UNIVERSAL MODEL AIRPLANE NEWS

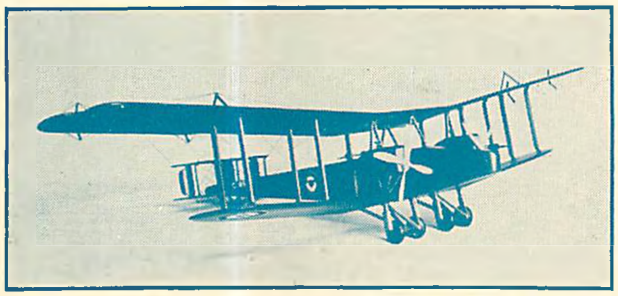
JUNE

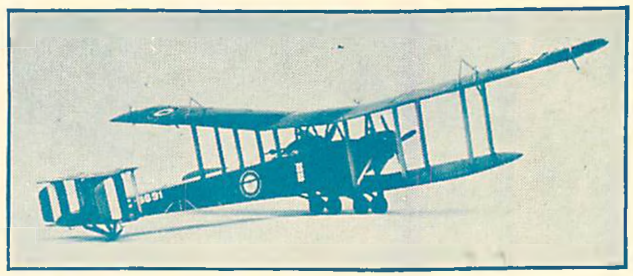
20¢

"THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO EXPERIMENTAL AVIATION"

THE RUSSIAN FIGHTER D-1

New and Improved
¼ Inch Scale Hawk Model Kits
(Solid Wood)





THE HANDLEY-PAGE O-400

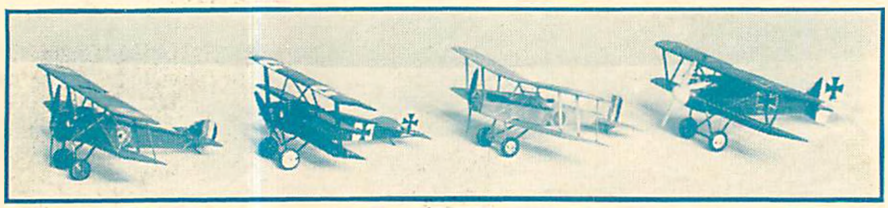
The Handley-Page kit contains all wood parts CUT TO OUTLINE SHAPE, two scale die cast four bladed propellers, four die cast Lewis machine guns (scale), four wheels, all insignia and numerals, scale bucket seats, two large bottles of green paint, one large bottle of shellac, one vial of black, and one vial of buff paint, one exact scale drawing full size for ¼ inch scale model, wire, tubing, etc., comprise the kit set. When you consider that the wings, fuselage, tails, and rudders are cut to outline shape and NOT blocks of wood; propellers, machine guns, and bucket seats are made; you get a full size plan, and more paint and glue than you need; you will realize that we have produced a very superior kit set. The Handley-Page has a 25 inch wingspan.

Over ten pictures, a plan, and several pages of data were used while making the plan and the model pictured above. We therefore feel sure that the plan and the model are exact in every detail.

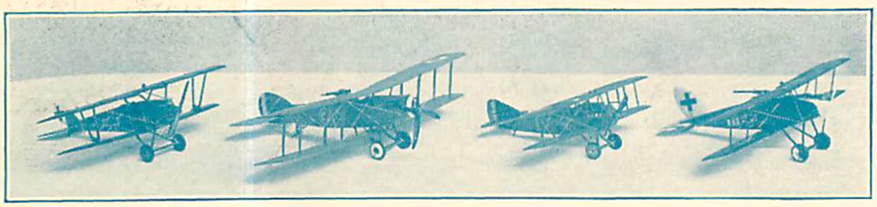
Handley-Page Kit Set $3.00

Don't fail to build this famous World War Bombing Plane.

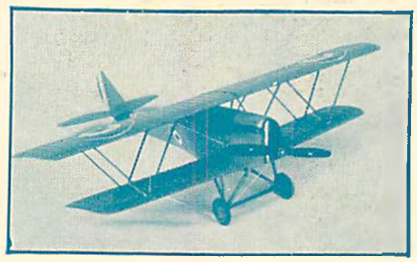
FOKKER D7 FOKKER D8 NIEUPORT 28 NIEUPORT 17



CAMEL FOKKER S. E. 5A ALBATROSS



Pfalz D111 BRISTOL FIGHTER SPAD 13 HALBERSTADT



Ansaldo-S.V.A.

The Ansaldo-S. V. A. is starting a new series of our ¼" scale model kits with more accurate plans, including information about the real plane. The kit contains the same materials as the other small war plane kits listed on this page.

Here are 13 World War planes you can build. Each plane when completed will be exactly to scale, ¼ inch to the foot, of the plane it copies. All wood parts as, fuselage, wings, tail and rudder are cut to outline shape from Balsa. This leaves only the hand finishing to the builder. A scale die-cast propeller ready for mounting, cement, full size ¼ inch scale print, wheels and struts are in each kit. Remember all parts are cut out and *NOT* blocks of wood as are furnished in the sets selling for less. You also get all the necessary insignia. The kit sets for any four of the planes pictured here can be had for $1.50. (This does NOT include the Handley Page). Separate kits at 50 cents each.

Sherwin-Williams Aeroplane Finish Paints Are Used in All Kits

These kit sets contain scale cast machine guns and scale bucket seats.

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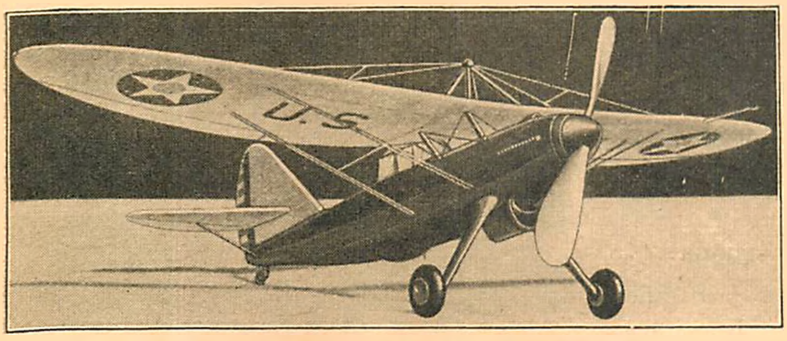

DOUGLAS Y10-43 OBSERVATION. Our Model 27, shown above. Army's newest observation plane which, in official test, made 200 miles per hour. This model is authentic to minutest detail. Wing span 24". Weight, 1.7 oz. Parasol type wing makes it an outstanding flyer and unusual model. Send your order today, only ..... $1.00 each

Old timers at building model airplanes, as well as beginners, like George D. Wanner kits. George Wanner personally supervises planning of all kits. He knows how to build kits that are complete in every respect and plans that old and young can follow easily and understand completely. Be convinced. Order a kit today. The two models shown and described below are leading all others in popularity. Which one do you want?

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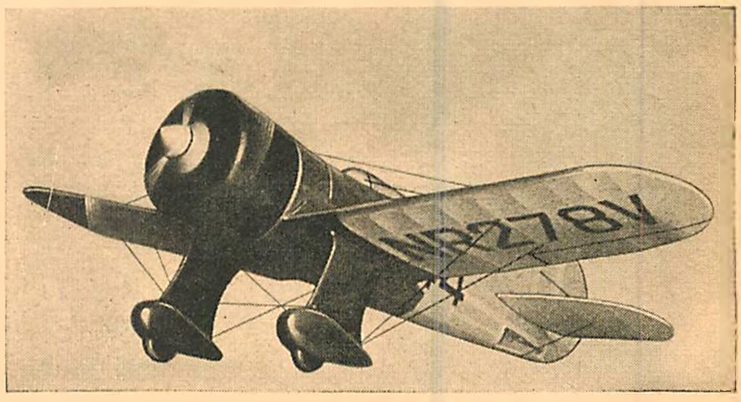

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VOL. X *No. 5*

Edited by Charles Hampson Grant

CONTENTS

JUNE—1934

In Our Next Issue

Fletcher Pratt gives you the high lights of French aviation development in another of his enlightening articles.

Elmer Pilzer, in *How to Build the Hanriot-Biche Pursuit*, gives you complete description and plans to build a flying scale model of one of the latest French pursuit planes.

In *The Development of the Fokker Fighters* Robert C. Hare continues his fascinating description of obscure and famous Fokker war planes.

Those who are starting their activities in model aviation will derive great benefit and pleasure from *Fundamentals of Model Airplane Building* by Edwin T. Hamilton, and from the contest which will be run in connection with it.

There will also appear the latest data on large airplanes, plans for solid scale model builders, three view drawings and other articles such as *Air Ways, How the Airplane Was Created, N.A.A. Junior Membership News, Aviation Advisory Board* and *How to Build a World Record Twin Pusher*, by August Ruggeri.

Order your copy of Universal Model Airplane News from your newsdealer now or send $2.00 for your year's subscription to this office, 551 Fifth Avenue, New York City. Canadian subscription, $2.00 per year. All other countries, $2.50.

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Sail These 2 New Boats

National presents these 2 new planes and 2 new boats just in the nick of time for summer sport. Never have we offered two more interesting or truly authentic scale model planes. Never have you seen real true-to-life model boats so easy to assemble. Words fail to express the lasting enjoyment, the performing ability, you will experience in these, the newest, most up to the minute models for air and water.

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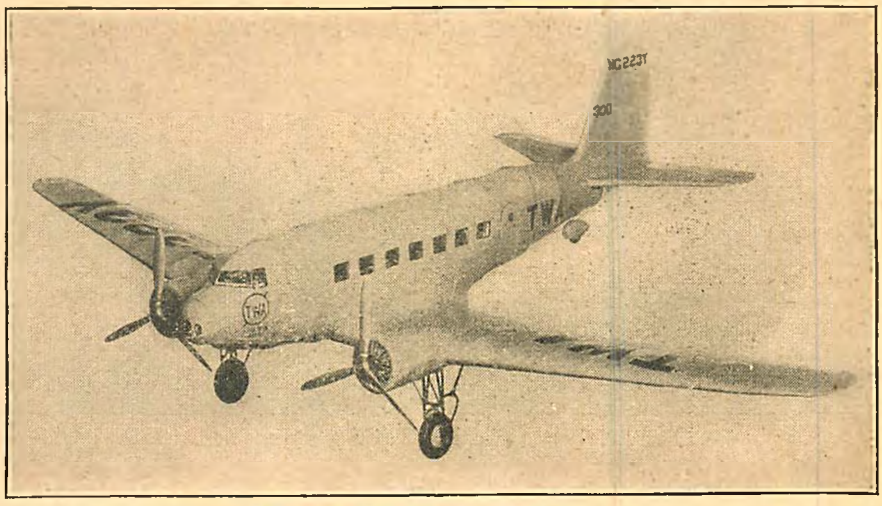
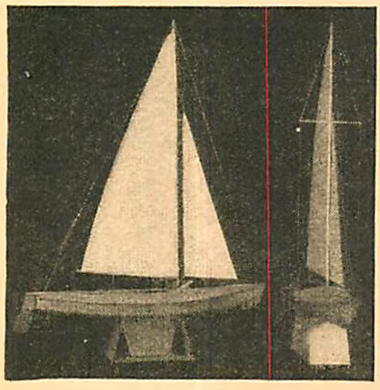


DOUGLAS TRANSPORT DC-1
½" scale, span 42½", length 30⅛", wgt. 4 oz.
Color Silver gray—Black lettering



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80 parts each ready to assemble with finishing materials and illustrated manual to guide you.
KIT COMPLETE
Plus P. P. .25..... **$2.00**

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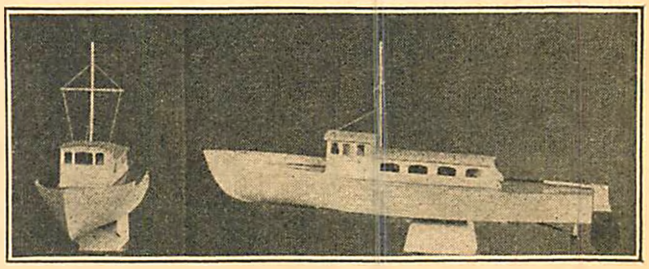
If you have tried your patience to the breaking point on all these technical details, here's a real surprise for you, for now with the new "Shipshape" model boat kits, you can easily produce authentic scale model boats. The kits are made up of small assembly parts, and die cut Jute Fibre Hull pieces. You can't go wrong. Lightweight, hollow hulls insure speed, balance and true buoyancy. Why waste time on designs and kits of dubious value, when National offers you assured success, real authentic models that work. Whether you prefer a sailing sloop or electric drive cruiser, order now and have a full summer's fun.



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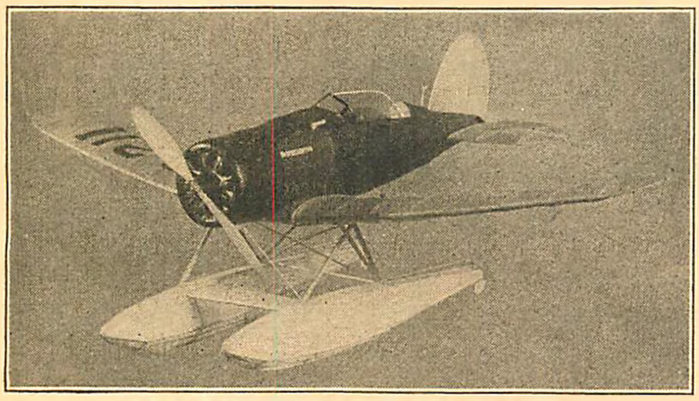

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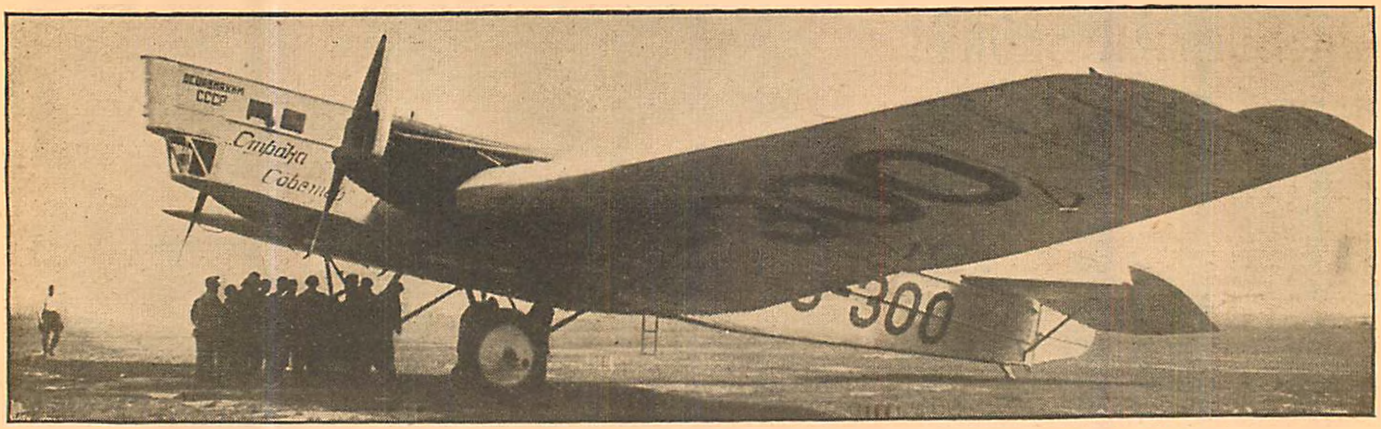


The "Strana Sowjetow", typical of the twin-engine bombers being developed in large quantities by the Soviets

Russia Spreads Her Wings

How the Soviets Are Developing Their Air Forces by a Concentrated Program of Aeronautical Education and Construction

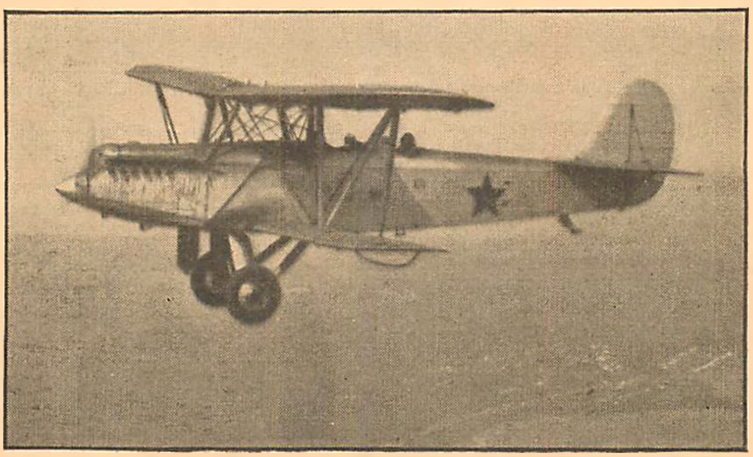
By FLETCHER PRATT

WHEN the new Russian ambassador came down the gang-plank of the ocean liner, many reporters surrounded him.

"How many airplanes have you got opposite Manchuria?" asked one of them, not expecting to be answered, but simply to see what reaction he would get.

The Ambassador bent toward him, and closing one eye, whispered, as though he were imparting a great secret, "As many as the Japanese have!"

He said a mouthful. The truth of the matter is that nobody, perhaps not even the Russian leaders themselves, know how many airplanes they have, how good their flyers are, or what their sky-fighters could do if they faced a real enemy. But one thing every Russian is certain of—that if there is ever a clash of arms in Eastern Asia, the Red air service will be a fair match for the Japanese.

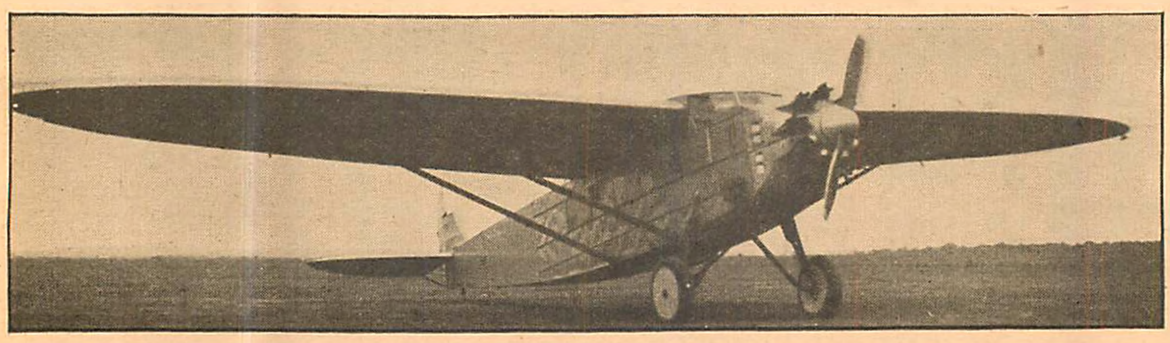


The Russian Fighter D-1, the standard two-seater fighter and observation plane of the Soviets. Plans on page No. 16

Behind this assurance, there is a vast amount of uncertainty—the uncertainty of the newest air service in the world, the only air service among the great powers that has no background of World War experience. For the last vestiges of the old Imperial Russian flying service were swept away in the revolution—the officers, who were all aristocrats, driven over the frontiers or killed in the fighting, the factories destroyed, the construction men scattered. And the Russian revolution came just as aviation was going through its most critical period of development—the last two years of the World War, the time when the Fokker D VIIs, the Handley and Gotha night bombers, the Curtiss flying boats, were setting the fashion for all the years of aviation development that were to follow.

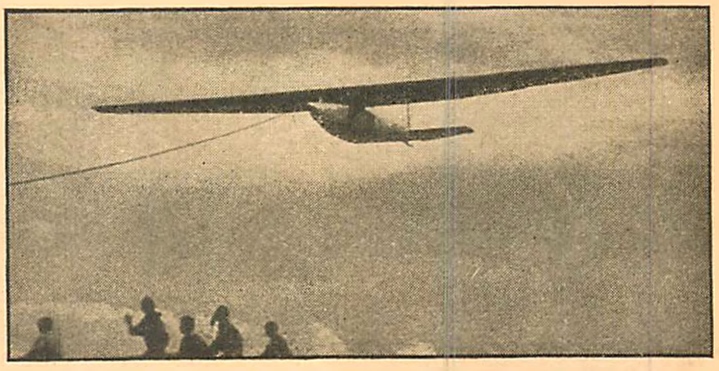
For some time after the revolution nobody thought about flying in Russia; they were too busy deciding who was to be boss and getting something to eat. When the Soviets finally settled the first of these two questions, it was 1923. Everything was disorganized; all the aviation factories had been in the west of the country, mostly in what is now Poland, and they had been destroyed or taken over by other governments. There were no airplanes and no flyers.

