At 12 the first trials were made, but they had no success. At 1 the "big guns" started, but they, too, had to land again soon. I also wanted to have a try. By the catapult-start I pulled my plane up as high as possible to utilize the impulse of the start. I flew as slowly as I could; by that the sinking speed of the soarer was brought to a minimum. Through the low speed the machine is very "soft" in all controls and "swims" through the air. Great care has to be taken not to come into a spin, which, with such a low height above ground, would have disastrous results. I flew under Wolf Hirth, who is known in the U. S. A. by his motorless flight above New York. Then we went on, slowly, hovering over the woods toward the town of Gersfeld. There, way over the valley above wheat and rye fields, a great turning curve was made. Back again to the forest. Then Hirth was lower than I was and had to go in to land. That was great fun, staying up longer than one of the cracks when conditions were bad. Then the big turn at the starting point came again and the play began anew. Without a sound I soared along, freed from earthbound restraint. Smoothly into the turns and gently out of them again, hearing the hawk's cry, unbound, using the simple forces of Nature; feeling how it is to be borne along without brutal force, without a sound—dreams of mankind are fulfilled.

But alas! I was sinking lower and lower and had to land, too. Eight minutes—the conditions were fulfilled. Again another pilot started, and so it went, but only a few were able to fly the required five minutes.

(Continued on page 43)

Quentin Roosevelt "Over There"

(Continued from page 19)

temporary bit of better visibility.

Finally there, off to the left rear of him, he spied a formation of four planes and quickly maneuvered around to rejoin his lost command before the clouds swallowed them up again. Catching up with the rear of the formation, he took his place therein and proceeded along, patrolling the line, glad to have companionship once more in that misty, lonely sky.

But what companionship! For, as he looked closer at the ships about him after accompanying the group for several minutes, he discovered big crosses adorning the sides of these planes. Unwittingly he had come upon and joined a group of German planes. For the very reason that the low visibility had prevented him from discovering his error sooner, so too—and fortunately for him—had the Boches failed to recognize Roosevelt as not one of their own. Thoroughly frightened at first by his luckless predicament, as he readily admitted to his companions later in telling of the incident, the young American knew he had to form a plan of action and work quickly before he was discovered himself.

Rousing himself from a momentary spell of inertia, Roosevelt decided, like many another good military tactician before him, that the best defense would be to attack.

Once his mind was made up Quentin did not lose a moment. Guiding his ship with utmost precision so that his first shots would take immediate effect, the American took careful aim at his nearest foe in front and then let both guns speak at once.

When the fierce hail of lead and steel suddenly struck the ship it burst into flames in an instant and tottered in its pathway. Unquestionably it was done for and seeing it fall, Roosevelt quickly ducked away and darted for home.

Despite the fact that the companions of the doomed German outnumbered Quentin three to one, they made no apparent attempt to harry his departure or give further chase. Perhaps they were too stunned by the very surprise and suddenness of the tragedy or, maybe also, they had too much respect for a foe who would thus cast himself into their very midst to seek a conquest.

On the morning of the 14th at 11 o'clock, the 95th Pursuit Group was to go on "high patrol between Dormans and Belleau Woods." The day dawned clear and warm with but a few scattered clouds to mar an otherwise perfect day.

At ten minutes to eleven the 95th Pursuit Squadron was all assembled on the flying field to receive final instructions from the flight commander, Lt. John Hambleton. Ten men were to make the flight and they agreed to meet over Coulommiers, at an altitude of 600 meters. From there they planned to fly to Château Thierry in formation for the start of their operations.

With this stage of the journey once reached, one of the flyers was already missing. He had become lost in the clouds which were becoming more dense with each succeeding half hour. Shortly thereafter, Lt. Hambleton and another member of the already depleted squadron were forced down with motor trouble. Lt. Curtis took charge of the remainder, who pushed on despite difficulties.

From Château Thierry, the little force flew on along the course of the Marne River which, at that stage of the war, served as No Man's Land between the opposing forces. Reaching Dormans, Lt. Curtis saw ships in the murky offing which, upon closer observation, turned out to be Boche aircraft. It was a formation of seven Fokkers and the American commander immediately signalled his men to climb, at the same time turning away toward their own lines.

By this maneuver the Yankees sought to come down upon the Germans in surprise attack from the clearer air higher up. The enemy were flying at an approximate altitude of 4700 meters, so the Americans went up to about 5200 meters before they started their opening offensive dive. Everything seemed to play into the favor of the attacking force except the wind, now considerably stronger and blowing hard toward Germany.

Zooming down suddenly upon the Germans, Lt. Curtis and his followers opened fire before the enemy were fully aware of the impending attack. To collect themselves and organize for the fray, the Boches immediately dove, hoping too, by this maneuver, to get into the protecting shelter of the denser cloud banks of the lower air strata.

THE obvious tactics of the American forces at this juncture were to keep their advantageous position on top and to swoop down with punishing effect every time an opportunity offered itself. With these ideas in mind, most of Lt. Curtis' little band had climbed again after their initial contact with the enemy. Not so, however, with Quentin Roosevelt and his fellow flight companion, Lieutenant Knowles. Overanxious, these two, and comparatively new and inexperienced in the intricate arts of aerial combat, they kept right on boring down upon the Germans.

This was exactly what the enemy airmen were hoping for, to suck one or two of the American ships down into their midst where they could attack from all sides. Roosevelt and Knowles had unwittingly fallen into the trap.

As soon as their more experienced comrades perceived the plight of these two young Americans, they, too, dove down once more, and soon a grand mêlée of ships, shells and men mixed in almost indescribable confusion in the mist-laden air.

About all that could be done was to fly more or less blindly with sharp lookout for another ship. If it bore the markings of a foe, fire and fire fast, for in another instant the vapors would have swallowed it again. This hectic plan the Americans followed until both their munitions and gas had run dangerously low. Completely separated from one another and utterly disorganized by the baffling elements, they started for home one by one. As each man landed at the home airport, his first thoughts and words were for the safety of his comrades.

Finally all were in but Quentin Roosevelt. At first not much concern was felt,

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The Aerodynamic Design of the Model Plane

(Continued from page 29)

flight then was made with the expectation of witnessing an interesting series of barrel rolls and Immelmanns. To our surprise we were pleasantly disappointed for the ship flew as steady as a large transport. The wind which was fairly strong and gusty did not disturb its equilibrium in the least.

With the thought that possibly its good behavior was an accident, the model was flown again. The result was the same on this and every other flight that was made that afternoon. To say that the problem was a puzzling one is putting it mildly. Apparently, natural law was being contradicted.

Why should the same model fly erratically on one occasion and with perfect stability on another. After considering all possible causes, it was decided that for some reason the form or shape of the model had been changed. It was suspected that the dihedral of the wing had changed, due to atmospheric conditions and because the model had been resting on the bench in an uneven position, thus causing the wings to warp. Upon checking up my suspicions, by measuring the dihedral, it was found that it had decreased slightly. This was evidently the cause of the change in the performance, which was all well and good, but why should a change in the dihedral of the wing change an erratic, unstable plane into a steady flier? Here was more "food for thought." After due consideration a theory suggested itself, based on experiments made in the physical laboratory some years before.

In order to test this conception of the difficulty, three sets of wings were made for the machine. One with a dihedral angle of the same value, exactly as the one that was on the ship when tested; a second with *slightly* less dihedral, and one with slightly more. Each one was tested in turn, under the same flying conditions.

According to the adopted theory, certain definite results were to be expected. Would the tests uphold the theory? The model, when flown with the first test wing, was steady and almost human when in flight. The second wing with less dihedral was then tested, and "presto" the ship proceeded to cut up its old rocking tricks again. The third wing, with greater dihedral, produced the same undesirable results upon subsequent tests. The results of the tests were exactly what was to be expected in the light of the theoretical explanation attributed to the unusual phenomena.

THE answer to the problem was that on any airplane with a given span and with the center of gravity a given distance from the center of lift, it was necessary that the dihedral angle should be of a certain definite value. The first tests just described gave an inkling of this truth, which has been verified by means of a large number of tests with various types of model planes, since these first experiments were made.

This phenomenon as applied to airplanes may be called the "Grant Theory of Synchronized Oscillation."

Let us analyze the problem:— First, a dihedraled wing imparts a swinging or an oscillating tendency to the machine upon which it is mounted, the period of oscillation of which has a definite value for any given span and degree of dihedral. Second, a low center of gravity imparts an oscillating tendency, the period of which is proportional to the distance of the center of gravity from the center of lift. As nearly as can be determined, the explanation is as follows. If the period of swing of the center of gravity is an ODD MULTIPLE, or

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Learning to Soar in Germany

(Continued from page 41)

I hired a horse to make the transport from landing point to start easier for my crew. I was lying well in the race, but it was not to end well. Again I took the air. Two other soarers were coming in low to land as the "Francofurtia" was heading outward. But it was queer that I lost so much height. Had the thermal upcurrents ceased? Earlier than I had proposed I began the turn; back again over the wood. At a height of about ten feet above the treetops I flitted over the edge of the wood. Ahead of me there were still three separate trees standing too close to allow me to fly between them. As I could not avoid them, my soarer was pushed on its nose to increase its speed and thus it was able to jump over the tops. The fuselage of the plane was only five feet above the ground. The speed indicator showed sixty miles an hour. At the last moment I pulled the stick way back and lifted the right wingtip just over the treetop, then the left wing over the second tree. The speed had decreased a lot. The right wing had to go up again to avoid the last of the three trees. Only a few inches separated the left wingtip from the grass. With its last energy I pulled the machine up as high as possible. But it was not enough. Crashing, we turned around 180° and, with a jerk, the machine hit the ground. The outer wing was broken at the connection.