In that year there was a general reorganization of the Red defensive forces and the set up for a Soviet Air Force was made, carefully departmentalized. As a starter, some war-time German flyers were hired to train a new generation of Soviet pilots, and the first or Technical Section of the air force, began to build machines with what men it had. In those days the Soviets were intending to revolutionize the world over night and eat up the capitalist nations for breakfast. They didn't worry about a little thing like patents, but copied all the latest airplanes and devices right and left, without credit to the



The new ten passenger transport K-5 of 500 h.p. which has been placed on all the Soviet air lines. It is of the Kalinin type constructed by "Debrolet"

Students ready to launch a four motor bomber model into flight at a contest near Moscow

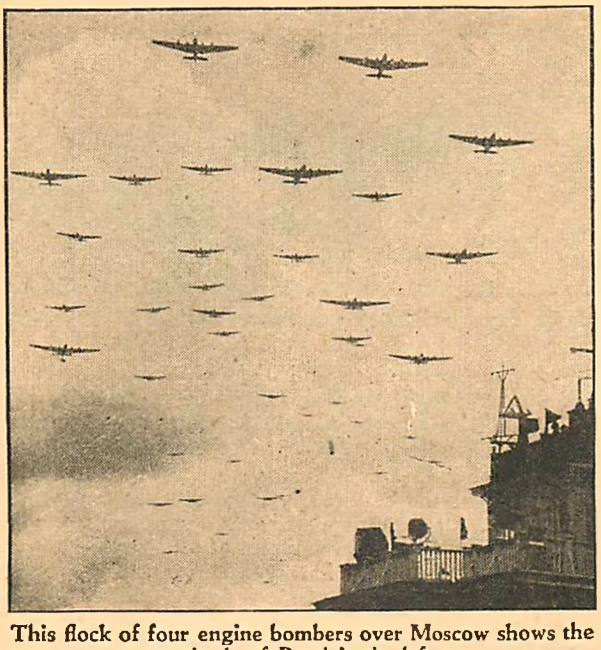


A soaring glider is towed into flight near Moscow. Note the advanced design of this ship

various manufacturers and designers.

This should have given them a fine start, but it didn't work out that way. In 1928, when Stalin launched the famous five year plan by overhauling all the departments of Russian economic and military life, the directors of the Red Air Force woke up to the fact that they were not much further along than they had been five years before. During the revolution their technical men had fallen well behind the rest of the world. When they came to copy the foreign machines, they made copies without understanding what they were doing; their light alloys had no strength, their machines were cranky and badly jointed and there was a distressing series of crack ups. Meanwhile, the free and easy attitude the Reds had adopted about patents, had resulted in foreign engineers refusing to lend any assistance. But worst of all, the rising sun of Japan was beginning to send menacing rays across the Orient and it began to look as though Russia might need a good air force some day.

So the opening of the five year plan marked a sharp change in the Russian attitude. The policy of not respecting capitalist patents was quietly dropped out the window, the first evidence of it being that the Soviet government bought, for a good sum, a license to manufacture D.H.9s. English and German airplane construction men were hired at any price to come in and teach Russians how to design planes. Four big factories were established and American engineers put in charge of them to install mass production methods. Experts who had worked in German and French factories were placed in charge of research institutions. More Americans were given charge of airways and airports; ground crews and lines of beacons were to be built up very similar to the American manner.



This flock of four engine bombers over Moscow shows the magnitude of Russia's air defense

With the help of these new foreign experts, a five year plan for Russian aviation was laid out. The planes it called for were especially interesting because the plan came to an end last year and though the Russians built far more planes than it called for, the proportions of different types remained about the same, and the list showed the basis from which the Red Air Force was operating. It provided for a ready-to-fight fleet of 80 heavy bombers, 120 long-distance reconnaissance machines, 342 pursuit planes, 80 training craft and 112 army "co-operation" machines, which means carriers. The naval air service was to have 12 torpedo carriers, 63 bombers, 242 pursuit and 86 reconnaissance seaplanes, beside half a dozen blimps, 664 land planes and 454 seaplanes—perhaps not a great deal for a country the size of Russia, but a lot when you are going to build them up from nowhere in five years.

The crucial point in the new Red air service, of course, was how to find 1100 aviators in that amount of time. In the best flying services, our own for example, only about one cadet in every five who manifests a desire to be a flyer, actually attains the dignity of becoming a real fighting aviator. The severity of the physical and mental requirements eliminates most of them before they ever become pilots, and even among pilots it is not everyone who can both submit to the discipline of formation flying and yet have the courage to take care of himself in an individual dog-fight. It takes more than courage, skill and discipline—it takes a genuine enthusiasm for flying, what they call "air-mindedness."

Now in the Russia of the Soviets, nineteen-twentieths of the people had never seen an airplane and probably a good third of them had never even heard that such a machine had been invented. Where then,

(Continued on page 32)

Glider enthusiasts assembled near Moscow for instruction. Flapping Wing glider in foreground draws interest

Young pioneers assembled for a model contest which is part of their aviation training

The Curtiss Raven YO-40B, recently developed from the 1933 sesquiplane

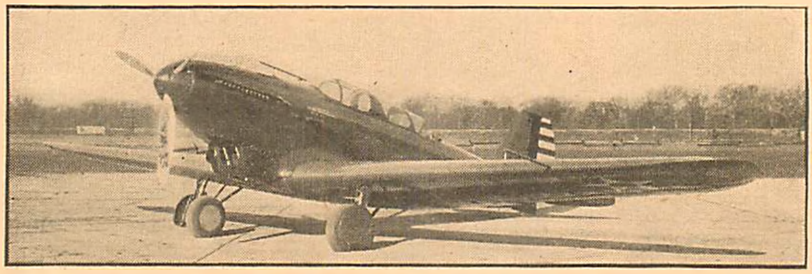
On the Frontiers of Aviation

Latest Developments of the Army Air Service That Give Promise of Its World Supremacy

By ROBERT C. MORRISON

THE appropriations for over 3000 new Army and Navy planes are very encouraging, but under the present circumstances, there may be radical changes in the government's plans, so we will have to wait and see what the outcome will be on the completion of the government aviation investigations.

The Navy's new aircraft carrier the "Rover," was launched a few months ago and will soon be entirely completed. At present funds for planes to go on the ship have been appropriated, but contracts may be let in the near future with aircraft manufacturers and we may see some new designs in shipboard fighters.



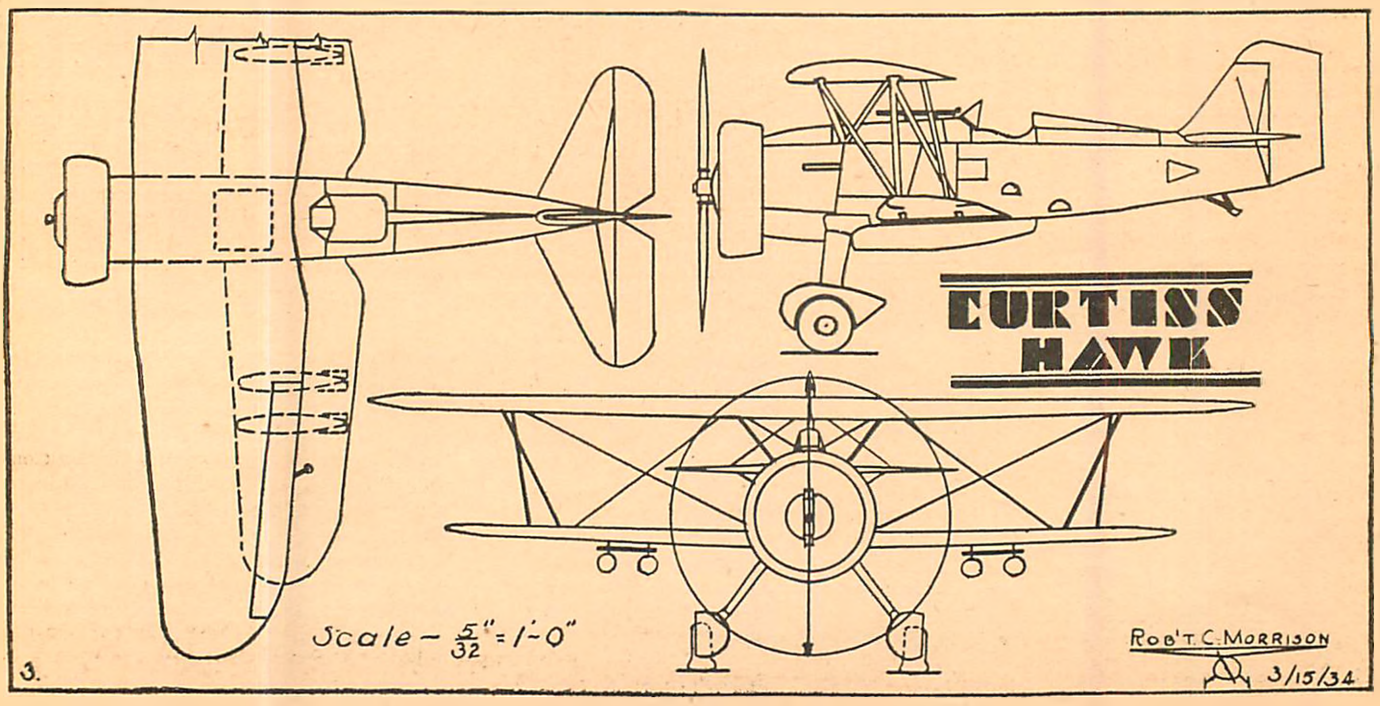
The new Consolidated Y1P-25 pursuit plane with a Curtiss Conqueror motor

The Naval air station at Pensacola has ordered three new gliders for training Navy student pilots. Ralph Barnaby, famous for his flight in a glider from the dirigible Los Angeles, will be chief instructor at Pensacola. The three new gliders have been designed by Dr. Franklin, designer of the glider Frank Hawks flew across the continent several years ago, towed by an airplane. No one will forget it.

1933 saw the introduction of the Martin Bombers, B-10 and B-12, Curtiss A-12 Attack, Douglas O-43 Observation and Boeing P-26. All these ships having passed the service flight tests, they are now standard equipment of our Army. The A-12 is a development of the A-8 Attack. Instead of having a Curtiss "Conqueror" engine as the A-8 does, the A-12 has a Curtiss-Wright "Cyclone," giving the plane more power and speed. The pilot's cockpit on the A-8 is open while on the A-12 it is closed. The gunner's cockpit has been moved forward considerably and a newly designed enclosure has been built over it. Wing slots and safety landing flaps are both used on the A-12 Attack.

The Martin Bomber is the fastest bomber in our air force. Performance data, as with all military planes, has been kept secret, but judging from the performance of the Martin Bomber in air mail operations, it has a cruising speed close to 190 m.p.h. and a high speed of about 220 m.p.h. Eight of the Army's 43 new Martin Bombers have been used in carrying the mail across the continent. Each is capable of carrying a ton of mail.

The P-26 is probably the most popular of military craft. Its speed is surpassed only by that of the Curtiss Swift, a pursuit plane similar to the A-8 Attack. One hundred and eleven P-26s have



been built for the Army in the last year. The Boeing Company of Seattle, Washington, claims that the Boeing P-26 holds the record for being designed and built in the shortest time of any plane put out by an aircraft company. At the writing of this article, several of these small, low-wing Boeings are being used by army officers for surveying air mail operations.

The Northrop Attack, mentioned before in this series of articles, is still undergoing tests at the Material Division. It is very much like the Northrop Delta except for a change in rudder and fuselage design. A single, large movable enclosure covers both pilot's and gunner's cockpit and is well forward in the fuselage.

Another new plane is the Consolidated Y1P-25 pursuit plane powered with a Curtiss "Conqueror" engine. The plane is a low-wing full cantilever monoplane with retractable landing gear. A glass enclosure covers both the pilot and gunner. The Consolidated is radically different from the former pursuits, having a crew of two and a full cantilever wing. The plane is of exceptionally clean design and will undoubtedly become a standard type of our Army Air Corps.

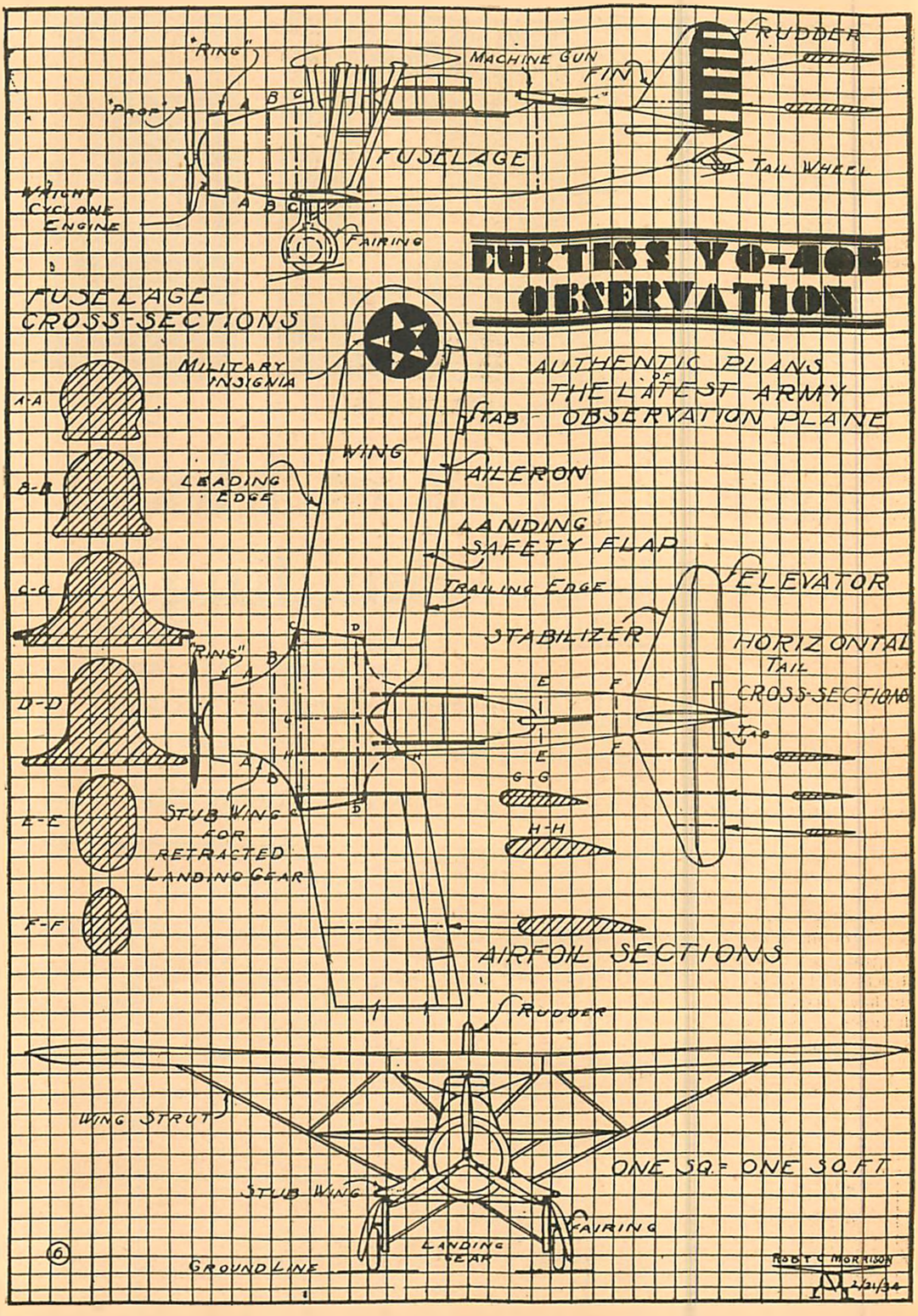
At present the Consolidated Aircraft Corp. is working on a two million dollar order of Fleet training planes for the Chinese government.

The Curtiss YO-40B, usually known as the "Raven," is a development of the 1933 "Raven." It is a high-wing monoplane with a Wright "Cyclone" motor. Plans of it are included in this article. The former Curtiss "Raven" was a sesquiplane, but probably because of the addition of landing flaps on the new ship, the entire lower wing was excluded, leaving only a stub wing as a nacelle for the retracting landing gear.

The Douglas Observation plane Y10-43 is one of the trimmest-looking Army planes at the present time. A straight wing replaces a gull wing formerly used. Several photos of the Douglas have appeared in UNIVERSAL MODEL AIRPLANE NEWS recently.

The Grumman FF-1 and the latest Curtiss Hawk (XF11C-2) are two other new outstanding planes. Other Consolidated ships similar to the Y1P-25 have recently been completed and are ready for first flight tests. A Consolidated single-seater pursuit, the P-25, is one of the new planes.

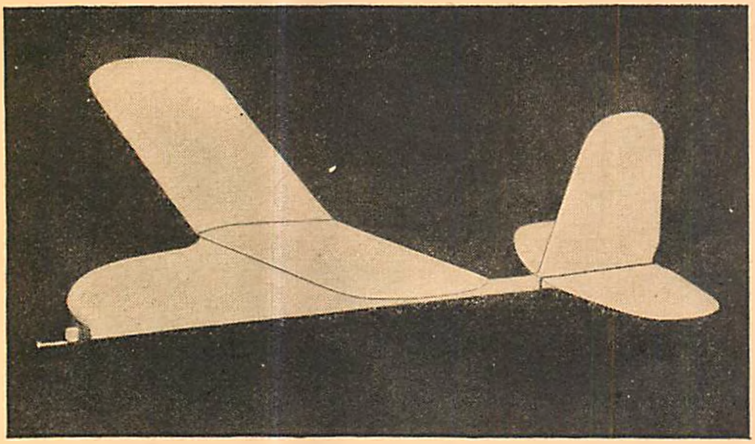
A new military transport and a new Army are now under construction. Many other ships are also being secretly built. version of the Douglas amphibian for the



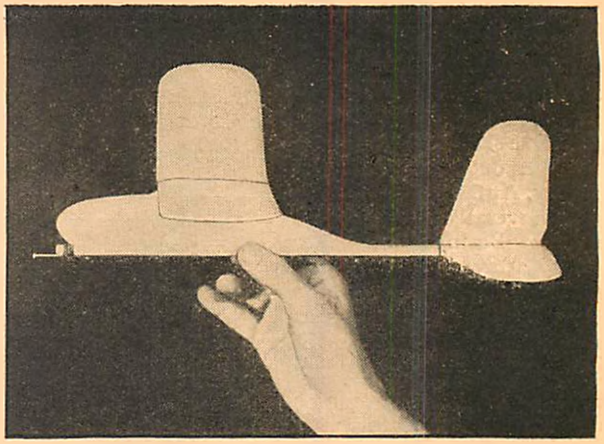
There has been a popular fallacy that European military craft are far superior to ours, but to those closely connected with U. S. military aviation, this statement is very much misconstrued and has been circulated about by pessimists who know nothing at all about our government aeronautical activities. Before the end of the year we will see the development of many new fighting planes shadowing the performances of any built heretofore in the entire world. Our bombers, which at present lead the field, are 100 per cent superior in performance to any foreign bomber developments! For this reason the Collier trophy was presented to the Martin Airplane Company for the development of its bi-engined bomber.

Last month, along with the exporting of three Boeing 247s for Germany and the selling of a license for building Douglas transports in foreign countries to Anthony H. G. Fokker, two new Curtiss Condor Bombers were sent to China. Lieut.-Commander Frank Hawks accompanied the planes. He will demonstrate the astounding performances of the ships there, in the hopes of receiving an order for some from the Chinese government. China is already a big user of Curtiss planes, to Japan's dismay.

(Continued on page 42)



The finished glider. Note the balance weight on the nose



To launch the glider, hold it as shown here

Fundamentals of Model Airplane Building

In our next issue, look for information about the contest which will be run in connection with this model building course.

Any questions about this course or on model building in general, will be gladly answered by the Editor

A New Complete Course in Model Airplane Building for Beginners Who Wish to Become Expert

By EDWIN T. HAMILTON

EDITOR'S NOTE

How can I learn to build successful model airplanes and compete with experts? This is the burning question which stares approximately 200,000 model builders in the face every year. Most of the literature on model airplanes has catered to the builder who already knows how to build and fly model planes. Those new to this art have been left to shift for themselves and to pick up haphazard information as best they could.

The function of Universal Model Airplane News is to promote model building and flying universally among novice and expert, and thereby to further knowledge of aeronautics.

We therefore take great pleasure in presenting this valuable course by an expert in the art and a well known author, Mr. Edwin T. Hamilton. In collaboration with the editor, he will endeavor to make this the greatest course in Model Building ever presented.

These articles are not primarily for the experienced builder but for the novice. Each month an actual model will be built on these pages so that the builder will learn the fundamentals of the art by doing the operations explained.

Complete plans, diagrams, illustrations and step-by-step instructions will accompany each model. With each succeeding article, the models will become more complicated, embrace greater building problems and present the reader with more advanced methods.

In this progressive manner all phases of model airplane design, construction, assembly and operation will be fully covered in such a way as to make its mastery assured. The collection of these articles should prove a valuable treatise on the subject.

THIS is the second article of our series on model airplane construction. While step-by-step instructions will be given in these articles for each model as it is presented, detailed information will not be repeated when it has already been given in a preceding chapter. Because of this progressive method of presentation, it is vitally important that those following the entire series as a course be thoroughly familiar with what has gone before.