Again: my winter's work was cut out for me.

BACK NUMBERS WANTED

We would like to obtain back copies of "Model Airplane News" published during the years of 1929 and 1930. Issues particularily needed are:

Vol. 1, No. 6
(December, 1929)

Vol. 2, Nos. 1 and 2
(January and February, 1930)

Vol. 2, Nos. 4 and 5
(April and May, 1930)

It will be appreciated if those of our readers having any, or all, of the above issues will communicate with the editor.

UNIVERSAL MODEL AIRPLANE NEWS is interested in purchasing exact scale drawings of all large airplanes. If anyone has any for sale or can tell us where they can be obtained, we will appreciate hearing from them.

How Well Do You Know Your Airplanes?

(Continued from page 32)

11. Bristol Fighter. Several engines. 2 place
12. Comper Swift. A.B.C. Scorpion 35 HP. 1 place
13. Curtiss-Reid Rambler. Gipsy 90 HP.
14. Fokker XA-7. Curtiss Conqueror geared 600 HP. 2 place
15. Douglass XA-2. Liberty V-1410 420 HP. 2 place

We are sorry to note that our engraver left off plane No. 7, which was supposed to be the Alexander Bullet. We wish to commend Mr. Wooding especially for the answer which he gave to the No. 7 plane. It shows keen perception. He says it is either Jimmie Doolittle and his Gee-Bee or the S-6 going after the world's speed record. It is going so fast that all that one can see is a blank space. Pretty clever, eh, what?

We are sorry to say that we have found it necessary to discontinue the Silhouette Contest for a few months at least. However, it may appear in some of our later issues.

Until then, happy landings!

Aerodynamic Design

(Continued from page 43)

approximates an odd multiple of the swinging period imparted by the dihedraled wing, the airplane will be unstable. The effects of the two tendencies will operate in harmony with one another to continue and INCREASE the rocking condition.

On the other hand if the period of one oscillation is approximately an EVEN multiple, or is not a multiple of the other, the airplane will be STABLE, resisting and completely overcoming any rocking tendency. In the latter case, one oscillating tendency works against the other; one overcoming and dampening out the other. The ship will therefore be stable, and cease to rock. This may be too complicated for the novice to completely understand. However, the idea is of sufficient importance to the model designer or aeronautical engineer, to suggest that he sacrifice a few valuable moments to study the problem and acquire a clear conception of it. This theory will be discussed at greater length later.

Fig. (51) shows an airplane with a dihedraled wing (AB) and low center of gravity (G). The dihedral has been made excessively large to illustrate the facts clearly. The arc (AHB) is the arc of swing of the wing. The line (OH) is the radius of swing. The arc (XY) is the arc of swing of the center of gravity. The line (PY) or (PX) is the radius of swing. The periods of oscillation of the wing and center of gravity are proportional to the length of the respective radii, (OH) and (PX). One radius should be an odd multiple or, not a multiple of the other, in order to insure stability.

NOW that we know something of the nature of the problem of attaining lateral stability by using a dihedral angle with a low center of gravity, what is to be done to secure the desired results?

A few simple rules and examples are given here that will give satisfactory practical results. A more involved and detailed discussion will be taken up later for the benefit of the more inquisitive students.

If your model is of such design that the center section of the wing (in Monoplanes) is about on the same horizontal line as the center of gravity (rubber motor) or very slightly above it, then as a general rule the dihedral should be about "one in six" on each half of the wing, or each wing tip should be raised one inch for every foot of span in order to insure a fairly low center of gravity. The center of gravity is usually very close to the rubber motor, so when the wings are dihedraled this amount, the center of lift is raised above the center of gravity sufficiently to cause a low center of gravity effect. Line (PH) Fig. (51). This condition usually applies to planes whose fuselage is formed merely by one or two sticks, the wing being fastened directly to them.

The above rule is a good one to follow in the case of all such stick models. In the case of "body" models, having fuselages similar to large ships and the wings fastened to the top of the body, the center of gravity is usually well below the wing center section. Fig (51). It is necessary then to give each half wing a dihedral of only one in twelve. This is just one-half the amount used when the wing is down close to the line of the rubber motor. In other words, if the center section of the model is about 4% of the span above the center of gravity, the dihedral angle on the wing should be such that each wing tip is raised one-half inch for every foot of span.

The table given here conveniently shows the amount of wing dihedral to use for various values of low center of gravity. (If any of these combinations should cause your model to rock unnecessarily, change the dihedral angle very slightly).

IN order that you may understand clearly the use of the table, the following example is given:

In the process of designing your model, we assume that you have reached the point where it is necessary to determine the correct amount of dihedral. For the sake

Distance from the Center of Gravity to the wing center section	Amount to raise each wing tip per foot of span	Angle of each wing with horizontal given in degrees
0 or Minus	One inch	10 deg. 40 min.
2% of span	¾ inch	8 deg.
3% of span	⅝ inch	6 deg. 40 min.
4% of span	½ inch	5 deg. 20 min.
5% of span	⅜ inch	4 deg.
6% of span	¼ inch	2 deg. 40 min.

of insuring added stability you have decided that the center of gravity (about the center line of rubber motor) shall be 4% of the wing span below the center section. The wing span is to be (25) inches, so the center section therefore must be one inch above the center of gravity. As the wing center section is to rest on the TOP of the fuselage, this side of the body must be one inch above the motor.

The proper amount of dihedral under these conditions will be found in the table to the right of the notation "4% of span." Thus each wing tip should be raised ½ inch for every foot of span. The span is slightly over 2 feet. Therefore, according to the above rule, each tip should be $1\frac{1}{24}$ inches higher than the center section, the angle of each wing with the horizontal being about $5\frac{1}{3}$ degrees.

So far in this chapter many facts have been given for you to use in acquiring LATERAL stability. Next month we will proceed with the problem of directional stability, the lack of which causes the tendency of an airplane to "spin."

Before closing this instalment, I wish to correct several typographical errors which have occurred in past issues in these articles.

In the October issue, on page 35 in the 13th item, the quantity (π) has been left out of the formula. The formula should be, $P = \frac{d \pi D}{W}$. In item 14 the formula given is for the area of ONE propeller blade. In item 23 in the formula for propeller blade area when double surface wings are used, the last quantity in the numerator has been inverted by mistake. The formula should read

$$a = \frac{A P^2 (1/3 + 6c)\ (4 + I)(1 + \frac{U}{8.5})}{160 D \sqrt{(2 D)^2 + P^2}}$$

In the December issue on page 34, about half way down the first column, the phrase, "and (X), that part of each half wing that is to have NO dihedral angle," should be changed to, "and (X) that part of each half wing that is to have A dihedral angle." This will probably clear up several puzzling questions.

I suggest you look over your back issues and make these changes.

Until next month, *Happy Landings!*

Quentin Roosevelt "Over There"

(Continued from page 42)

his pals believing that his homeward flight was temporarily impeded by the bad weather. So the squadron went to mess fully expecting his arrival at any moment. When three o'clock came around and he had not yet appeared, all Allied airports were called on the phone to ascertain if the missing airman had landed astray.

Several days elapsed, days of untold agony and anxiety on the part of Quentin's comrades, before the sorrowful truth finally became known. It was garnered, then, from an intercepted wireless message between German posts. The message went on to state that on July 14th a group of German ships, while on patrol, had been attacked by an American squadron north of Dormans. In the course of the ensuing battle, an American pilot, Lt. Roosevelt, who had shown conspicuous bravery in attacking persistently, without regard to personal danger, was shot and fell at Chamery.

By a strange coincidence, some of Quentin's comrades, after the armistice had been signed, met the man who had brought him down. The German, a young non-commissioned officer, barely twenty years old, expressed his sorrow upon learning who it was he had victimized but said simply that had he not done so, he himself might have fallen in the fray.

The shock of Quentin Roosevelt's loss was deeply felt by all who knew him, for he was equally admired as a man and loved as a friend.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of UNIVERSAL MODEL AIRPLANE NEWS published Monthly at Springfield, Mass., for October 1st, 1932. State of New York. County o. New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared George C. Johnson, who, having been duly sworn according to law, deposes and says that he is the Publisher of UNIVERSAL MODEL AIRPLANE NEWS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

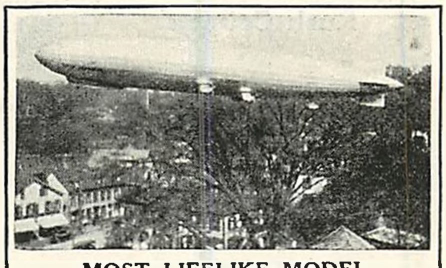
Publisher, George C. Johnson, 125 W. 45th St., New York, N. Y. Editor, Charles H. Grant, 125 W. 45th St., New York, N. Y. Managing Editor, George C. Johnson, 125 W. 45th St., New York, N. Y. Business Manager, George C. Johnson, 125 W. 45th St., New York, N. Y.

2. That the owner is: Jay Publishing Co., 125 W. 45th St., New York, N. Y. George C. Johnson, 125 W. 45th St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

George C. Johnson, publisher. Sworn to and subscribed before me this 5th day of October 1932. Charlotte Shapiro. (My commission expires March 30, 1933).