Not only should you be familiar with preceding chapters, but each of their details should be mastered through actual construction. If you have not mastered the details given last month in the May issue, you will find those given here just that much more difficult, as your author assumes in his writing of instructions that you know them.

It will be found helpful to keep all preceding chapters on hand when working on a new one so that they may be quickly consulted if difficulties arise. If you should miss a copy, write immediately to your editor and request the missing one. Copies will be kept on hand for such emergencies.

The model presented this month is another "all balsa" glider, which incorporates four new steps in model work. Designed, built and tested by your editor, Charles Hampson Grant, it has proven itself in every way to be a first-class flier. Similar in general construction to the one he designed for you last month, it brings to the reader refined features missing in our first glider.

In this, we find curved tips on wing, elevator and rudder, adding greatly to its graceful appearance in the air. It is also equipped with a nacelle, which is the equivalent of a fuselage or body, of a tractor powered plane. Its wing, instead of being perfectly flat as in the first model, has a "dihedral," while the curvatures of its various parts make the introduction of the "graph" plan necessary. Each of these improvements, together with their terms, will be fully explained later.

Before we start any actual work, let's read these instructions all the way through, and as we read them, refer constantly to the plan, illustrations and photographs. Each has a story to tell, so let's find out what it is all about before attempting to master it.

We have already explained last month our reasons for giving plans that are not full size, but you may be wondering how we can hope to give curved sections unless full size. This is done by reading and copying "graph" plans. Such a plan is used where the giving of direct dimensions would be difficult, such as the curve of the nacelle's upper edge. Turn to the plan and locate the "Side View."

There you will see the word "Nacelle." Study its curved form. Note that no dimensions are given to aid the builder in cutting this form. This is because it would be impossible to do so. Now locate the same part at the bottom of the plan. There is the nacelle drawn on squares, each of which represents a ¼" square.

Let us see how it aids us in cutting the nacelle. Take a sheet of white paper and carefully rule it with ¼" squares. An exact copy of the nacelle is now drawn free-hand on these squares. Care must be taken to see that the line you are drawing on your paper passes through each square in exactly the same location that the corresponding line passes through the same squares on the graph plan. In other words, when drawing anything on a graph plan, you are actually drawing square by square, so that if your line passes through each square in the correct location, the whole drawing will be correct when completed.

While such a plan is absolutely necessary for a curved piece such as the nacelle, unless full-size plans are given, one is not

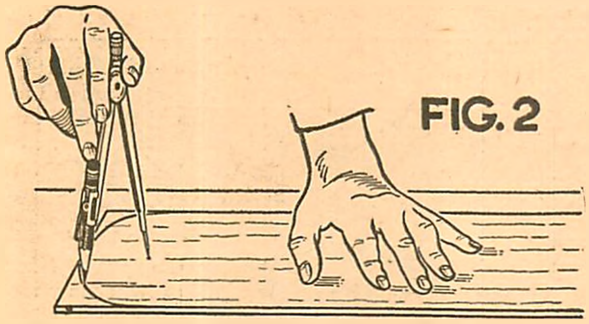


FIG. 2

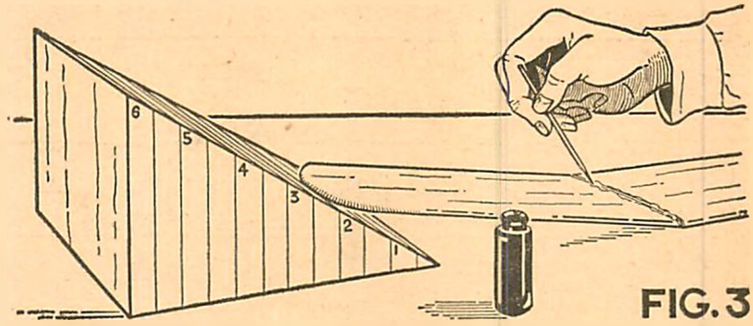


FIG. 3

required for the elevator and rudder. They are shown on graph simply to give the reader practice in reading and copying such plans. Locate the elevator at the upper right side of the plan under "Plan." Note that full dimensions are given for cutting this piece. This is possible because its form can be obtained by straight cuts and two perfect half circles, which are drawn on the wood itself with a compass, as shown in Fig. 2. The wing and the rudder are also cut in the same manner. However, for practice, draw all the parts shown on graph and set aside for future use. Such a full-size drawing is called a "pattern."

With this understanding of our plan, we are ready to gather together our required materials. As has already been pointed out, our glider is an "all balsa" model, so the only material for building we will need is "sheet balsa," except for the glider's stick.

(See May issue). At your nearest dealer, purchase the following:

(A) 1 piece 1/16" thick, 3" wide and 11" long—Sheet Balsa
(B) 1 piece 1/8" thick, 3" wide and 18" long—Sheet Balsa
(C) 1 piece 1/4" thick, 1 3/4" wide and 9" long—Sheet Balsa
(D) 1 piece 1/4" thick, 1/4" wide and 13" long—Balsa Stick

Let us turn to the plans and see what each of these items is for. (A) Turn to the plans and locate the rudder under "Side View" and the elevator under "Plan." (This latter view is often shown in plans as "Top View," which is the same as "Plan"). Note that a dotted line runs around each of these pieces indicating the necessary size of wood required to cut them out. Adding both the rudder and elevator pieces together, both of which are 1/16" thick and 3" wide, we find we need a piece 10 1/2" long. The added 1/2" is for waste, so we ned only one piece 1/16" thick, 3" wide and 11" long from which to cut these two pieces.

By following the dotted lines around the nacelle, it will be seen that the piece from which this can be cut must be 1/4" thick, 1 3/4" wide and 9" long. Because of its form, no surplus stock need be added to this piece. A glance directly under the nacelle will show the stick with its given dimensions of 1/4" square and 13 1/2" long. In the plan under "Wing" two views may be seen. The lower one shows its front edge head on, or as it would look if you were standing directly in front of it on the same level. The upper view shows a top picture of the wing or how it would look if you stood directly over it looking down. In this view can be seen the dotted lines indicating the squared board from which it must be cut. It also gives the 3" width and 18" length of the wing, while its edge view shown just under it shows the thickness of 1/8". These dotted lines are not practical in most plans but are added here as an aid to the beginner. Hereafter, they will be left out and the builder will be made to figure his own overall dimensions.

The stick should be carefully sanded with a piece of No. 00 sandpaper. However, do not round the corners where the nacelle is to be cemented to it. The "trailing" (meaning rear, or back) end is then notched, as shown in the plans. Note the large view of this notch at the right of the plans. When completed, the nacelle pattern must be traced on its piece of wood and cut out.

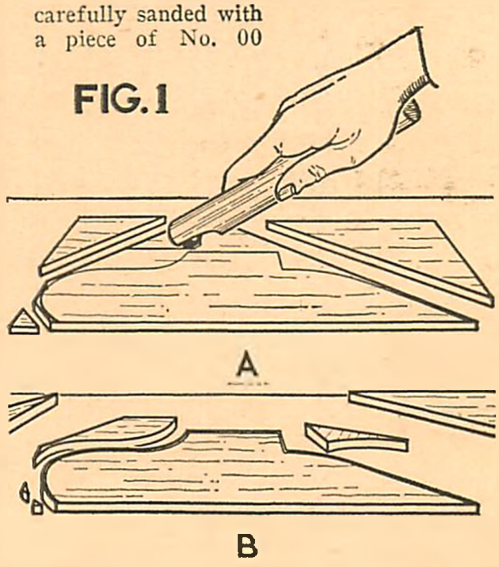


FIG. 1

Place a piece of carbon paper shiny side down on the wood with the pattern over it. Line up the straight bottom edge of the pattern with the bottom edge of the wood and then go over the outline of the pattern with a sharp pencil. If carbon paper cannot be obtained, shade the back of your pattern paper with heavy pencil marks, turn the marks over on the wood, line it up and trace over your original lines.

When tracing has been finished, remove the pattern and go over the lines carefully with the pencil on the bare wood. The nacelle is now cut out. Two important steps are used in this work, as shown under "A" and "B" of Fig. 1. When cutting pieces with various curves, cut away all excess large stock with straight cuts, as shown at "A." This makes the cutting of the curves considerably easier, as there remains little stock to remove. The curves are then cut just outside the lines so that the edges may be sanded smooth without fear of passing the outline, as shown at "B." When cut out sand both sides of the nacelle slightly round the top of its front portion, but keep the top straight part, which holds the wing and the lower edge which is to be cemented to the stick later, with sharp edges. The back portion is sanded to a sharp edge.

With rule and pencil, lay out the elevator and rudder, as shown in the plans, on their wood. Make the end curves with a compass, as shown in Fig. 2. The radius, or width the compass is spread, is shown for each end, such as "1 1/8" RAD.," etc. These pieces are then cut out, as was the nacelle, sanded smooth on both sides and their edges rounded. The wing is laid out with 1 1/2" radius ends on the wood and cut, as in Fig. 2. If you wish added protection before cutting the elevator and rudder, lay their patterns over your pencil lines and test to see that the pattern and your lay-out work are exactly alike. The wing is shaped and given its necessary "dihedral" at this time. In the plans under "Wing Section" will be seen a graph of the wing's section. Such a section is really a picture of how the wing would look if cut all the way through at any point. Make a full-size copy of this section on paper ruled with 1/8" squares, as shown. Note that the underside of the wing is left straight and flat, while its top side is curved. A "template" of this curve is now made. Trace the curve of the wing on heavy cardboard. Cut this cardboard in a square with the concave side of the curve for a bottom edge. This piece of cardboard is then used to determine when the wing has been properly formed. Sandpaper the top of the wing until it approaches the desired curve. Place the bottom edge of the template on the wing and test to see if the curve of the

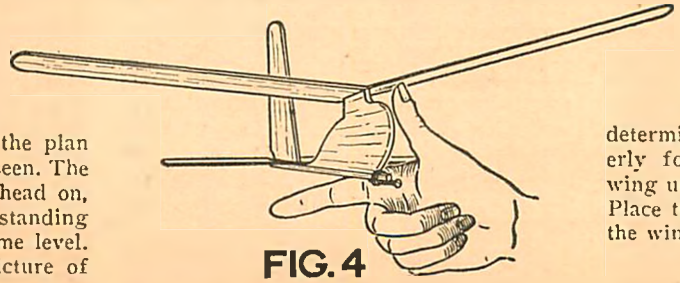
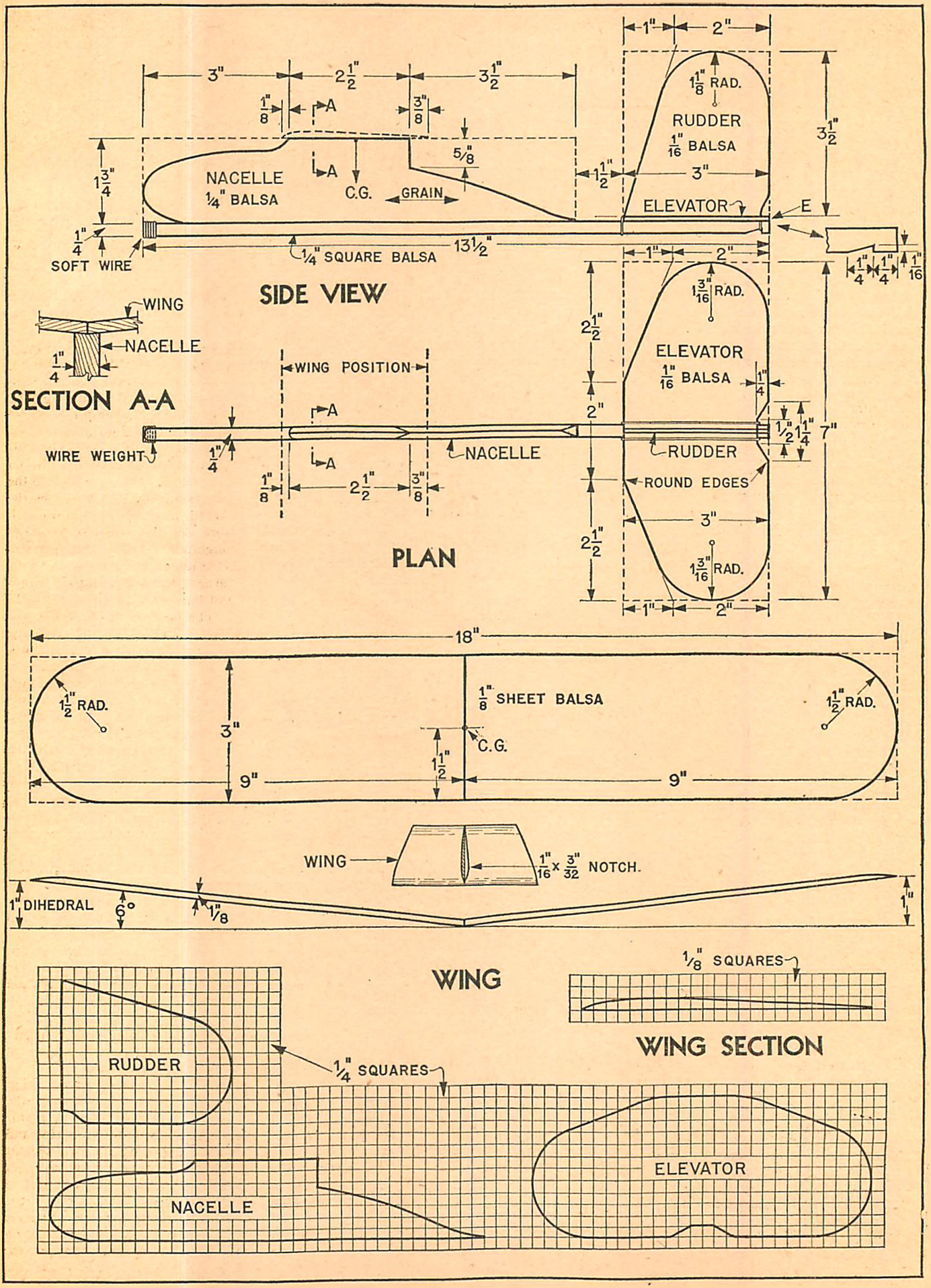
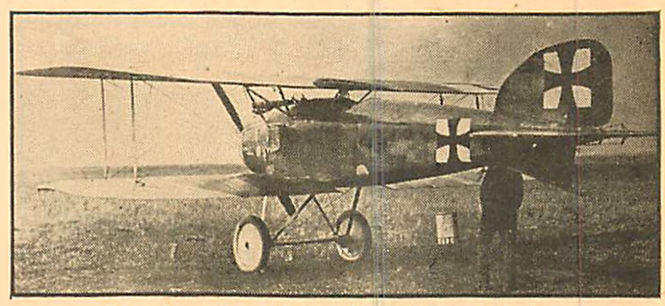


FIG. 4

(Continued on page 36)


SIDE VIEW
NACELLE
1/4" BALSA
C.G.
GRAIN
SOFT WIRE
1/4" SQUARE BALSA
13 1/2"
RUDDER
1/16" BALSA
ELEVATOR
SECTION A-A
WING
NACELLE
WING POSITION
WIRE WEIGHT
PLAN
ELEVATOR
1/16" BALSA
RUDDER
ROUND EDGES
1/8" SHEET BALSA
C.G.
18"
9"
WING
1/16" x 3/32" NOTCH.
DIHEDRAL
6°
WING
1/8" SQUARES
WING SECTION
RUDDER
1/4" SQUARES
ELEVATOR
NACELLE

The Albatros D-3, the finest of the German pursuit ships



Actual wartime photo of the Albatros D-2

The Albatros Fighters On Parade

The encyclopedic definition of albatross is—"a sea-bird allied to petrel, also name of a 1915 German aeroplane."

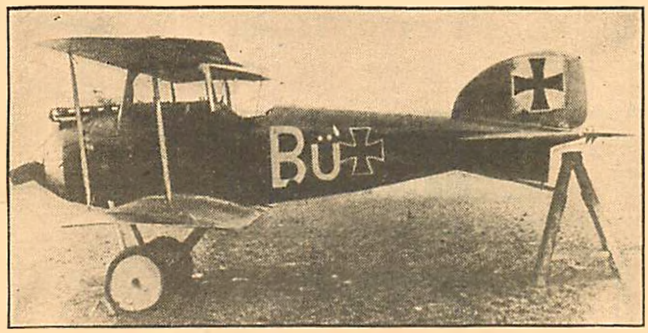
The author of these adventitious adjectives may not have realized that he had partly described one of the twelve Albatros types of German World War fighting planes you will see described in this article.

In this and the articles that follow, pictures and descriptions of Germany's finest pursuit planes of the World War will be brought to light for the first time in America.

The First Article of a Series That Will Tell You Facts About the Finest German Fighting Planes of the World War Published Now for the First Time

By JOSEPH NIETO

The author has built up one of the finest collections of data and pictures of World War airplanes in the United States, from which he draws to enlighten and entertain you in this series of articles



The first of the Albatros D series, the D-1, which appeared on the front in 1916. It was used by the great ace, von Richthofen

DURING the last two years of the war, at a time when the Central Powers and the Allied Forces were strenuously concentrating on the supremacy of the air, the Albatros-Werke (Albatros Works) brought out a number of single-seaters known as the "D" types, classified as pursuit planes, to be assigned to the German Imperial Air Force "jagdstaffels" along the front, to engage in combat the "verdampt" Spad and Nieuport single-seaters that were making themselves very disagreeable in threatening the German supremacy.

In 1916, the Albatros D-1, first of this series of most efficient German pursuit warplanes, was produced under the serial or firm name L.15. This type, noted for its speed, stability and ease in maneuvering, was revolutionary in structural design among the outstanding pursuits of that period. It is known that the greatest German ace of aces, Baron Manfred Freiherr von Richthofen, had preferred the Albatros D-1 to any other pursuit type, and with this ship he was victorious in downing several of the finest Allied pursuit planes as well as two-seaters. Subsequently the Baron chalked up many of his long string of victories with the D-2 and D-3 types.

In taking up the description of the D-1, the fuselage, characteristic of the albatross, should attract first attention, as this section presented unusual structural design in comparison with other pursuit types of that period. Unlike the linen-covered framework employed in the average fuselage, the D-1 employed a wireless plywood fuselage. This kind of covering enabled the reducing of the number of longerons to three, of wood, on each side of the body and made wire bracing and other connections unnecessary, however retaining perfect alignment and strength.

Formed by four quarters of plywood, the sides were vertically flat, while the top and bottom were curved from the nose to the tail, being formed thus by the curved inner members into which were set the squared fuselage longerons. These four quarters were joined in curves at the four corners, leaving no jagged edges and tapered squarely to the tail.

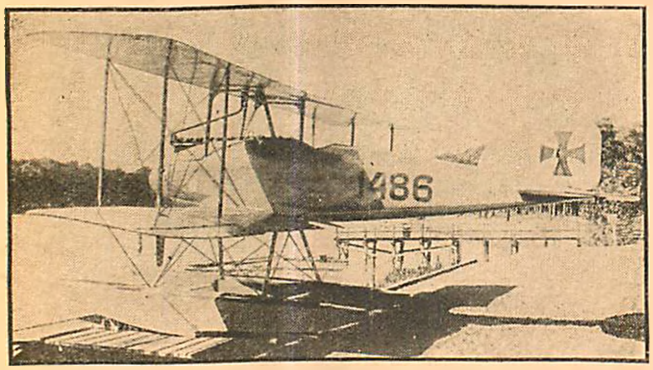
The nose of the fuselage was of the "bullet" shape. A large spinner cap at the root of the propeller curved in line with a metal nose disc attached to the fuselage ahead of the engine, and to this was attached the fireproof metal cowling around the engine, protecting the plywood. All air vents were also set in metal.

The wings were the conventional thin cambered type of oblong shape and almost square at the tips. The upper wing was all one piece with a slight dihedral angle, while the lower wings were of two pieces attached to the lower fuselage longitudinals by a special sheet steel fitting which also connected to a vertical strut at this point and to an extra heavy horizontal strut. The lower wings, slightly shorter than the upper, were connected to the fuselage by light steel sockets attached to the spars and pinned to the fuselage halves of the fittings, so that these could be easily detached when the machine was to be dissembled.

The wings were supported by two parallel steel struts at each side near the wing tips and braced by two sets of carriers or guy wires, a single wire attached to each side of the upper wing braced these to the nose. Ailerons were employed only in the upper wing. The attachment of the cabane

SPECIFICATION CHART ALBATROS "D" TYPES

Type	Engine and Horse Power	Height in Milimeters	Length in Milimeters	Span in Milimeters	Weight Empty	Useful Load	Speed in Kilometers	Time Of Climb 1000 Meters	Time Of Climb to 5000 Meters
D.1 D.2	Mercedes 160 Benz 150	2950	7400	8500	673 Kilos	225 Kilos	175	4¼' min.	37¼' min. (D.1 only)
W.4	Mercedes 160	3350	8260	9500	775 Kilos	250 Kilos	155 160	4'-5' min.	
D.3	Mercedes 160	2980	7330	9004	661 Kilos	225 Kilos	165	3 1/3' min.	28 4/5' min.



The Albatros W-4 seaplane used extensively as a seaplane. It had a speed of 100 m.p.h. and carried a useful load of 550 lbs.

to the fuselage by a screw adjustment facilitated any alteration of stagger.

The stabilizers consisted of a two piece vertical fin. The fore or stationary piece covered with plywood was integral and filleted with the fuselage. To this fin was attached the rudder of the balanced control type, constructed of steel tubing. The horizontal stabilizers were set on with bolts and connected to the inner members of the fuselage on each side. To these fins was attached the one piece balanced control elevator or "flipper," also constructed of steel tubing. The tail skid was attached to another vertical fin under the tail.

The landing gear, normal as in average types, was secured to the fuselage by steel sockets into which were set and bolted the V struts. Two 760 x 100 wheels turned on the conventional type axle. Rubber was first used for shock absorbers and then spiral springs were used. The track measured 1800 milimeters.

Some of the D-1 types were equipped with a 160 or 170 h.p. Mercedes engine, while others employed the 150 h.p. Benz, both water-cooled engines. The D-1 carried 90 liters of fuel in the main tank and 28 liters in the auxiliary (app. 30 gals.), sufficient for only 1½ hours' flying. The cooling system consisted of a small box-like "Windhoff" designed radiator installed on each side of the nose below the engine and just above the lower wing. The armament consisted of two rapid-fire guns arranged partly behind and on each side of the engine head on the cowling. The maximum horizontal speed of the D-1 was 175 kilometers per hour (app. 110 m.p.h.).

The Albatros D-2, also produced in 1916, had the same main dimensions and was of the same construction as its predecessor, as will be noted in the table of specifications. The fuselage, however, presented a few minor changes. For one thing now, the upper wing was connected to the fuselage by a more efficient strut arrangement so as to allow better vision for the pilot. Whereas in the D-1 the wing struts at the mid-wing section joined to a point at the top, they separated and spread outwardly at this point in the D-2 in parasol fashion. The N type strut was employed at this section instead of the vertical and parallel arrangement of the D-1.

In the D-2, the distance between the upper wing and the fuselage at the mid-wing section was shortened, allowing for more visibility and also adding structural strength to the upper wing, as in the preceding type there existed a collapsible tendency at this section under strain. Two ailerons were also employed in the upper wing of this machine.

The serial or firm name of the D-2 was L.17. The L.16, practically the same as the D-2, still employed the radiators on the fuselage as installed on the D-1. The radiator in the D-2 was set in the upper wing and exposed to the airfoil. Here, too, the 160 h.p. Mercedes and 150 h.p. Benz engines were standardized equipment. The speed of the D-2 was approximately 110 m.p.h.

Much success was had with this machine at the front. Lt. Baldamus, German ace who fell in April of 1917, had scored in 18 victories with his Albatros D-2. Baldamus had brought out many improvements in the instrument arrangement of the D-2. This type had proven its worth, having greater stability and being easier and safer to land.

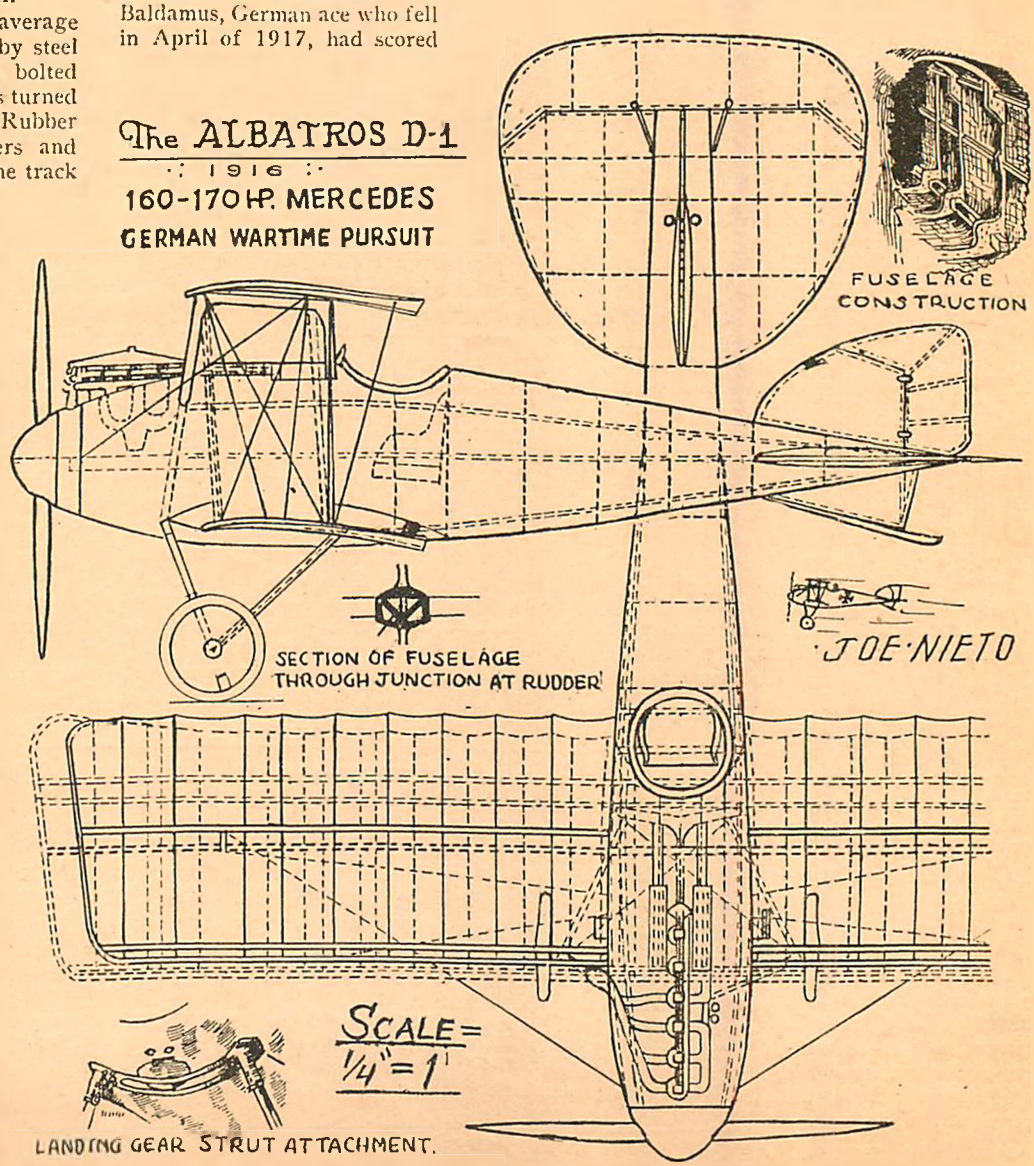
The guns on this machine were arranged just as on the D-1. Owing to the similarity of its outlines, the D-2 was "dubbed" the German Spad.

The Albatros W-4, adventitiously described in your dictionary—"allied to petrel"—was a single-seater seaplane. This machine was not used extensively in combat services, but it had served its purpose to a marked degree as a scouting seaplane.

Almost the same in many instances as the D-2, there were some exceptions, however, such as to increased wing area and general dimensions. The fuselage constructed along the same lines as the D-1, was also covered with plywood. The small vertical fin under the tail on the preceding types, was not present in the W-4, however, inasmuch as most seaplanes of that period did employ a tail float.

The upper wing of the W-4 was set higher above the fuselage than on any of the preceding types, corner braces at the tops of the mid-wing struts were compulsory to counteract the collapsible tendency.

(Continued on Page 39)

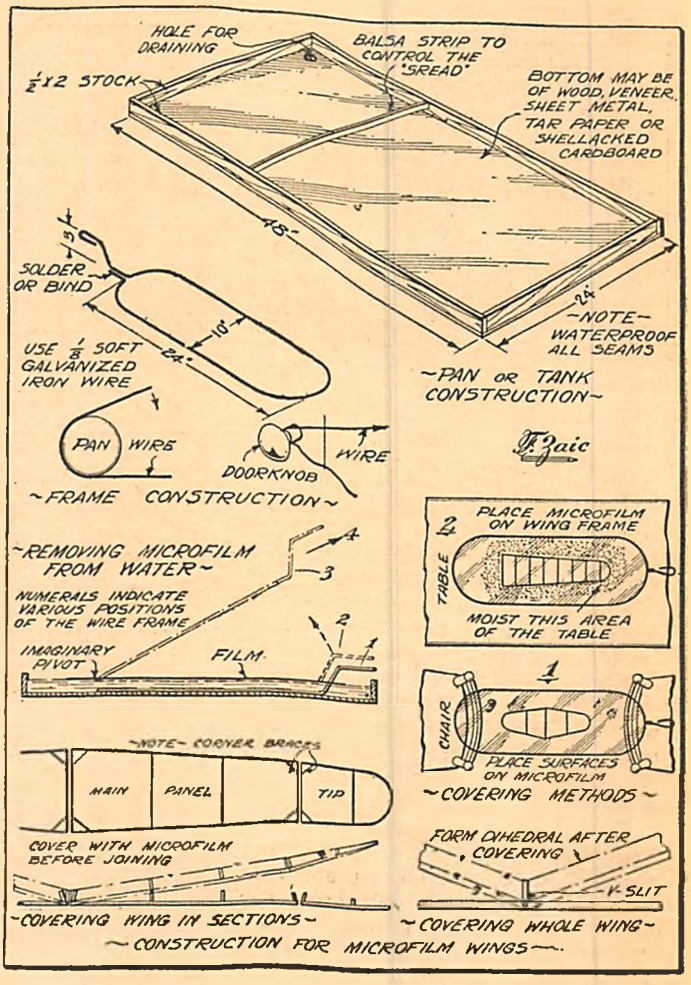


Microfilm

What It Is, How to Make It and How to Use It

By JOHN YOUNG

Drawings by Frank Zaic



WELL fellows, here's what many of you have been waiting for. Up to the minute information on that high-flying covering, microfilm!

Let's take a glance at microfilm's rise to popularity. It was presented to the model building world in 1931, by Bob Clary and Jerry Kittel. Many of those who tried it out, declared it impractical and dropped further experimentation. What a surprise these fellows got when Herbert Owen of New Britain, Conn., carried off first place with his microfilm-covered R.O.G. at the 1932 Eastern States Contest. Time, 7 minutes 30 seconds. This was microfilm's first major success and it served to stimulate interest to fever pitch. Within a few months, 'film was sweeping the wing-frames out from under old "king superfine", and by the time the 1933 National Meet arrived, paper "jobs" were as scarce as Model-T Fords.

The great b on that microfilm was to the indoor builder, can best be realized by noting the increase in the duration of indoor ships over an eight month period. Tractor "times" increased from 14 min. to 19½ min., commercial "times" from 7 min. to 10 min., and R.O.G. flights from 7½ min. to 9½ min. in duration.

This lightweight material is nothing more than a thin sheet of celluloid and is obtained by pouring a few drops of some nitro-cellulose solution on to water. These drops spread into a large thin sheet from which the volatile substances readily evaporate. The dry film left is microfilm. Usable sheets can be made that are twelve times as light as the finest paper tissue and that weigh .001 of an ounce per 100 square inches! Microfilm's light weight and reasonable strength make it an ideal covering for indoor endurance models and provides a light and decorative covering for flying scale models when used in thicker form.

The relative thickness of microfilm sheets is best judged by the colors the different sheets reflect. A thin sheet reflects a short wave length color such as blue, while a thick film reflects a long wave length color, for example, red. Films ranging in color from red to greenish gold are used to cover tractor wings, while those sheets having gold and blue colorings should be used only on tail surfaces and R.O.G.s.

If we are to make microfilm of good quality, we absolutely must have a good solution to start with. With this thought in mind, let's choose one that has proved satisfactory to many of its users. This solution consists of two parts of clear lacquer to one part of thinner, by volume. To two fluid ounces of the mixture, add about six drops of castor oil for flexibility.

We now need a tank of some sort in which to make the microfilm and several frames or hoops for lifting the sheets. The tank should be about 20" wide by 30" to 40" long by 1" (one inch) deep. An inverted bath or table cover of the porcelain over metal variety, is just right for this, but if one isn't available, a tank can be readily made from corrugated cardboard or thin wood. Coat the inside of this type of tank with melted paraffin and paint the outside with shellac to waterproof it. When water is in the tank, it should rest flat on some smooth hard surface. (Syphon the water out when emptying).

The frames are made of 3/32" aluminum or 1/16" iron wire, bent into the form of an oval, and should be provided with a handle at one end. A handy sized hoop for making sheets for covering the sections of tractor wings is 16" to 18" long by 8" wide. A smaller frame, 12" by 6", is sometimes used to raise very thin sheets for R.O.G.s and tail surfaces.

It's a good idea to supplement the equipment you now have, with a "cross-stick". This is merely a strip of balsa that is inserted between the sides of the tank so that it lies on the surface of the water. By moving it back and forth, we can regulate the amount of surface area of water in use.

And now for the actual making of microfilm.

Have plenty of solution handy and don't be discouraged if you waste three or four ounces of microfilm before you lift a successful sheet. Everybody has the same trouble at first. Even the expert sometimes uses up half a bottle of mixture before regaining the knack of making and lifting off good sheets.

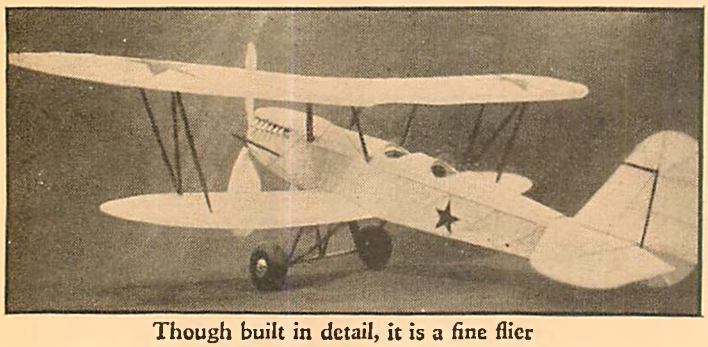
First fill the tank with enough cold water to completely cover the rim of the lifting hoop. The frame is now placed on the bottom of the tank and the cross-stick adjusted so as to enclose the right amount of water area. This should be between two and three times the area of the frame and is readily found by leaving from 4" to 6" of clearance all around the hoop. Now, pour the microfilm solution on to the water from as near the surface as possible, in a slow, steady stream. (If you want long sheets, pour the solution in a line).

Let the film dry for four or five minutes and then raise the frame directly under it until the edges of the sheet are supported ⅛" above the water by the rim. Now gather the excess microfilm around the edge of the hoop or bunch it up out of the way by moving the frame against the sides of the tank. This prevents any overlapping and at the same time makes the hoop easier to raise.

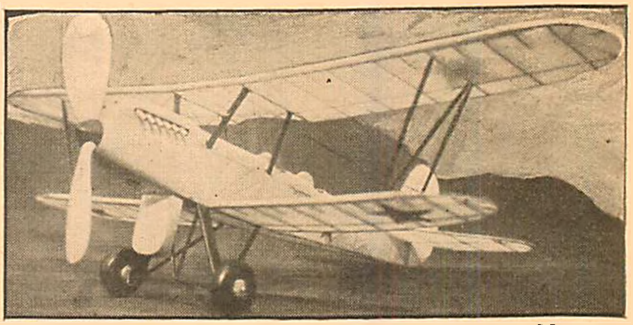
The next step is "lifting" and it's right here that 90 per cent of the sheets are broken and so wasted. Raise the frame slowly and steadily in an arc, as shown in Fig. 1, being careful to keep the lower edge of the hoop just above the surface, until all the film is clear of the water. Any overlapping microfilm is now drawn back with wetted fingers and the sheet hung up to dry. Sometimes when you are lifting a sheet, the microfilm sags or slips off the frame. Remedy this by coating the hoop with rubber cement before using it.

The amount of solution to use for making certain sizes and thicknesses of sheets varies with different mixtures, so you will have to do a little experimenting on your own to find the proper amount to use for

(Continued on page 43)



Though built in detail, it is a fine flier



Compare this model with the full scale ship, page No. 4

How to Build a Russian Fighter

The First Complete Description and Plans of a Flying Scale Model of a Russian Airplane to be published in America. The Two-Place Fighter D-1

By ELMER PILZER

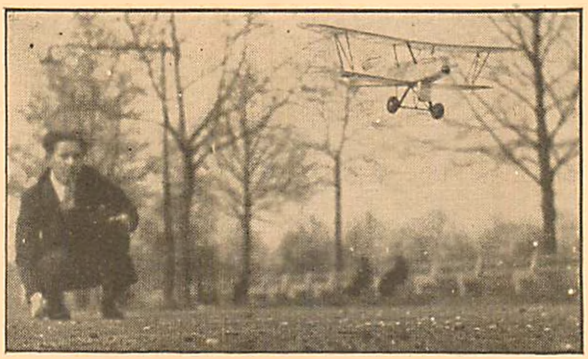
THE great progress made by the Russians in their development of efficient airplanes, is well exemplified by the general purpose D-1 type of plane. The Soviets have clearly designed this plane to serve many purposes efficiently. It may be used as a two-seater fighter, a light bomber, an attack plane, and as a reconnaissance or observation ship. The same type of ship was used in rescuing many of the stranded Russians exploring the Polar regions.

The D-1 is powered with a twelve cylinder Vee, Russian built, water-cooled engine of 650 h.p., type M.17.

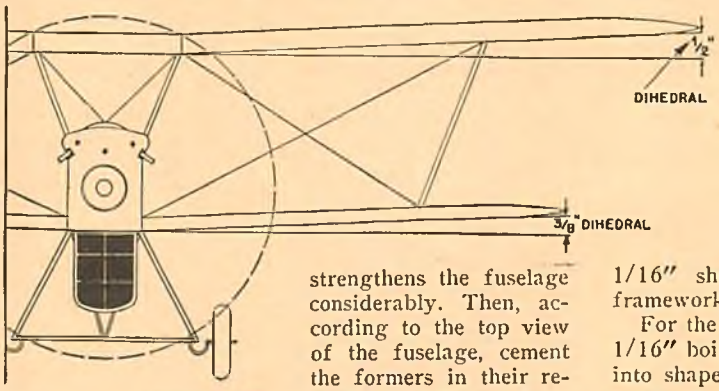
The rectangular fuselage is made of welded chrome molybdenum steel tubing and is covered with fabric. Its armament consists of two sets of twin machine-guns, one set synchronized to fire through the propeller and the other set mounted over the rear cockpit. This plane is capable of carrying a load of bombs or a torpedo.

Russia can proudly put her faith in such a dependable ship as the Russian Fighter D-1.

By carefully following the instructions and working over the full-sized plans, you will not only produce a biplane of unusual strength and lightness, but also a model which will give you continuously long and steady flights.



The model gets away for a long steady flight



Fuselage

We are going to assemble this model somewhat on the same style as the real airplanes that are made in the factories.

In order to make the side of the fuselage in one piece, it will be necessary to join drawings No. 1 and 3 together and pin them on a soft pine working board. Now pin transparent wax-paper over the drawings and start making the sides of 1/16" sq. balsa. The sides are indicated by the very heavy lines. After both sides are finished, with the aid of carbon paper, trace and carefully cut out the formers of 1/16" sheet balsa. When this is done, cement 1/16" sq. balsa under the formers. This strengthens the fuselage considerably. Then, according to the top view of the fuselage, cement the formers in their respective places, using 1/16" sq. balsa for the bottom of the body. Now cement the stringers in the notches of the formers and put on the 1/16" diam. reed cockpit coaming.

Nose Block and Propeller

Select a medium soft piece of balsa for the nose and proceed to trace and cut the side view. The same is done with the top and front view. Then cut the block in half from the top down and cut out the inside until the walls are 1/8" thick. Now cement them together and put in the wire clip for the motor stick. Be sure to put a liberal amount of cement on so as to prevent the sides from coming apart after the model is finished. Finally cement nose block in place on fuselage and give it and the fuselage a fine sandpapering.

A poorly carved and unbalanced propeller is the cause for many troublesome flights of a model. Therefore utmost care should be taken in carving the propeller. Make a template of thin cardboard, of half of the front view of the propeller. Now trace around that on both ends of the block and proceed to cut away all the waste, which is shown by the lined section on drawing No. 1. Do the same for the side view. Then carefully cut out the camber and twist of the blades. Sandpaper it and apply one coat of banana oil. Finally balance it and put on the propeller shaft and nose cone.

Tail Surfaces

The stabilizer should be made in one piece, therefore, you may either draw it up or trace one-half on a piece of transparent paper and turn the paper over so that it shows the other side of the tail. (Do likewise for the wings).

A piece of 1/16" sq. bamboo is put across the horizontal tail to increase its strength. The leading and trailing edges of the tail are of 1/16" x1/8" balsa. The tips are of 1/16" sheet balsa and the remaining framework is of 1/16" sq. balsa.