AIR WAYS—Here and There

(*Continued from page* 23)

which controls the speed of the motor. If readers would be interested in knowing more about the details and construction of this trainer, we will be pleased to hear from them. If it is warranted, we will publish plans of it in some future issue. It is not only valuable in teaching the young man the rudiments of flying but it is possible to build one of these and use it as a commercial venture, charging a fee for each "ride" that the pilot takes.

Harold F. Maschin of 44 West Silver Street, Westfield, Mass., directed the construction of this machine. He is an old model builder, having won the Western Massachusetts championship in 1930. He also competed in the National Contest at Detroit. At present he is with the Greenfield Glider Club, which is quite active. Picture No. 20 shows a group of Maschin's models.

Model Flying Club of Australia

THOSE boys away down in Australia seem to have been pretty busy since we heard from them in our last issue. Recently a meet was held, at which Sir Charles Kingsford Smith, the president of the club, was on hand to pass judgment on the work of the members. In Picture No. 21, he shows great interest in the take-off of the "Winnie," built by Reginald Searles, who is launching it. We would say that this model had real flying qualities.

In Picture No. 22, Stan Baker and Ivor Freshman, secretary of the club, are timing Reginald Searles' R.O.W. twin pusher. Sir Charles is intently watching the action of the machine as it gets under way. Picture No. 23 shows a group of the active members of the club. R. R. Cook is presenting a cup to Sir Charles Kingsford-Smith in appreciation of his services. Mr. Freshman is at the left.

Columbus Society of Model Engineers

A NEW club room has just been donated to the C. S. M. E. by the superintendent of the Municipal Airport of Columbus, Major William F. Centner. It is a well-appointed room and furnished with everything that a model builder loves. The airport officials also gave the club a completely furnished ground-school classroom, fully equipped, where a course in model airplane ground-school work will be held each Saturday morning at 9:30 a.m., free to any member. This class will be under the supervision of J. E. Konkle, secretary of the society. Fifty-seven members signed up to take the course in the first week.

At the formal opening on November 6, the last contest of the season was held at the airport. Over 350 members and their parents were in attendance. At this contest, Hyp Dauben was the first-place winner in the flying scale event with a Taylor Cub, which he flew for 57 seconds. This flight was made in a room which had a ceiling of only 35 feet.

It is interesting to note the progressive character of this club. No other club in the country, as far as we know, is engaged in the active study of model design and building to the extent of the Columbus Society of Model Engineers. Some of the tough old top-kicks of the flying corps are beginning to look on the new generation in a new light when they see some of these present-day models soar out of sight. Lately, Mr. Konkle says, several of them change feet and get red under the collar when a twelve or fifteen-year-old builder starts to ask some real technical questions. It is about time for some of these present-day operators and pilots to begin realizing that the model builder of today will be taking his seat before many RPM's are turned over. Look around, pilot!!

CORRESPONDENTS WANTED

HERE is a letter that has come all the way from a young man who belongs to the Auckland Model Club of Auckland, New Zealand. It is self-explanatory:

I have been a model airplane enthusiast for three years. Consequently I have had some experience, both in spruce and balsa, which we began with two years ago when our record was 45 seconds. It now stands at 137 seconds outdoor and 203 indoor. I am afraid this will seem funny to you with your wonderful flights. However, we are now getting soaring flights which mark the beginning of great duration.

I belong to the Auckland Model Aero Club, which is affiliated with the New Zealand Model Airplane Association. We are also a section of the local aero club, which flies four Gypsy Moths, one Puss Moth, one Comper "swift," a Desoutter and a Waco cabin bus.

Hoping to hear from some of my American brother model builders.

JACK GARRETT.

Robert Hillburg of 3952 Garfield Avenue South, Minneapolis, Minn., wishes to know if some builders of model planes in some other countries would write to him. He is interested in exchange ideas.

Here is another young man who wishes to correspond with other readers. He is Richard Blustein of 9 Eastland Terrace, Haverhill, Mass.

Mr. Beverley Southwell of 5460 Bond Street, East Oakland, Calif., wishes to exchange ideas with other model builders. He is exceptionally interested to hear from builders who employ smoke screen and bomb dropping from their planes. Can anyone tell him of a mixture to use on bombs that will work better than gunpowder?

Robert Huddleston of 1310 North Gale Street, Indianapolis, Indiana, writes us that he is secretary of the Brookside Model Airplane Club in Indianapolis. He says:

"Our club would like to correspond with model airplane builders in other cities. We have 21 members and there will be plenty of correspondence for anyone who wishes to write."

Steve Zipay of 135 Penn Street, Kingston, Pa., is another young man who wishes to correspond with other readers.

Aviation Advisory Board

(Continued from page 38)

look through the pages of the current aeronautical publications you will undoubtedly find several concerns advertising gliders for sale. Advise that you write these concerns for such plans as you require.

Next, we have the pleasure of settling an argument between two young men of the Kent, Connecticut, School. John Urban asks:

Question: Are the girders of the Akron made of duraluminum rather than aluminum? I have just had an argument with a friend of mine on this point.