For the vertical tail, a piece of 1/32"x 1/16" boiled bamboo is carefully worked into shape with the aid of pins and the rest of the frame is also of 1/16" sq. balsa.

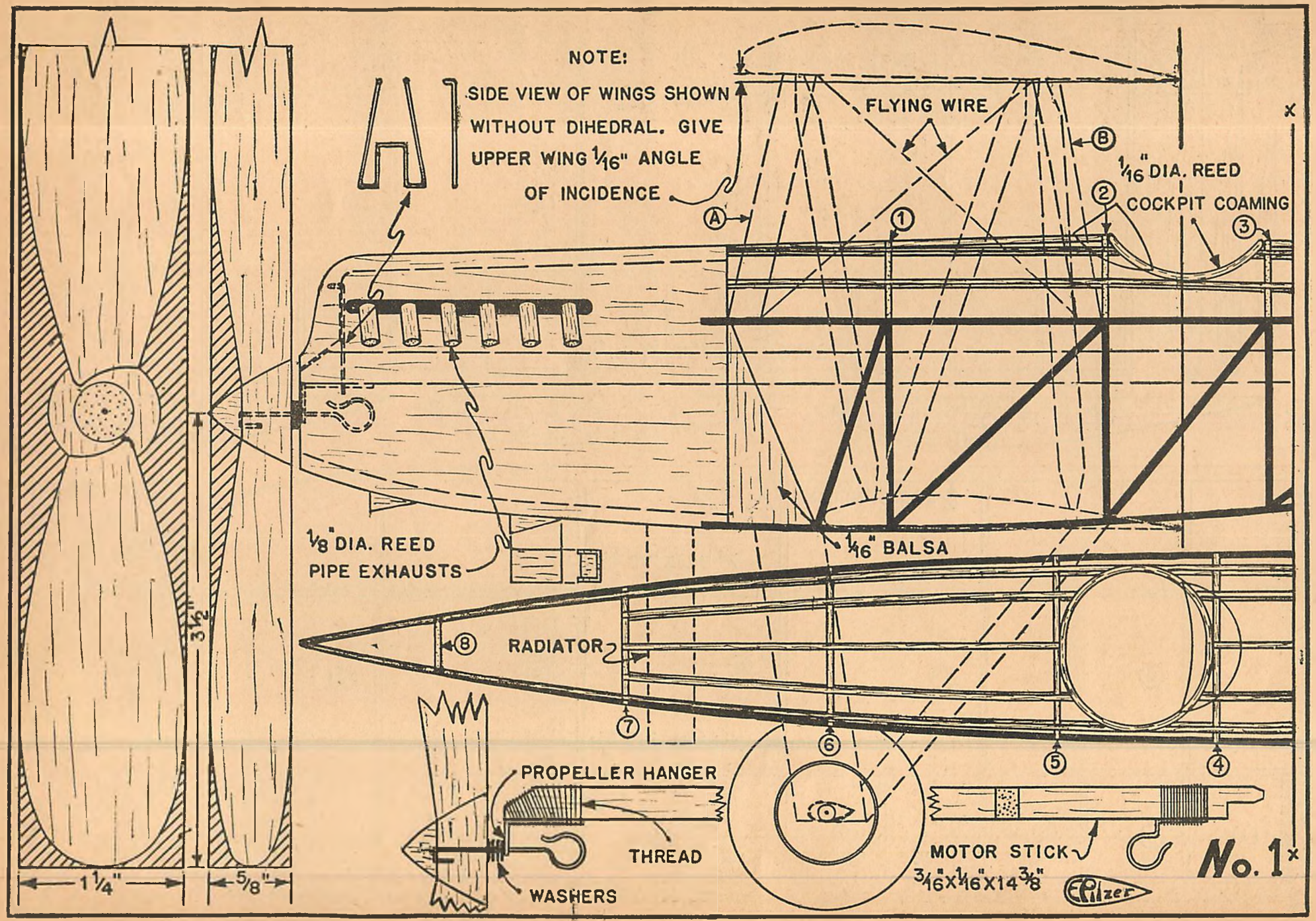
It is advisable to let both surfaces dry on board overnight so as to prevent warping. Before covering, sandpaper both tails to obtain a smooth covering job.

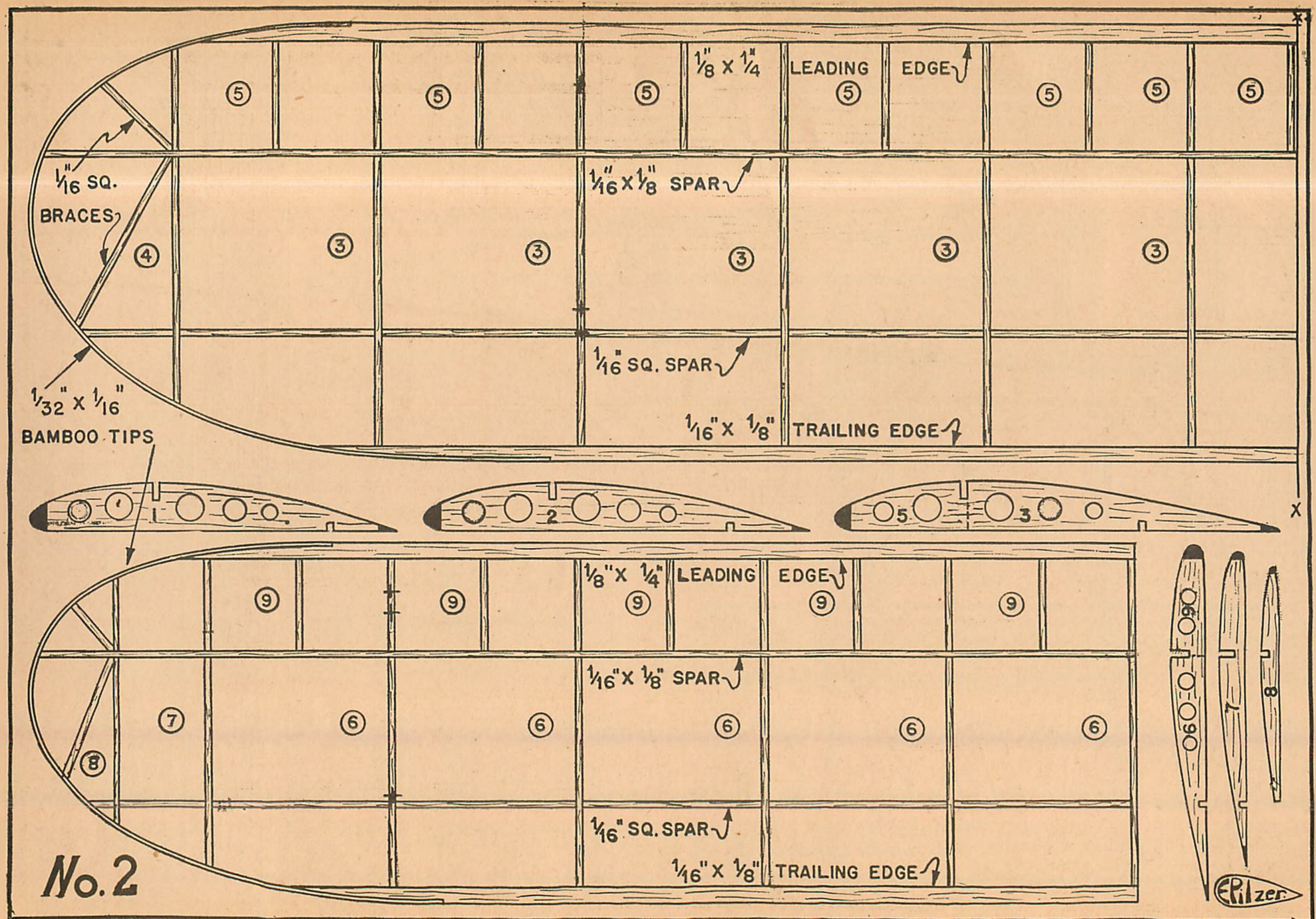
Wings

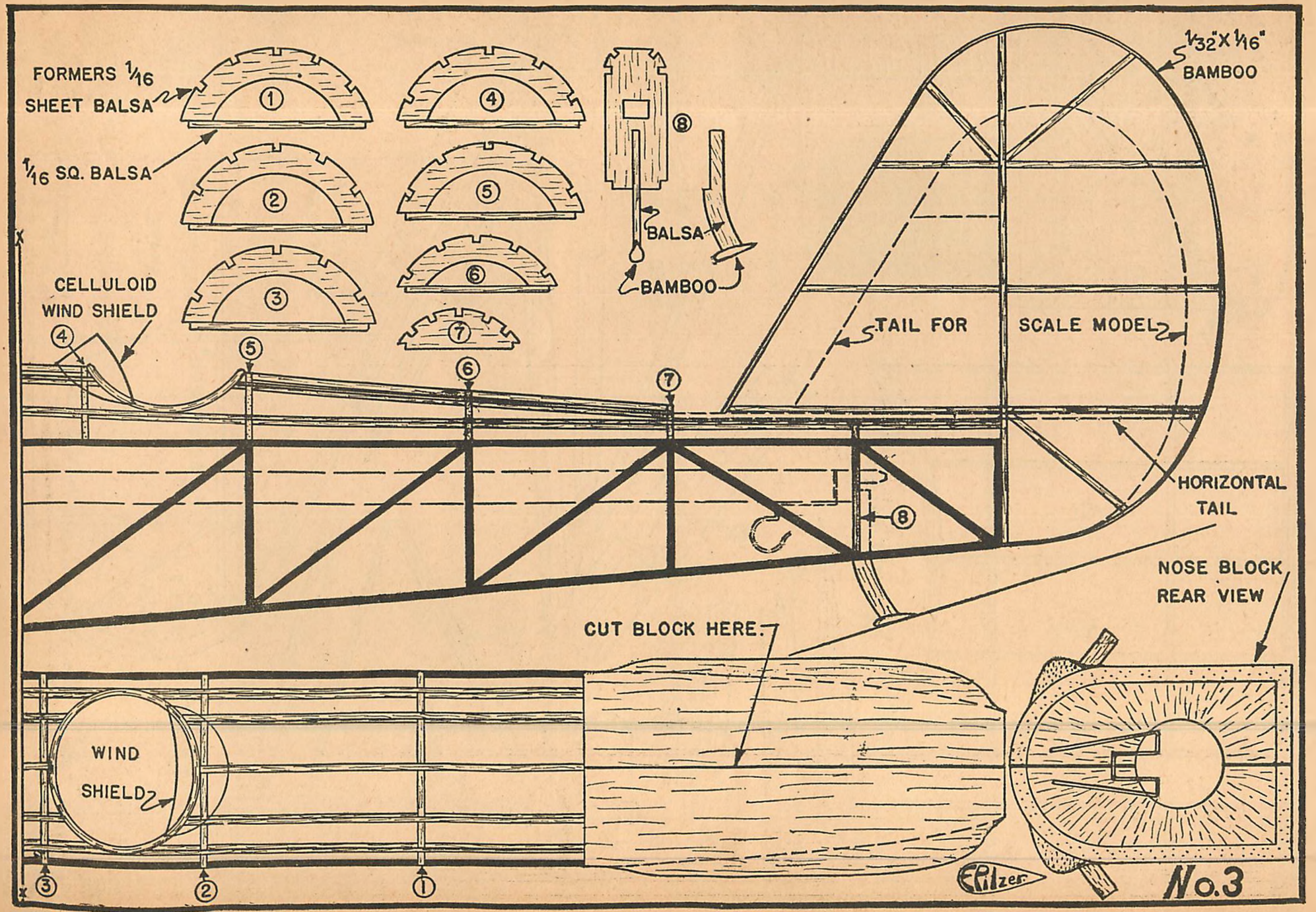
Trace and cut out all the ribs of 1/16" sheet balsa. In order to reduce unnecessary weight, lightening holes are put into the ribs. If desired, they may be omitted.

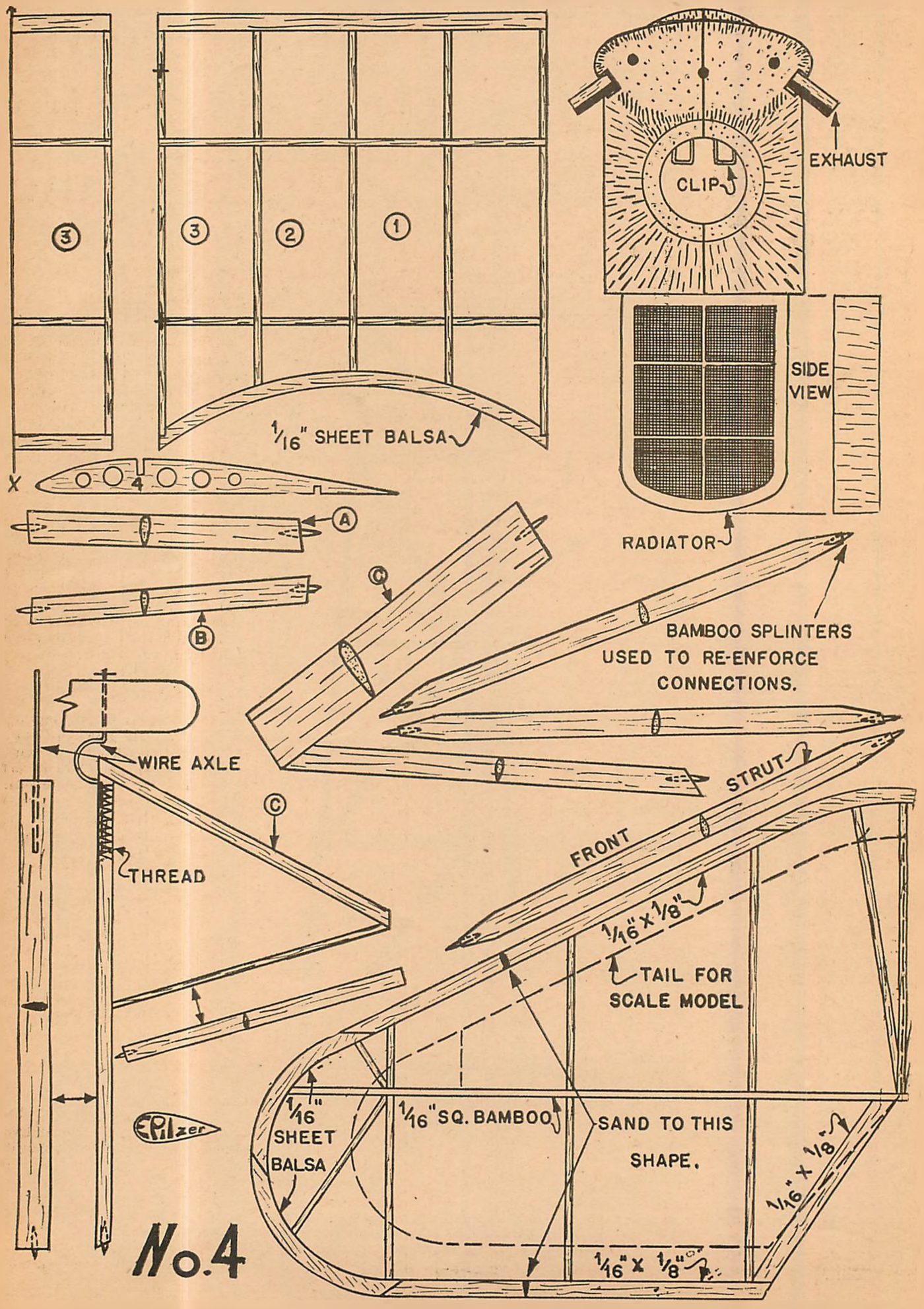
After you have traced the other side of the wings, pin down the rear spar and the leading and trailing edges. Then cement all the ribs in their respective places and bend a boiled piece of 1/32"x1/16" bam-

(Continued on page 40)


NOTE:
SIDE VIEW OF WINGS SHOWN WITHOUT DIHEDRAL. GIVE UPPER WING 1/16" ANGLE OF INCIDENCE
FLYING WIRE
1/16" DIA. REED
COCKPIT COAMING
1/8" DIA. REED PIPE EXHAUSTS
1/16" BALSA
RADIATOR
PROPELLER HANGER
THREAD
WASHERS
MOTOR STICK
3/16"X1/16"X14 3/8"
1 1/4"
5/8"
3 1/2"
No. 1


1/8 X 1/4 LEADING EDGE
1/16 SQ. BRACES
1/16 X 1/8 SPAR
1/16 SQ. SPAR
1/32 X 1/16 BAMBOO TIPS
1/16 X 1/8 TRAILING EDGE
1/8 X 1/4 LEADING EDGE
1/16 X 1/8 SPAR
1/16 SQ. SPAR
1/16 X 1/8 TRAILING EDGE
No. 2
EPilzer


FORMERS 1/16 SHEET BALSA
1/16 SQ. BALSA
CELLULOID WIND SHIELD
BALSA
BAMBOO
1/32"X 1/16" BAMBOO
TAIL FOR SCALE MODEL
HORIZONTAL TAIL
NOSE BLOCK REAR VIEW
CUT BLOCK HERE.
WIND SHIELD
E Pilzer
No.3


3
3
2
1
1/16" SHEET BALSA
X
4
A
B
C
CLIP
EXHAUST
SIDE VIEW
RADIATOR
BAMBOO SPLINTERS USED TO RE-ENFORCE CONNECTIONS.
WIRE AXLE
C
THREAD
STRUT
FRONT
1/16" x 1/8"
TAIL FOR SCALE MODEL
1/16" SHEET BALSA
1/16" SQ. BAMBOO
SAND TO THIS SHAPE.
1/16" x 1/8"
1/16" x 1/8"
E. Pilzer
No.4

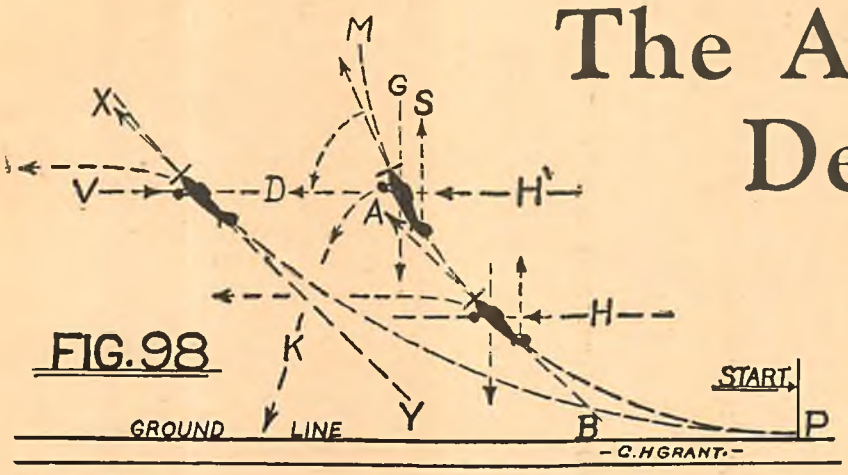


FIG. 98

The Aerodynamic Design of the Model Plane

How the Position of the Wing and the Speed of the Plane Affects Longitudinal Stability

By CHARLES HAMPSON GRANT

Article No. 28 Chapter No. 3

THOUGH these articles deal primarily with model airplane design, the principles explained and applied here are the same which govern the stability of full scale planes. The only difference in the two cases being the manner in which these principles are applied.

In the preceding article it was shown why and how the stabilizer operated to produce longitudinal stability, the amount of stability developed being dependent upon the stabilizer area, its angle relative to the wing chord and its distance from the center of gravity.

It was shown that the angle between the stabilizer and wing chord affected the nosing up tendency of the plane. The greater the angle, the more quickly the plane would nose up at any given speed. As the speed of a plane diminished under these conditions, the nose dropped, the rear of the fuselage being held up by the stabilizer. Thus the plane righted itself; for a plane's speed always diminishes when it noses upward and starts to climb.

It is this depression of the stabilizer under speed in which we are interested. The more the tail is depressed, the more the plane is forced out of its normal flight position. Therefore, there is a limit to the amount of angle we can use between the stabilizer and wing. Normally it is about 3°.

However, in certain types of planes a depressing effect on the tail is produced by other conditions. In such cases, the angle of the stabilizer to the wing must be given a different value, which depends upon the intensity of this tail depressing effect. One of the most common examples in which such conditions exist, is in the parasol wing monoplane or the extremely high wing monoplane. In fact they exist in any plane in which the center of resistance of the airplane is *above* the line of thrust. The higher the center of resistance (R) fig. No. 97 is above the thrust line (T), the greater will be the tendency for the upper part of the plane to be forced back by the resistance (R), and a consequent downward reaction takes place at the tail (S). In other words, the thrust (T) and resistance (R) will cause a clockwise couple, forcing the tail down and pulling the nose up.

We can see from this that the effect of the high resistance caused by raising the wing or wings a considerable distance above the thrust line, duplicates the action of the angle between stabilizer and wing, fig. No. 97. It is logical to assume therefore that a high line of resistance (R) may be used to produce this effect, in place of the negative stabilizer angle, or at least a fraction of it. This has proved to be the case in actual practice. All parasol wing planes require less negative stabilizer angle (relative to wing) than planes in which the wing is close to the line of thrust or below it. Any reader who has flown many models can visualize this action of a parasol or extremely high wing.

The correct setting of the stabilizer for any height of wing above the line of thrust,

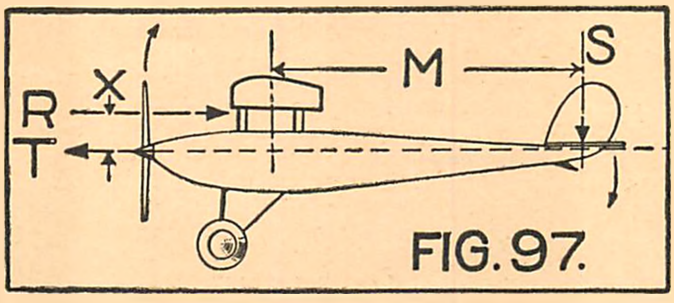


FIG. 97.

is given by the table on page No. 36 of the May, 1933, issue. The values given are based on an angle of stabilizer to wing of 2° for X=O, where (X) equals the distance from the line of thrust to the wing center section. The value (M) is the distance from the center of gravity to the center of the stabilizer. Obviously, the larger the value of (M), the greater will be the resisting effect of the stabilizer against the force (R), fig. No. 97. The governing factor of this problem is the distance (X) relative to distance (M). Practice has proved that if the distance (X) is 1/24 of (M), the angle between wing and stabilizer may be reduced ½°. That is, the stabilizer should have a setting which is ½° more positive than in cases where the wing center section is at the thrust line, not above it. If (X) is 2/24 of (M) or 1/12 (M), then the setting should be 1° more positive. If there is a difference of 3° in the case of a mid-wing monoplane, there should be a difference of only 2° if the distance (X) is 1/12 distance (M). (These figures are based on the existence of a normal dihedral in the wing. If the wing happens to be straight without a dihedral, then ½ the vertical distance from the center section leading edge to a line joining the wing tips. when the wing has a normal dihedral of about 8°, should be subtracted from the actual value of (X) for the straight wing, before calculations are made).

The angular amount to *increase the normal setting* of the stabilizer (or decrease the angular difference between stabilizer and wing), for any normal difference in angle between wing and stabilizer may be determined by the following formula, where (a) is the angular increase in degrees.

$$a = 12\left[\frac{X}{M}\right]$$

This formula is only approximate but will give satisfactory practical results. As an example let us suppose (X)=2″ and (M)=12″, while the angular difference between wing and stabilizer is 3° when the wing is at the line of thrust. Then:—

$$a = \left[\frac{12x2}{12}\right] = 2, \text{ or } a = 2°$$

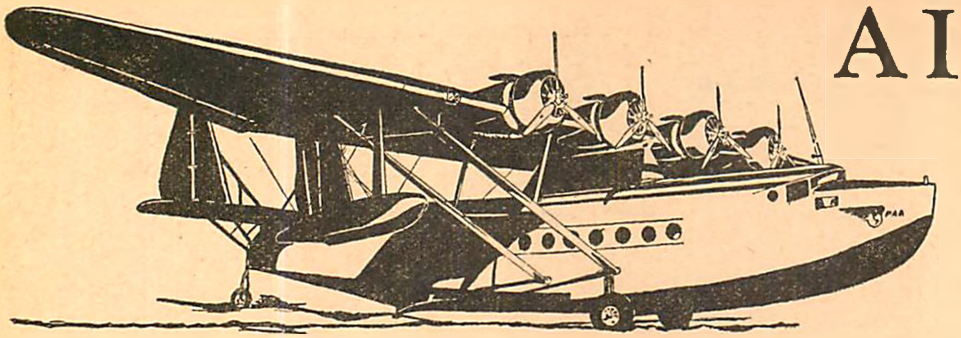
In other words the stabilizer should be set at an angle of (3°-2°) or 1° less than the wing.

Now it is opportune to divulge a very important point in regard to the effect of different speeds on the longitudinal stability of a plane. It is on this point that many designers go astray, designers of large airplanes as well as model plane engineers. To illustrate our problem graphically, suppose we take a practical example and examine it.

You have built a plane that flies very well. It climbs at a normal angle and without stalling, it recovers its normal level flight attitude gracefully at the crest of its climb. The glide is gentle and not too steep. Now, you bring out a plane from the work shop identical in every respect as the first plane, except that it weighs more; we will say 4 oz. instead of 1 oz., as in the case of the first model. You make this plane ready for flight. Of course it must

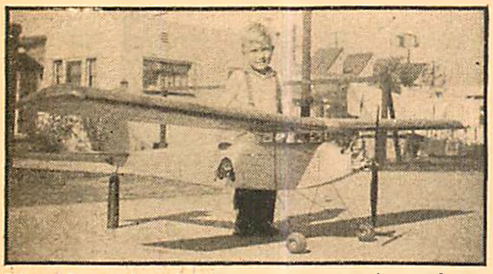
(Continued on page 41)

AIR WAYS HERE and THERE

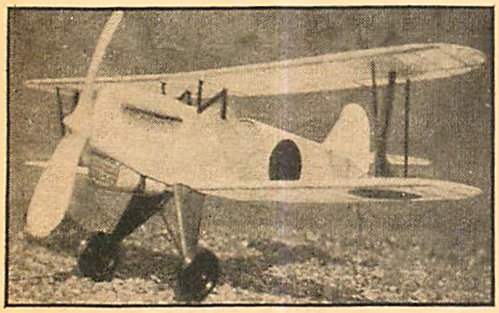


The new 36 passenger "Sikorsky"

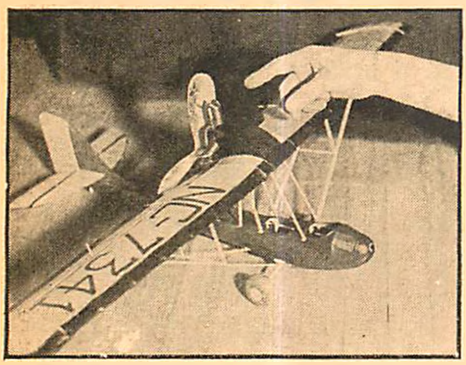
What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments



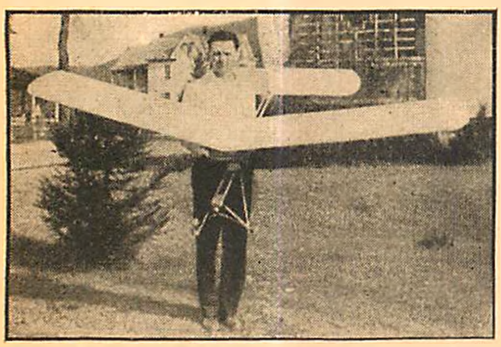
Pict. No. 1. An eight foot gas model by Mel Anderson. A neat job with clean lines. It has made a short flight



Pict. No. 2. Here is a model Kawasaki Fighter built from plans in our April issue, by Elmer Pilzer, author of the plans



Pict. No. 8. C. W. French Jr. built this unique Curtiss Junior. The motors are enclosed in wings



Pict. No. 5. Clark Hile and his 8 ft. gas plane. It has flown for 4 minutes

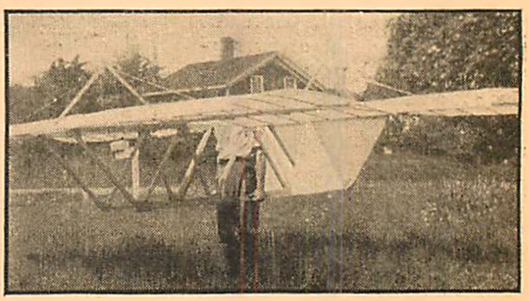
FOR several months we have promised our friends a larger Air Ways section. This month we are able to fulfill this promise and as you read on, you will find some very interesting data on machines that have been built recently.

In some of our more pensive moments we often wonder if the readers of Universal Model Airplane News realize the valuable training they are receiving while pursuing this hobby of model airplane designing and building. Many start in with the idea of deriving some "fun" from this hobby. However, they find out very quickly that model airplane building is a very jealous running mate and demands not merely a casual association, but eventually intensive study. The reward of this effort and study is great enough in the mind of the average builder to lighten the burden of his efforts. After all, *merely building* a model airplane embodies chiefly manual training work; work with the hands and not necessarily the head. The result of the work of such builders is often something that looks like an airplane but performs like a sand flea.

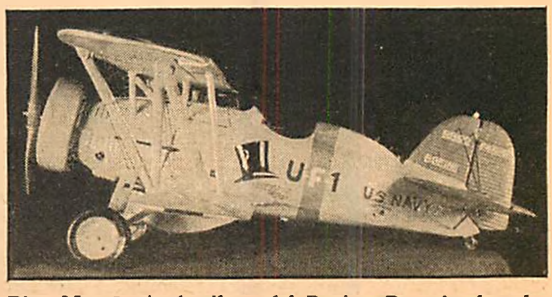
One of the most important points a builder must realize is that a model airplane must first be designed correctly before any tool is taken in hand. The success of a flying model depends entirely upon the proportional weights and measures of the plane. Possibly through long experience and great effort a builder may learn to create a model without understanding the principles thoroughly. However, the greatest success attained with the least effort is usually made by those who substitute a little head work for work in the shop.

Research in principles of aerodynamics where it embodies the study of mathematics, physics or other things which will be of value to the mature model airplane builder, brings success quickly in model building and flying. Of course, a builder must have the brain to take in these things in the first place. If he has not, he had better drop model airplane work and follow some other pursuit; he will certainly never be a designer of full size airplanes. After all, model designing is merely a form of training which will be of benefit to those who wish to follow aviation later in life. I therefore wish to emphasize the importance of applying mathematics and physics to your model airplane designing. In this way you can take "a bitter pill with a sugar coating" and have the idea constantly in mind that you are storing up knowledge and power which may be used later in life. We appeal to the strong, not the weak. Most of the contributors whose names appear in Air Ways are following this philosophy. The infinite pains and the amount of time spent on the models are indicated clearly by the pictures and the sketches shown here.

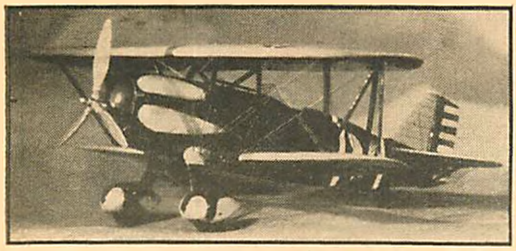
A young man in Vermont has turned his aeronautical efforts into the field of art. He has asked that I do not mention his name in connection with his drawings. However, I am sure he will forgive me in



Pict. No. 4. James Young and his 14 ft. span tandem monoplane glider. He has not made test flights yet



Pict. No. 3. A detail model Boeing Pursuit cleverly built by Paul Banko. Picture by Emery Kartone

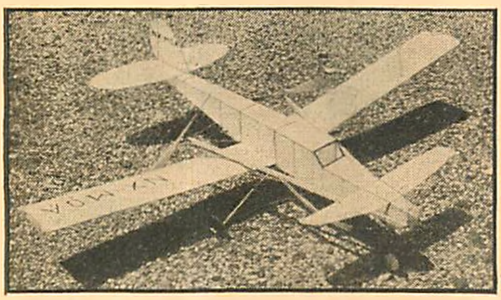


Pict. No. 11. A neat solid scale model Hawk P6E, by Thomas Miller Jr. It is the second model he has built

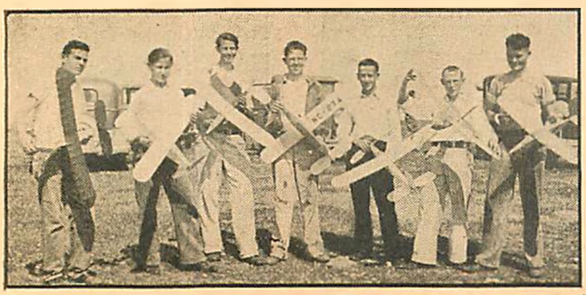
this case; for his example may be of benefit to others. Judging from the sketches which he has submitted over a period of two years, Mr. H. C. Wood of Lyndonville has developed from a novice to an expert, whose latest effort appears at the heading of this Air Ways section. It is a very clever drawing of the latest Sikorsky seaplane, flight tests of which have recently been successfully made. Spurred by his interest in aviation, this young man has developed an art ability which unquestionably will raise him to high places.

Now we have some more gas engine model news. Mel Anderson of 1500 So. Fremont Ave., Alhambra, Cal., sends us picture No. 1 of his 8′ span gas model. He says, "The other day I attempted the first flight. It took off in about 8 or 10 feet, climbed sharply into a partial stall. From a left down wind turn, the ship crashed into the ground." Such incidents are not unusual when experimenting with gas models. It takes a little while to work the "bugs" out of them. However, from the picture it may be seen that Anderson's model is a beautiful job and exceedingly well constructed. From snap judgment I would say that the crack up was due to too little dihedral and not enough difference in angle between the stabilizer and wing. Probably the stabilizer should have ½ degree greater negative angle.

Last month we printed plans of the Kawasaki Fighter. Due to the rush to get the copy in the last issue before going to press, we were unable to provide photographs. However, here is a fine picture showing the finished model; picture No. 2, by Elmer Pilzer of 1388 Bristow Street, New York, N. Y.

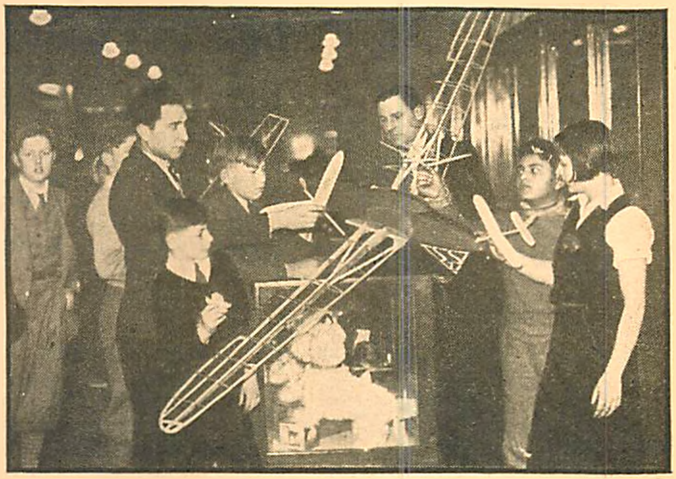


Pict. No. 7. Here is a novel three wing model that has never crashed, by G. V. Weeks of Milwaukee



Pict. No. 14. Senior members of the Bakersfield Model Club, Cal., who qualified for their recent contest

Pict. No. 13. A glimpse of the Bamberger Aero Club in action. Mr. Polk, director, and Gustave Scheurer examine a 7 lb. glider built by Scheurer



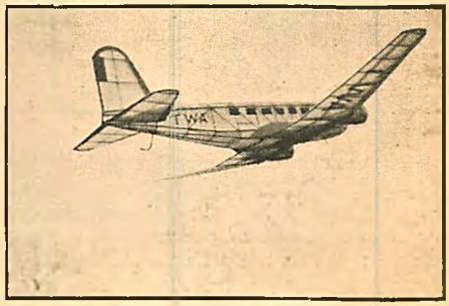
Paul Banko of 10002 Sophia Ave., Cleveland, Ohio, is another fine builder and occasionally provides his friends with model airplanes and supplies. Picture No. 3 shows a Boeing F4B4 which he has recently built. The construction is very unusual. The fuselage structure is made of pine which has been first covered with sheet balsa and then with metal. Balsa sheet helps the builder to mold the metal to the form of the job very easily. The tail surfaces are not covered with metal, but merely with balsa on which 1/32″ square strips have been glued and sandpapered to half-round shape. All details have been faithfully carried out, even to the machine-guns, which may be inspected by opening a little hatch on the side of the fuselage. Note the tail light on the fins. The details include such items as gas and spark control, fire extinguisher, safety belt, leather-lined cockpit and instrument board. He says he made the plane from flying model plans and a picture. Model builders take note of what an ingenious young man can do.

Has it ever occurred to you that flying model plans can be made from solid scale plans by means of a little head work? In like manner, solid scale models can be made from flying model plans.

Here is another young man who has extended his scope of aeronautical endeavor. James Young of 38 W. Main St., Williamson, N. Y., has sent in picture No. 4. He has branched out into the glider field. The picture shows his latest creation, which has a span of 14′. It is of the tandem wing type; two monoplane wings, one behind the other. He says, "It has not been tried out yet, but will be very soon." We await anxiously some word of his surviving the first test and its possible success.

Clark Hile of Pleasant Gap, Pa., has been busy with a gas engine job. In picture No. 5 he is shown holding it. It is powered with a Brown Jr. motor and has flown for 4 minutes on 1/3 tank of gas. Here we can chalk up another success to the rapidly filling ranks of gas model fans.

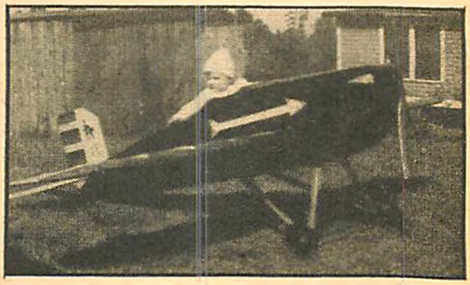
Frank Zaic of 328 E. 6th



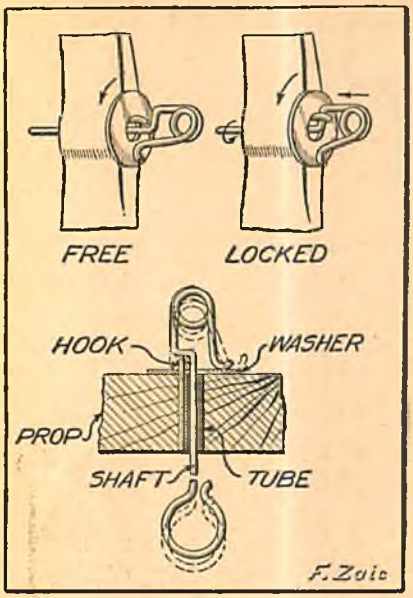
Pict. No. 9. A model Douglas DC-1 by Lawrence McCready and Raymond Lahey. It has a span of about 4 feet

Pict. No. 15. Some members of the Hartford Aero Club, Hartford, Conn.

Pict. No. 12. One of the most realistic flying pictures we have received. A Fairchild coming in, by Jim McCracken



Pict. No. 10. B. B. Gray built this 12½ ft. rubber powered model (?) for his friend



Pict. No. 6. In the diagram at the left, Frank Zaic has given you something very useful which you can make and try out on your next model. It is a novel free-wheeling arrangement for a propeller. Frank is an expert draftsman as well as model builder, as you can see

Pict. No. 19. Mr. A. E. Brown and Mr. Ivor Freshman directing a contest of 60 entrants at Sydney, Australia

St., New York City, has no picture to contribute, but instead sends us a very neat drawing of his latest free-wheeling device. It is shown in picture No. 6. We are sure that this will be extremely useful to many builders, especially as it comes from such an expert as Zaic.

Picture No. 7 shows what is characterized as a "brainstorm" by its designer. It is a three wing model built at the Milwaukee Orphan Asylum under the direction of G. V. Weeks of 2119 E. Jarvis St., Milwaukee, Wisc., about three years ago. In spite of its odd design, it is a remarkable flier and will take off from an ordinary lawn. Weeks says, "In the hundreds of flights I have seen, never has it made anything except a perfect landing unless it struck something while in flight." It has a 48" span and a length of 36". The two 10" propellers are turned by eight strands of ⅛" flat rubber in each motor. The motor sticks are 22" long.

Mr. C. W. French, Jr., of 15 Perkins Manor, Jamaica Plain, Mass., has just finished a Curtiss Jr. of unusual design, shown in picture No. 8. This model is unique in the fact that the motors run parallel to the leading edge of the wing and are enclosed in it. A gear device at the center drives the propeller. This system does away with the unsightly motor stick. Good flights of 40 seconds have been obtained with only part of the available power and number of turns. If any readers would like to see the plans of this ship appear in a future issue of the magazine, will they please write the editor.

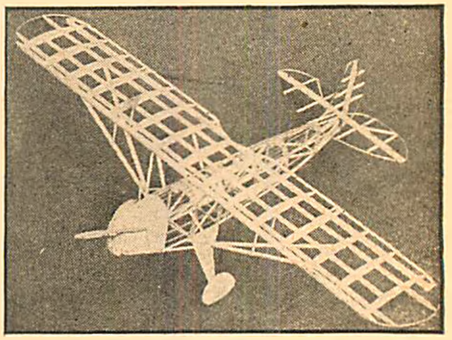
Picture No. 9 shows a Douglas DC-1 Transport model, built by two young men. Lawrence McCready of Pelham Manor, N. Y., and Raymond Lahey, also of Pelham Manor, have built it to a scale of ½" to a foot. It has a special feature; a retractable landing gear which lowers automatically. Twin rubber motors are led diagonally from the engine through the wing and wing fillet into the fuselage. The propeller shafts have the equivalent of a universal joint to straighten the thrust line. The weight is 4¾ oz., span 42 ½" and it has 8" propellers.