Answer: The girders of the Akron are made of duraluminum or of some similar alloy. Aluminum cannot be used in construction where great stress is incurred as it is not strong enough.

Question: Does the Curtiss-Bleeker helicopter come up to the expectations of its inventor and the Curtiss-Wright Corporation?

Answer: As I do not know what the expectations of its inventor and the Curtiss-Wright Corporation are, I cannot answer the question as you have phrased it. The Curtiss-Bleeker helicopter, I understand, has risen off the ground under its own power but has not been capable of flights which would be of commercial value or which would satisfy the flying requirements of the average pilot.

This young man says that a statement appeared in our magazine some time ago to the effect that a model autogiro could not be made that would fly by means of the autogiro principle.

This is true to a certain extent, because on the model autogiro the vanes must be set at a negative angle in order to keep them spinning properly. On a model, the vanes will not spin against the air when set at a positive angle of attack because at this angle of attack the resistance incurred is greater, and is of such an amount that the momentum of the vanes in the model is insufficient to keep the rotor spinning continuously during the flight. On a large machine, the weight of the rotor and its size enables it to keep spinning without slowing down suddenly. On the large machine, the vanes of the rotor are set at about one to two degrees positive angle of incidence.

Walter S. Gillespie of the Blackstone Hotel, Barbourville, Ky., wants to know a formula for making good model cement.

Answer: The formulas of the commercial cement are not made public usually and therefore I am unable to tell you the exact chemical makeup. However, you can make a fairly good model cement by dissolving celluloid in banana oil, which may be obtained in a drug store. I notice that in your questions you also say that you have tried acetone but it does not work very well. Try dissolving celluloid in amyle acetate. This may give you better results. We will be pleased to know what success you have from your future experiments in this line.

HERE we have a letter from Francis Alexander of Newcastle, Pa. He says that he has an R.O.G. biplane that flies but does not climb.

Question: How can I correct the trouble?

Answer: This is a very common fault of improperly designed biplanes. I should say that nine out of ten were afflicted with this condition. As a rule, it is due to the fact that the propeller BLADE AREA is too small COMPARED with the wing area. Many biplanes are nothing more than a monoplane which has been properly designed and assigned a propeller, to whic' another wing has been added, thus increasing the wing area to double the size without giving a thought to increasing the propeller area in accordance with it. There are two things you can do to correct the trouble: Put on a propeller with about twice the blade area, or cut down the pitch to about 3/5 of what it is at the present time.

DEPARTMENT OF AERO-PHILATELY

(Collecting of Air Mail Stamps)

This department will be devoted to stories about Air Mail stamps, news issues, important flights, etc., and will undertake to answer questions of general interest to collectors, but only Air Mail stamps will be considered. Address communications to Mr. L. W. Charlat, care of "Universal Model Airplane News," 145 West 45th St., N. Y. City.

Readers of UNIVERSAL MODEL AIRPLANE NEWS can beat me all hollow when it comes to building miniature planes, but I think that I can tell them a thing or two about the little aircraft portrayed on various Air Mail stamps.

Let's start with the Zeppelins. We find that no less than four countries, the United States, Germany, Liechenstein, and Russia, furnish remarkable Air Mail stamps depicting artists' conceptions of the majestic Graf Zeppelin in flight. Also, we should not overlook the pioneer Dirigible flown by the great Santos Dumont on Oct. 19, 1901. This curious Dirigible is shown (encircling the Eiffel Tower) on the issue of 1929 Air Mail stamps of Brazil.

If you are interested in the history of aviation, you will be stirred at the sight of the first plane that actually flew. Wright's famous "Box-Kite" (in a modified form) is shown on the special set of stamps issued by the U. S. on the occasion of the International Civil Aeronautics Conference held in Washington on Dec. 12-14, 1928. An earlier model of the Wright plane appeared on the 20c U. S. Parcel Post stamp of 1912 and marks the first appearance of the airplane on our stamps.

The frail Bleriot Monoplane which made the first crossing of the English Channel (July 25, 1909) has been utilized for stamp designs by France and also such remote places as Tunis and the Belgian Congo.

The fine old De Havilland-4 is shown on the first U. S. Air Mail stamp consisting of the 6c, 16c, and 24c denominations. The 24c stamp with the center inverted is the most valuable of all of the Air Mail stamps. Scott prices it at $3,300. The De Havilland-4 shows up again on the 24c stamp of 1923 and the current map type of the 10c, 15c, and 20c denominations.

"The Spirit of St. Louis," Lindy's famous Ryan Monoplane, is pictured on the stamp issued in 1927 in honor of his famous flight to Paris. The same plane can also be found on all of the issues of the Dominican Republic.

Ecuador shows its liking for the Ryan Brougham, and this sturdy type of passenger-carrying plane is figured on all of its stamps for the Air Service.

One of the most successful airway systems is that of the Scadta Co., of Colombia Republic. This fine record may be due to the use of Junkers planes, which type is illustrated on their stamps. The stamps of little Esthonia and far-off Persia also exhibit Junkers.

If you will turn to Haiti, you will be greeted by a magnificent stamp showing the modern tri-motored Fokker. The same type may be seen also on the current issue of Japan, and another type is shown by Belgium.

Dornier-Wal and Savoia Flying Boats are shown on strikingly beautiful stamps issued by Spain in 1926 (Semi-postal Red Cross issue) and the stamps of Greece respectively.

The De Havilland planes appear to have been used to a greater extent for stamp designs than any other make. Egypt shows us a splendid miniature of the De Havilland-34.

The De Havilland-36 (Hercules) greets us on the first Australian stamp. Turbulent Nicaragua issued a beautiful set of stamps in 1929, showing a couple of smart De Havilland-9's surveying the Momotomba Volcano, and India displays a rather poorly drawn De Havilland Moth (66).

There are many other interesting types of planes to be found on Air Mail stamps, and their identification presents a very instructive side line for the collector.

Building the Stinson "R"

(Continued from page 24)

5 and No. 6, connect the underside of the stabilizer and the fuselage at the points shown in No. 4. The rear pant strut, also shown in No. 6, joins the underside of the fuselage at the point shown in No. 4.

Pants

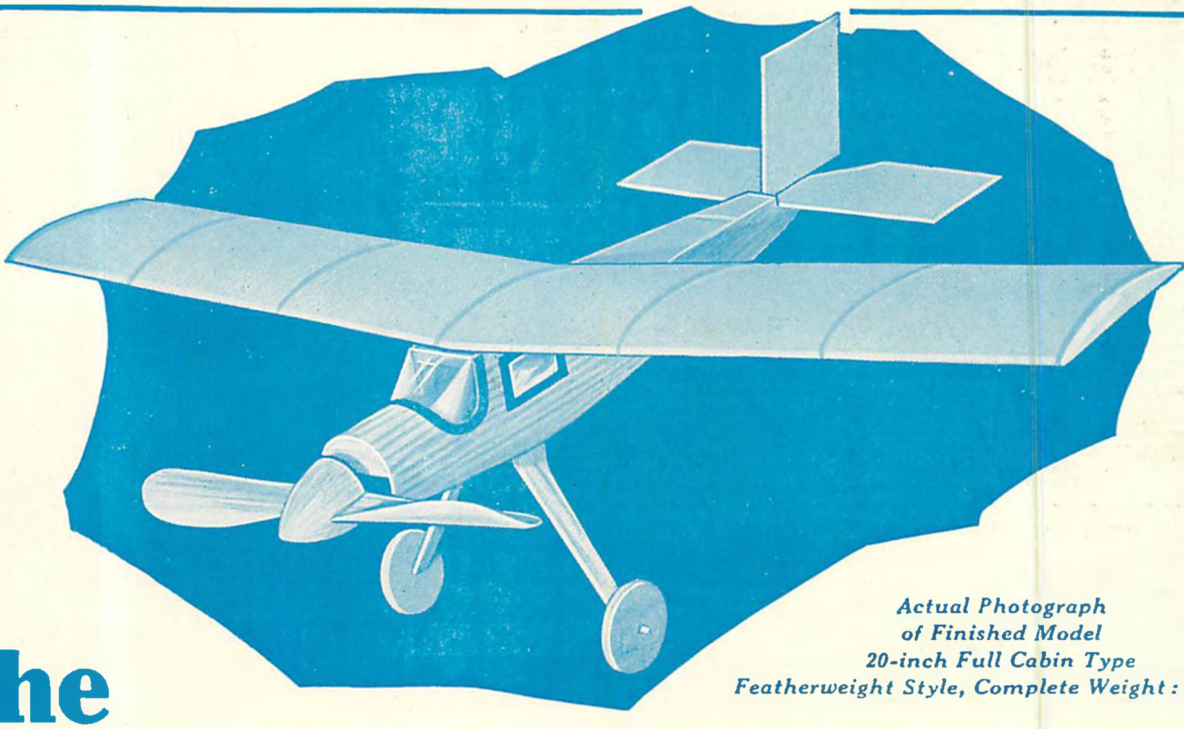
The landing gear pants are shown in No. 2 and No. 5. The main pants take a 1¼" wheel and the rear pants will accommodate one of ⅝" diameter. It is advisable to build these up of numerous pieces as shown, rather than to try and cut the center section out of one piece.

Propeller

The propeller in No. 5 is of the modern type used on this ship and may be made of wood or metal as indicated. The plane is now ready for assembly.