As far as we know, B. B. Gray of 311 McDonald St., Douglas, Ga., has the honor of building the largest rubber powered model in existence. Picture No. 10 shows the ship with one of Gray's friends in the cockpit. The unusual thing about this ship is that it actually operates on the ground if not in the air. The span is 12½'. When the rubber motor has been wound up, the youngster in the picture pulls a lever which releases the propeller and off she goes. It will roll along on the ground at about 15 m.p.h. for something over 150'. Without the youngster it has made several attempts to take off. Twelve strands of 1" rubber are used. Gray expects to add four more which he believes will enable it to fly very successfully.

Picture No. 11 shows a solid scale model of a Curtiss Hawk P6E built by Thomas Miller, Jr., of 210 Brown St., Glasgow, Ky. This model is exceedingly fine considering that it is only the second model that Miller has constructed. After the practice afforded in building a few more, Miller should be well up among the leaders.

Jim McCracken of 608 W. 31st St., Oklahoma City, Okla., has sent us picture No. 12, at which we had to look twice before we could determine whether it was a large ship or just a model. It is a picture of his 27" span Fairchild "24." Those of you who have tried to take pictures of models will recognize this shot as a very unusual one.

(Continued on page 46)

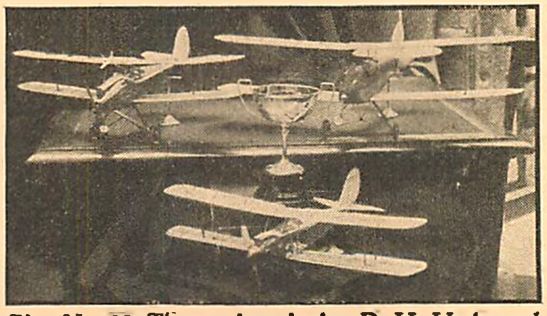


Pict. No. 17. A neat 12" model of a Fairchild No. 22 by T. J. Primrose of Manchester, England

Pict. No. 18. The Japanese have taken up model building in a big way here.

Pict. No. 20. Frank Furniss of Sydney, Australia, with his scale model D. H. Moth

Pict. No. 16. Members of the Red Comet Model Airplane Club of Baltimore, Md.

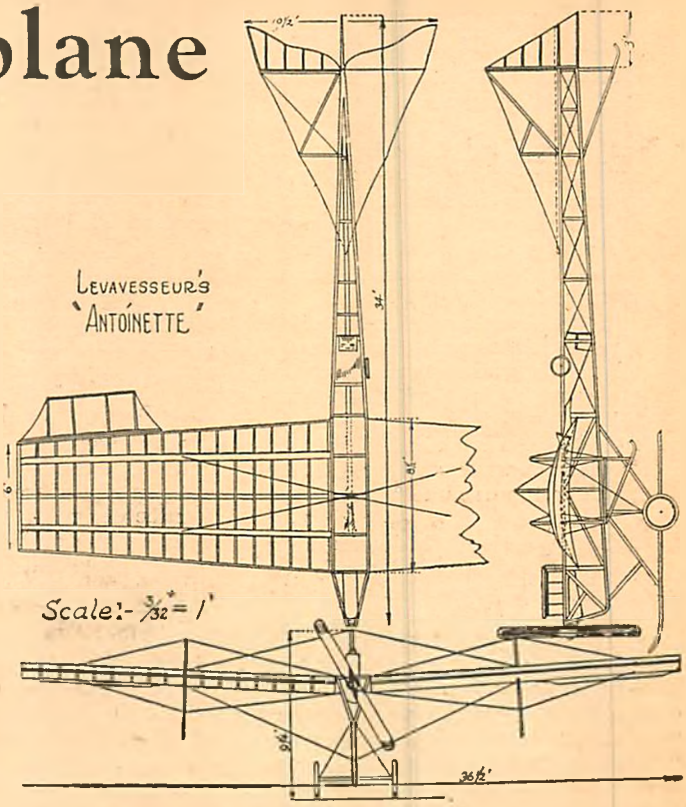


Pict. No. 22. Three prize winning D. H. Moths and the Championship Cup by Auckland Model Airplane Club, New Zealand

How the Aeroplane Was Created

How the French and Other Pioneers Solved the Problem of Flight and Started the Race for Air Supremacy

By DAVID COOPER

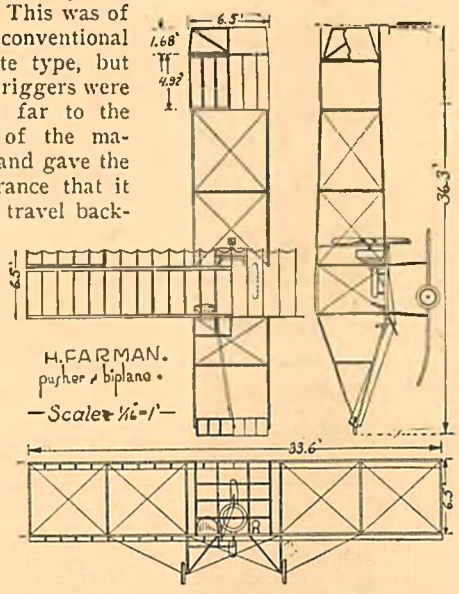


IT HAS been noted that thus far, all the American contributors to aviation history have been grouped apart since the opening of the twentieth century. But there were many others too, who were striving for the honor of being the first to fly. All this competition was in progress at the same time but some sought success along different channels. However, all followed along the same fundamental reasoning and the results could but be the same if this course was followed.

Two years after the Wright brothers had made their first and so historic flight, Santos-Dumont, a Brazilian who had come into wealth and had the means for such experimental work, made his first contribution to heavier-than-air flight. Alberto Santos-Dumont, previous to this time, very much interested in flying, had constructed and flown several lighter-than-air craft. His several ventures into this class of flight soon convinced him however, that it left much to be desired, and although he had won a prize for the first flight around Eiffel Tower, he abandoned the balloon and turned his attention to the glider.

He first built a cell type glider similar to the early Wright model, but although it rose a short distance, he was dissatisfied and abandoned it for another. This second, was larger but somewhat similar to its predecessor, except that it was equipped with floats and actually arose from the waters of the Seine River near Paris, it's initial impetus being supplied by a power boat.

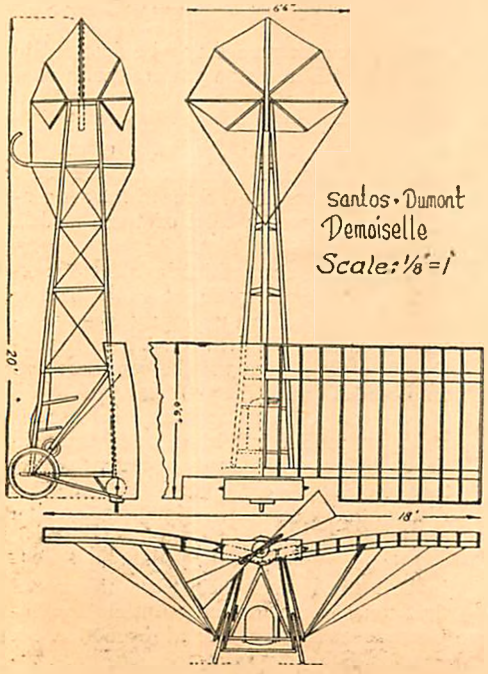
Encouraged, Santos-Dumont started work upon his first powered aeroplane and in a short time it was ready for flight. This was of the conventional box-kite type, but the outriggers were placed far to the front of the machine and gave the appearance that it would travel backwards. This model the "bis no. 13" was a disappointment, making only a few brief hops off the earth displaying very poor stability. This initial attempt of power flying by Santos-Dumont came in 1905 but in the following year his "bis no. 14" was more successful, making a flight at Bagatelle, France, Sept. 14, 1906, for a duration of eight seconds and on October 23, the same machine flew a distance of 160 feet, winning for the proud inventor the Archdeacon prize of three thousand francs for exceeding twenty-five meters. Although the diminutive Brazilian did not know it, the Wrights had done better, three years previous to this.



During the summer of 1905, Captain Ferber and Ernest Archdeacon both intensely interested in aviation, began to experiment with gliders, and through the efforts of Archdeacon, Gabriel Voisin of the Voisin brothers, Bleriot and Leon Delarange, became associated with the pair thinking to function better as a group, but these were individualists and though they assisted one another, they did better alone. The Voisins and Bleriot however, worked closely together and Farman dropping his art studies in Paris, joined Voisin his old friend.

Bleriot, the real guiding genius among the French aeronautical experimenters, began his investigations in 1900 on the ornithopter, but after he had constructed two or three models, he reached the decision that it could never be practical as a flying device and completely dropped work on it. He turned his attention next to the cellular wing type and with the assistance of the Voisin brothers in 1904, he built his first glider. This machine was a complete failure although his next, also a glider with floats, was reported to have risen from the Seine. Number three, had a new idea incorporated in it, a wing type called the ellipsoidal wing, in which the supporting surface described an oval form. This idea was used later by Voisin in a successful biplane, the form being used for the tail surface only, however. This number three was fitted with two twenty-five horse-power motors and was intended to be flown from the water, but it too, was doomed to failure and junked.

His fourth, with quadrangular cells was a complete failure, being wrecked on the first attempt to fly it. One would think that by this time Louis Bleriot was too much discouraged to try further to conquer either his spell of hard luck or the problems of flight, but, perhaps one of the greatest things about this man was his



indomitable courage and tenacity, for failure seemed only to spur him on to greater effort. At any rate, undaunted by these failures, he started his fifth machine, in which his design was much changed. This next model was a new type, using only a single wing but similar to Santos-Dumont's in the placing of all controls forward, with the motor and propeller at the rear of the wings. With this effort, Bleriot's luck seemed to have changed, for this machine although quite unstable, actually flew for six seconds. Thus encouraged, Bleriot built his sixth model, a tandem monoplane, fashioned after Langley's, and on its trial flight he covered a distance of 180 meters and a little later made a speed of 80 kilometers an hour, but like its predecessor it was quite unstable and soon was wrecked.

By this time, Bleriot had spent over $150,000 and had survived nearly 50 wrecks and crashes, but success must be had at any cost and he ventured still further. On April 5th, 1907, in his seventh venture, he made the first powered flight in a monoplane ever recorded. This model was a complete departure from all previous design, since it was the first to have the motor placed in the nose and had all the controls at the rear and attached directly to the body, thus doing away with the outrigger idea entirely. Undoubtedly, this set the pattern upon which most aircraft were designed later.

Meanwhile, Bleriot's contemporaries had not been idle, and on March 16th the same year, Leon Delagrange flew for the first time, a cell type biplane built by the Voisins and October 15th, Henri Farman made his first flight in a machine of his own design, in which he followed rather closely the designs of both Curtiss and Wright. The same year brought a new group into the picture when Louis Breguet and M. Richey began a thorough study of the helicopter principle of flight. Though it was a little known fact, Breguet's investigations brought to light many hitherto unknown points about wing surfaces though his work along this line came to naught. He later brought out a biplane similar to the common type in construction, but of unusual stability. Monsieur R. Esnault Peleterie also brought out a new type of monoplane after the design by Bleriot, but more streamline; these became known later as the R.E.P.

On October 26th, Maurice Farman made the first public *turn* and later a complete circle, while on March 21st, 1908, Leon Delagrange took Farman aloft as the first passenger besides the pilot. On January 14th this year, Farman had already won a rich prize of 50,000 francs offered by Archdeacon for being the first to fly one kilometer in a circuit course, and with Bleriot

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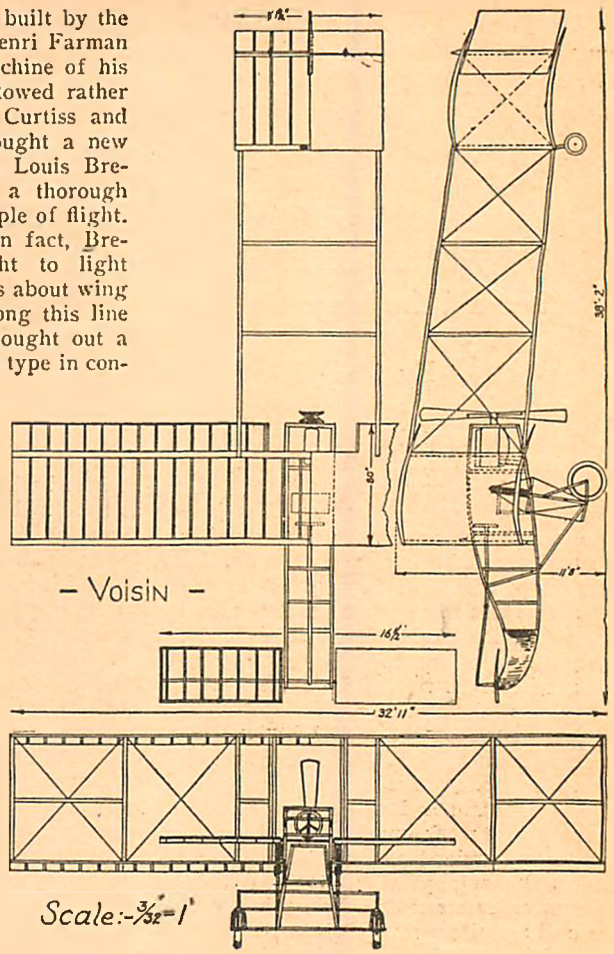

The Eastern States Outdoor Contest

Sanctioned by the National Aeronautic Association

Sponsored by Universal Model Airplane News and the Bamberger Aero Club, Newark, N. J.

SATURDAY, May 19th, the day on which the Eastern States Outdoor Contest is to take place, is drawing near. We hope all would-be contestants are tuning up their fuselage, stick and gas models for a good showing. Remember, the winner will be sent to the National Competition at Akron, Ohio, to be held on June 27, 28 and 29, 1934.

Those who attend this Eastern States Outdoor Contest will see probably the greatest display of gas engine models ever assembled in one place. A number of talented young men are working their heads off in order to make a good showing in this event.

The events to be held are as follows:

Fuselage Endurance (weight rule).

Stick Model Endurance (weight rule).

Gasoline Engine Powered Models Endurance. (7 lb. limit).

Prizes

Some very unusual prizes are to be offered. The high point winner of a contest will be given a free trip to the National Competition at Akron. High point winner of the Bamberger Aero Club will also be given a free trip to the National Competition. If he is also the high point winner of all the contestants, the second high point winner of the Bamberger Aero Club will be awarded the free trip. Those who win first place in each event will be awarded a large trophy. Second place winners in each event will be awarded a small trophy. Winners of third, fourth, fifth and sixth places in each event shall be awarded a gold medal.

We are sure that those eligible to enter this contest will receive this news with great joy.

All contestants should be at Newark Airport with their ships at 9 A. M. If the weather makes it impossible to hold the contest on this day, it will be postponed to the following day, Sunday. In the event that Sunday also is unsuitable for flying, the contest will be held on May 26th. In the meantime, sweep the cobwebs off your workbench and get busy. This contest will be held under the official rules of the National Aeronautic Association and all records will be certified. Following are the rules which will govern the contest:

Rules

All contestants must be under 21 years of age. There will be no senior and junior class.

Each contestant shall be the owner, builder and operator of the competing models. However, the design may be obtained from any source. All parts except thrust washers must be built by the contestant.

No part of a model may be dropped in flight. Models must be powered with rubber strands.

Each contestant will be allowed, in each event, three official flights. He will be credited with the greatest elapsed time made in any one of his three flights. A contestant is allowed a total of three models in each contest.

A flight is a start which lasts for 30 seconds or longer. Any flight under that or failure to fly in turn promptly when summoned, is a delayed flight. Three successive delayed flights will be considered as an official flight.

Any contestant breaking the contest rules or conducting himself contrary to the ordinary requirements of common courtesy may be disqualified. Models are not disqualified if broken in landing after an official flight.

Flight time begins the instant a model is in full flight and ends when the model first touches the ground or meets any object preventing further flight within ten seconds. However, if a model meets an ob-

(Continued on page 39)

Boeing-U.S. Army PW-9

THIS original design was first built in the latter part of 1922 and flown early in 1923. There were several variations in the various models submitted to the air corps, before a number were released for production. This model was the first of the series produced for the service

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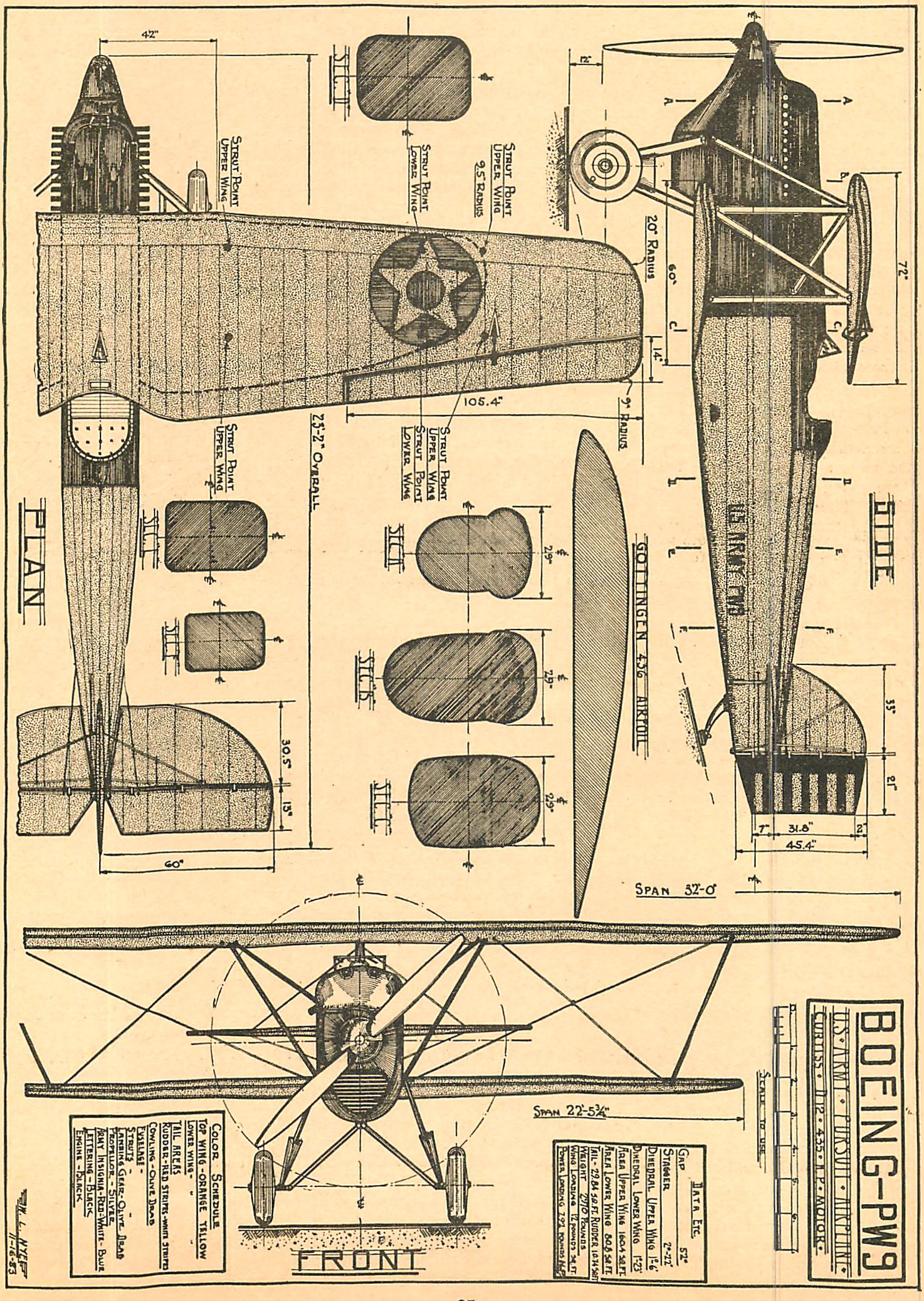


THE NATIONAL AERONAUTIC ASSOCIATION JUNIOR MEMBERSHIP NEWS

1934 National Championship Meet

HERE are the contest rules for the biggest model airplane meet of the year. Read them over carefully and then start getting ready to go to Akron, Ohio, where the 1934 meet is to be held.

Imagine the thrill of flying indoor models in the huge Goodyear Zeppelin Airship Dock! This mammoth structure is one hundred eighty feet high inside, all clear vertical space. Truly this is a veritable model flyer's dream, to be able to have such a place for his indoor models. It is taken for granted that all the present records will be exceeded. By how large a margin is the question.