Ample time should be allowed for all parts to dry after gluing. The navigation lights on wing and rudder may now be put on. They can be made of small pieces of balsa. As a base for the paint, a coating of shellac should be applied. The color scheme is completely explained in the assembly drawing. Note, however, that the stabilizer is red with a black border and the rudder is black with a red border. The license number appears also on the underside of the opposite portion of the wing. The insignia detail as used on the fin, is shown in No. 5. The propeller is silver, as are the windows and windshield.

Here's the Biggest 50-cents worth you ever saw anywhere!



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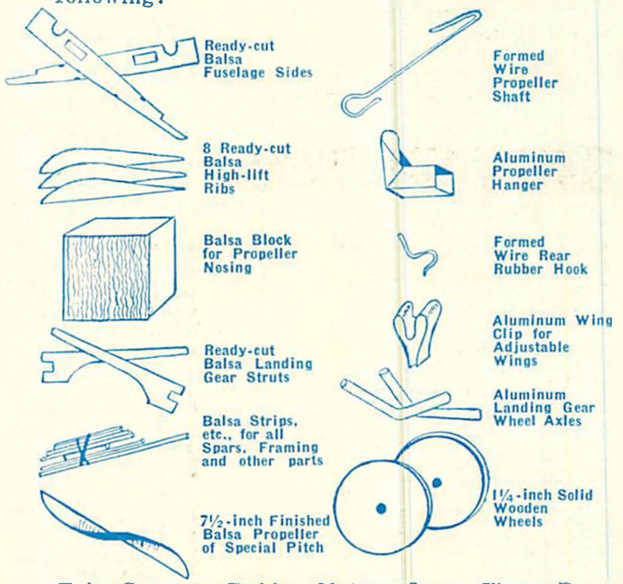

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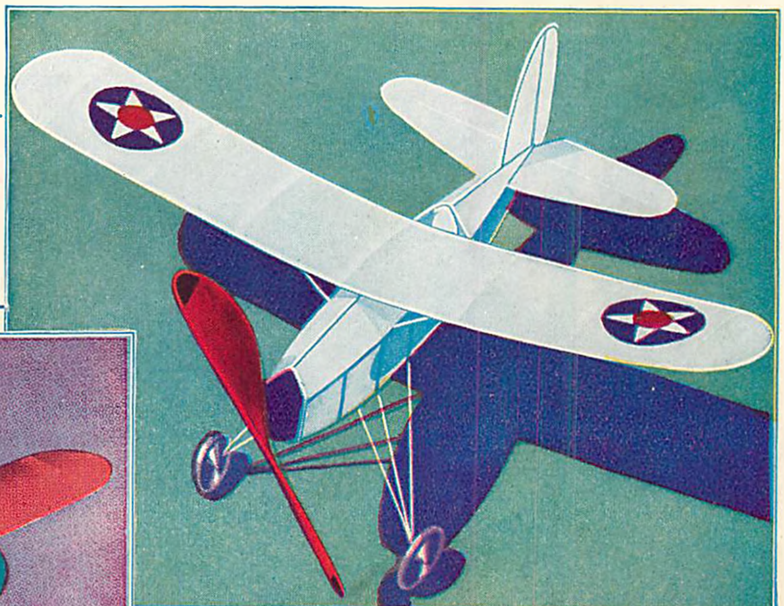
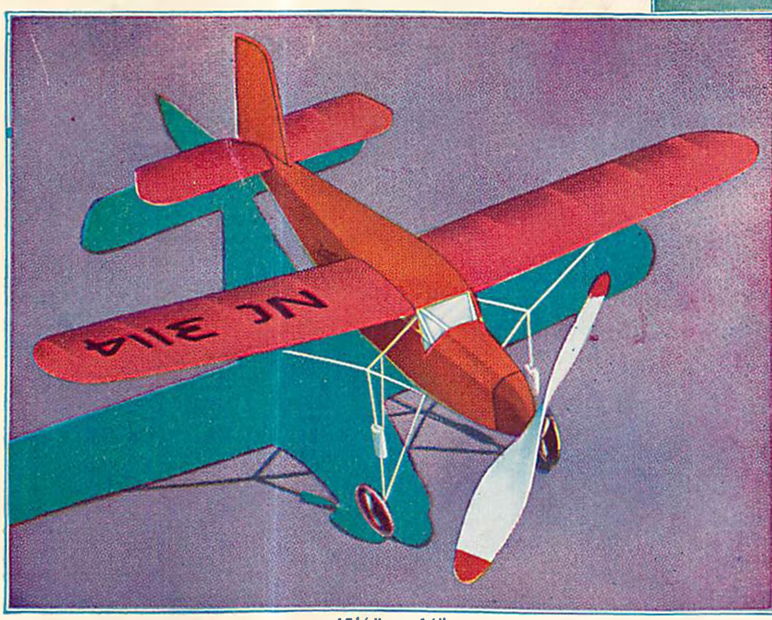


12½" x 9½"



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