The sponsors are planning many interesting things for your visit to Akron. The members of the Women's Chapter of the National Aeronautic Association of Akron, one of the most active chapters in the country, are doing their utmost to see that nothing will be left undone to make certain that all entrants have the best time of their lives. The Men's Chapter will be very much on the job helping out with the arrangements. Many of them will serve as officials. The Akron Chamber of Commerce, also one of the sponsoring group, will insure that Akron does its best, and that is some best indeed. THE UNIVERSAL MODEL AIRPLANE NEWS, as always, will take an active part in the arrangements. Those who attended the 1933 Meet in New York City will always remember how well they enjoyed themselves due to the efforts of that magazine and its staff.

There will be special arrangements for those older-than-twenty-one fellows, who may now compete under N.A.A. supervision in the newly formed OPEN class. The open class competitors will not be permitted to compete against the juniors and seniors for the traditional N.A.A. trophies, but there will be awards provided for them. From all indications there will be several entrants in the open class this year.

The dates of the meet are tentatively set as June 27-29. There will be complete information and instructions, entry blanks, etc., ready to mail to all those who are interested. Just send your name and address together with a large stamped self-addressed envelope to Dr. Theodore Troller, Contest Director, Guggenheim Airship Institute, Akron, Ohio. He will see that you are promptly supplied with the necessary forms, but be sure to enclose a large envelope with postage, otherwise there can be no attention paid to your request. Mail your request any time after May 10th.

Due to the centrally geographic location of Akron, many entrants who have not been able to attend the meets of the past two years, will have the chance to show what they have been developing in the way of new ideas. Many surprise models are expected. It is assumed that nearly every indoor model will be covered with microfilm. No lighter covering has yet made its appearance. There are reports that some of the builders have developed a heavier form of microfilm for outdoor use, thus providing a waterproof surface with very slight skin friction. It will be interesting to see what there is new this year.

The rules are sufficiently elastic to provide for unlimited varieties of sizes and designs. Remember that any sort of power except rockets may be used. Rockets are not allowed because of the fire hazard. Gasoline, motors are coming into their own to such an extent that they are no longer allowed to compete against rubber powered models. Reports of many gas models have been received and it is anticipated that there will be a number in this year's Texaco Contest. This should prove to be one of the most interesting events in the entire meet.

The prizes are so numerous that this limited space does not permit announcing them in this issue. There will be so many prizes that it will be hard to keep track of them all. There will be as usual the traditional N.A.A. trophies; Mulvihill, Stout Indoor, Texaco, Stout Outdoor, Bloomingdale, Moffett, and UNIVERSAL MODEL AIRPLANE NEWS Trophies. These are the first place awards which the winners hold for one year. In addition, the winners receive smaller trophies which they retain permanently. Besides these first place prizes, there will be cups, trophies, medals and prizes of various sorts.

The meet is under the sanction of the N.A.A. so that all records will be officially recognized. N.A.A. competition rules will be observed. Each winner will be known as the 1934 National Champion in his class.

Digest of Rules for 1934 National Championship Model Plane Meet

THIS meet is for members of the N.A.A. exclusively. There are no restrictions on the design of models except that they meet the specifications named. However, a model must drop no part in flight. Each contestant shall build his own model with the exception of bearings and power plant. Any form of power except rockets may be used. Booms, outriggers, multiple motors, gears, and other types of mechanical power application may be used. Any number of propellers may be used on a model, either pusher, tractor or both.

Mulvihill Outdoor Contest

MODELS shall be of the STICK type and hand-launched. The effective main supporting surfaces (wings) shall be no less than 100 square inches and no more than 300 square inches in area. Models shall weigh, ready to fly, at least one ounce avoirdupois for each 50 square inches of wing area.

Stout Outdoor Contest

MODELS shall be of the FUSELAGE type and rise off the ground. The effective main supporting surfaces shall be no less than 100 nor more than 300 square inches in area. Models shall weigh, ready to fly, at least one ounce avoirdupois for each 50 square inches of wing area.

Admiral Moffett International Outdoor Contest

MODELS shall be of the FUSELAGE type and rise off the ground. The effective main supporting surfaces shall be no less than 100 square inches nor more than 200 square inches in area. Models shall weigh, ready to fly, at least one ounce avoirdupois for each 50 square inches of wing area. In this contest only one model may be used by a contestant. Foreign entries, excepting Canadian, may have their models flown by proxy. Each country is allowed a team total of six entrants. The American and Canadian teams will be selected by elimination flying on the day of the contest. Details of this elimination will be explained upon arrival in Akron. A model to be eligible in this contest shall not fly in any other contest of the meet.

Texaco Outdoor Gasoline Model Contest

MODELS shall be powered with internal combustion engines and shall be of the FUSELAGE type and rise off the ground. Models without fuel shall weigh no more than seven pounds and shall carry for flight an amount of fuel no greater than one quarter of an ounce liquid for each pound of model weight. The term "fuel" is interpreted as the mixture that is taken into or forced into the cylinder or cylinders.

Stout Indoor Contest

MODELS shall be of the STICK type and hand-launched. The effective main supporting surfaces shall be no less than 30 nor more than 150 square inches in area. There are no weight restrictions.

Bloomingdale Indoor Contest

MODELS shall be of the FUSELAGE type and rise off the ground. The effective main supporting surfaces shall be no less than 30 nor more than 150 square inches in area. There are no weight restrictions.

Exhibition Scale Model Contest

MODELS may be built to any desired scale. No model shall, however, be more than 48 inches in wing span. Models shall be accompanied by a drawing or print giving all dimensions and details necessary to judge the model. Each model shall be an exact replica of a man-carrying heavier-than-air machine, every part being proportional in size and location to the corresponding part of the large machine. Models will be judged on fidelity of scale, general workmanship, neatness, amount of detail, originality, color and finish. An entrant may enter more than one model but may not win more than one award. Models must arrive in Akron no later than June 20.

Definitions

THE following definitions are applicable to the above contests:

HAND-LAUNCHED—A model is hand-launched when it is released into flight directly from the hands of the launcher. The model shall be launched from an elevation of not more than six feet above the ground or floor.

FUSELAGE MODEL—A model of the fuselage type has a built-up, enclosed fuselage. The minimum area of the maximum cross-section of the fuselage must correspond to the formula $\frac{L^2}{100}$ where "L" equals the over-all length of the model, excluding the propeller. The fuselage shall be streamlined and have not less than 90% of its surface area covered. The fuselage shall be a structure which supports the motor, wings, empennage and landing gear. When rubber is used for power, it shall be contained entirely within the model.

STICK MODEL—A model of the stick type has a body composed of a single stick or open framework, rather than a fuselage. Models that do not meet the fuselage requirements are classed as stick models.

RISE OFF THE GROUND (R.O.G.) A model of the R.O.G. type has landing gear that permits it to take off from the ground or floor, starting from a standstill, under its own power. The landing gear must be strong enough to support the model while taking off and landing, and its usefulness must be demonstrated by gliding the model from a height of at least four feet, landing without damage and without nosing over. The wheels shall turn freely and be of such size as to permit the model to taxi easily on an ordinary platform. The minimum diameter of the wheels shall be not less than: ¾ inch for models whose wing area is less than 100 square inches; 1 inch for wing area between 100 and 150 square inches; 1½ inch for wing area between 150 and 300 square inches; 2 inches for wing area over 300 square inches.

NUMBER OF MODELS—Each contestant will be allowed a maximum of three models in each event, and he may use any or all to complete his flights, excepting in the Moffett International Contest where only one model is allowed to a contestant.

NUMBER OF FLIGHTS—Each contestant will be allowed a total of three official flights. A flight is a start that lasts 10 seconds or longer in an outdoor contest, and 30 seconds or longer in an indoor contest. Any flight less than that or failure to fly promptly when called shall be judged a delayed flight. Three successive delayed flights shall be considered as displacing one official flight. A contestant may at his option, declare a delayed flight when his model meets an obstruction that prevents further flight. If not declared to the timers at the time of the collision, such a flight is to be judged as an official flight. However, should subsequent official flights fail to surpass the duration of a delayed flight that has been declared, the contestant will be entitled to reinstatement of the delayed flight as official. If a contestant fails to make one flight of sufficient duration to be an official flight in his nine possible chances, his best time will be recorded as the time of his best flight.

TIME OF FLIGHTS—Flight time starts the instant a model is in flight and ends when the model first touches the ground or floor after being launched, or meets an obstruction that prevents further flight. Time also ends when a model passes from the timers' sight, but the timers shall make every effort to keep the model in sight until it lands. If a model meets an obstruction and falls free independently and resumes flight within ten seconds, time shall continue uninterrupted. However, if an obstructed model can be freed by any means within 60 seconds, time will continue but will not be credited for the period that model was not actually in flight.

New Official Records

THE Contest Committee has recently recognized as official the following new model plane records. They are all for indoor models.

STICK MODEL AIRPLANE R.O.W. Class B

Junior: Hyman Oslick, Philadelphia
6 minutes 43 3/5 seconds.

STICK MODEL AIRPLANE, R.O.G. Class B

Senior: Bruno Marcki, Medford, Mass.
9 minutes 24 3/5 seconds.

Junior: Hewitt Phillips, Belmont, Mass.
7 minutes 09 seconds.

STICK MODEL AIRPLANE, hand-launched, Class B.

OPEN: Frank Zaic, New York City
6 minutes 57 1/5 seconds.

Junior: Raymond Steinbacher, Ridgefield, New Jersey
9 minutes 07 seconds.
Class C.

OPEN: Frank Zaic, New York City
8 minutes 23 4/5 seconds.

FUSELAGE MODEL AIRPLANE, Class C.

Senior: John Young, New York City
10 minutes 41 2/5 seconds.

GLIDERS, Hand-launched. Class A.

Senior: David B. Hecht, New York City.
34 2/5 seconds.
Class B.

Senior: David B. Hecht, New York City
31 3/5 seconds.

It is interesting to note that the first records in the OPEN class have made their appearance. Frank Zaic, a member of the New York "Aeronuts" and a licensed glider pilot, established the first records in the class for those over twenty-one. He took part in the Spring Record Trials of the "Aeronuts" in which the other New Yorkers above made new records. Zaic says he is not proud of his new marks and knows very well that someone will soon do much better, but he is willing to start the Open Class record book and give the others something to shoot at.

The records made by Marcki, Phillips and Steinbacher are especially worthy as they were made in armories that are less than 50 feet high. Lights and wires cut into the space to further hamper the models. When fellows set new records under such conditions, they are going to make things interesting when they get a chance in the larger buildings.

Chapter News

JORDAN'S Junior Aviation League, the model plane club sponsored by Jordan Marsh Company of Boston and the Boston Traveller, has become a new chapter of the N. A. A. The membership numbers nearly two hundred active and it is believed that this will be increased with the present impetus that is being given the model game. Capt. Willis C. Brown is Club Director and may be addressed at Jordan Marsh Co., Boston, Mass. He will be pleased to give information to prospective members.

THE Springfield Model Aeroplane Club, of Springfield, Mass., has just become a Junior Chapter of the N.A.A. The club has been active for several years.

The director is Mr. Ernest A. Walen and may be addressed at The Heatbath Corporation, Springfield, Mass. Enthusiasts living in the vicinity of Springfield will be fortunate to become members of this very live group. Incidentally, Mr. Walen has made a liberal contribution to the N.A.A. toward the purchase of a trophy for the new Open class.

THE Columbus N.A.A. Junior Chapter is under the direction of Mr. J. E. Konkle, 559 Ohio B & L Bldg., 22 East Gay Street, Columbus, Ohio. Mr. Konkle has an active organization of nearly two hundred members and expects to have one thousand members before the end of this year. This club is exceptionally active and great things are looked for in its program of activities and development. Mr. Konkle has had many years of model plane experience and this is sure to show itself to good advantage in the club's activities.

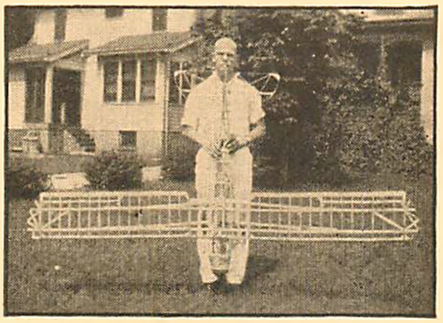
THE Northeast N.A.A. Junior Chapter is the first chapter of junior members to be formed in Philadelphia. Mr. Jesse Bieberman, 3219 East Brighton Street, Philadelphia. is club adviser. Many of the present official records are held by members of Northeast Chapter, most notably the gas engine model record of Maxwell Bassett. We know that we shall hear much from members of this chapter as they are very active in the competitive field. Mr. Bieberman is a model enthusiast of many years experience and has been an ardent supporter of the Open class idea. Possibly he will have a few Open class records to his own credit before long.

HUNTINGTON Model & Glider Club of Huntington, Long Island, has twenty-five active members under the leadership of Mr. James Fusaro, 1439 New York Avenue, Huntington Station, Long Island, New York. One of the interesting features of this club's by-laws is that older members must help the younger ones get started in their building work. This is an excellent provision and will help to make any club an excellent one. It is a little touch of this sort that often makes the difference between just a club and a really fine club.

FRESNO Chaper of Fresno, California. is as active as ever. Virgil Weidner, the club president writes that the chapter is inviting a number of Fresno boys to accompany them on an excursion to Oakland airport and a trip through the Boeing School there and the U. S. Naval Reserve Air Base. The railroad has given the boys a special rate for the occasion. This is an added example of what can be done in the way of club activities. At a recent meeting of the club a representative of Western Institute of Technology spoke on Aeronautic Engineering.

SEATTLE, Washington, is forming a chapter of junior members under the leadership of Mr. W. W. Conner who is Vice-President of the N.A.A. for the Ninth District. There were forty-six boys present at the preliminary meeting and interest in Seattle is unusually high. It is expected that the Seattle Chapter will be in active status by the time this is printed.

THE Pueblo Model Airplane Club is organizing about one hundred fifty members into a Junior Chapter. Anyone who is interested may receive information by addressing the club in care of the Pueblo Chamber of Commerce, Pueblo, Colorado.



Henry Runkel, Bamberger Junior Chapter Member with partially completed gasoline model

BILLINGS, Montana, under the leadership of Mr. Donald F. Sump, Securities Building, is forming an active chapter of junior members. Billings has for several years been the center of model airplane interest for that part of the Northwest. It has been the regional contest point for Montana, North Dakota, South Dakota, and Wyoming and members of this organization have attended national meets in past years. Mr. Sump will be pleased to have interested enthusiasts communicate with him regarding membership.

DENVER, Colorado, has the Junior Aviation League of Denver, sponsored by the Gano-Downs Company of that city. The membership numbers several hundred and is an excellent club. It is planned to form a chapter of the N.A.A. in Denver in the near future with this club taking the leading part. Mr. Lloyd O. Tumblin of the Gano-Downs store is the person to communicate with about membership.

BUFFALO, New York, is forming a new chapter for junior members of the N.A.A. The Buffalo Evening News is sponsor and the club is under the direction of Mr. David E. Peugeot, who will explain the details to anyone who wishes to become a member. The News is planning to send a delegation from Buffalo to the National Championship Meet, June 27-29 at Akron. Mr. Peugeot may be addressed at the offices of the Buffalo Evening News, Buffalo, New York.

DANVERS, Massachusetts, is to be the headquarters of several chapters which are being organized in a number of Essex County cities and towns. Mr. Walter Lilligren, 23 Purchase Street, Danvers, Mass., will be pleased to inform any residents of Essex County concerning the arrangements.

JOIN the N. A. A. as a junior member interested in models and enjoy the benefits of membership in a real national organization with the satisfaction of knowing you are working side by side with the nation's leaders in aviation activities. This association has for its purpose the encouragement and advancement of aeronautics and the determination to keep America "first in the air." Only members of the Association are eligible to compete for N.A.A. model plane trophies and to have their record making model plane flights recognized officially by the Contest Committee. As the representative in the United States of the Federation Aeronautique Internationale, the Association has as a special responsibility the encouragement and regulation of air meets, races, and record trials.

NATIONAL AERONAUTIC ASSOCIATION
DUPONT CIRCLE
WASHINGTON, D. C.

I hereby make application for membership in the National Aeronautic Association as a Junior Member.

I enclose fifty cents for initiation fee and first annual dues. (Use check or money order.)

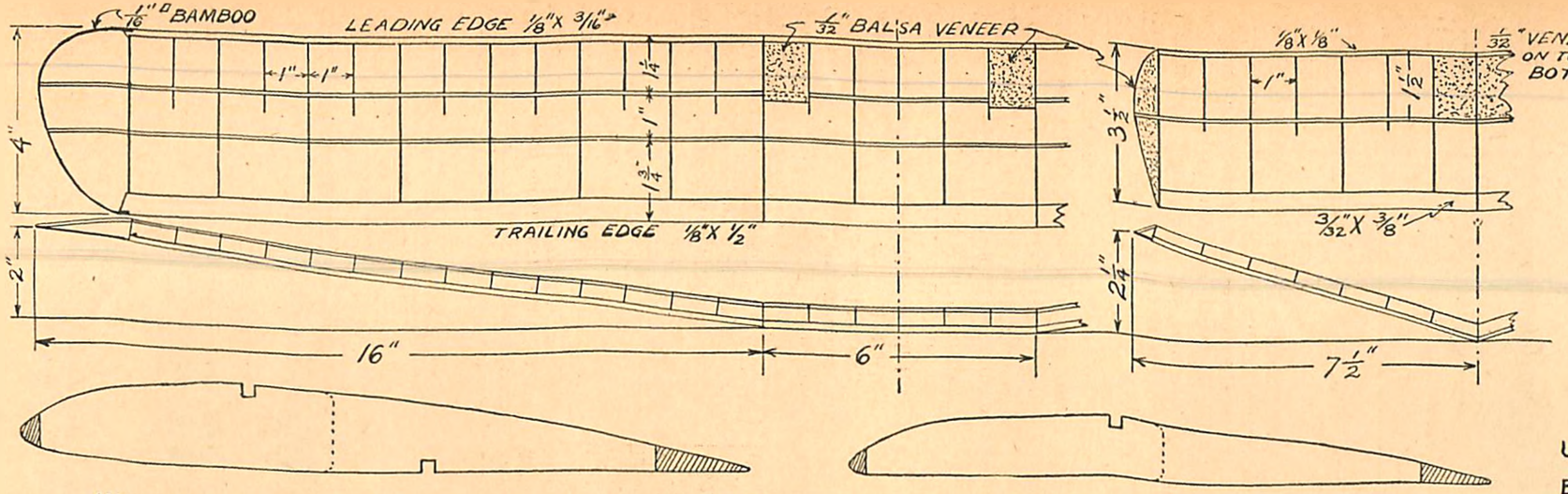
Name .....
(Please print or type)

Street .....

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

Date of Birth .....
(Month, Day, Year)

Approved .....
(Parent sign here, if applicant is under eighteen)



WING AND ELEVATOR COVERED TOP AND BOTTOM WITH SUPERFINE TISSUE THEN LIGHTLY DOPED

ATTACH TO FRAME WITH RUBBER BANDS

USE MEDIUM-HARD BALSA THROUGHOUT ENTIRE CONSTRUCTION

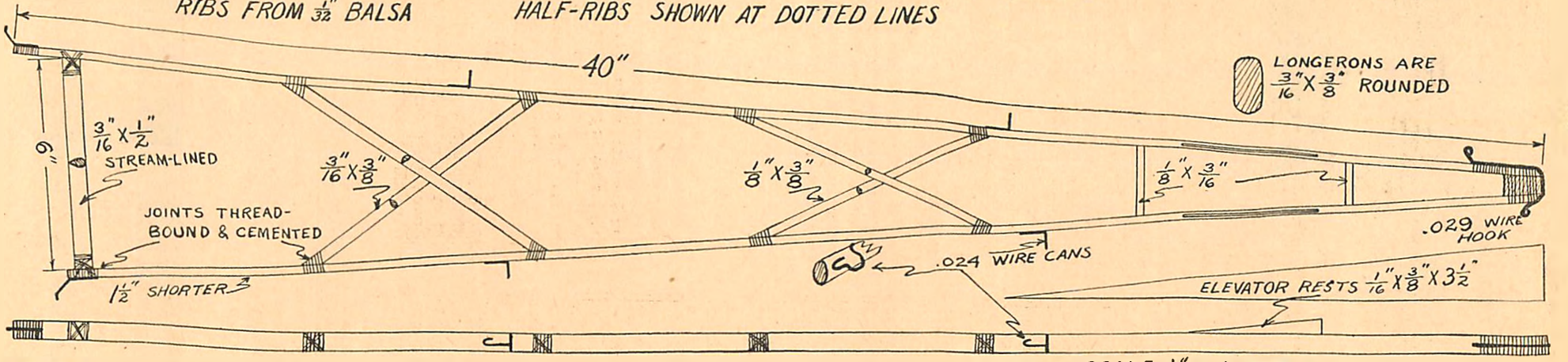
MAIN WING RIB ~ FULL SIZE

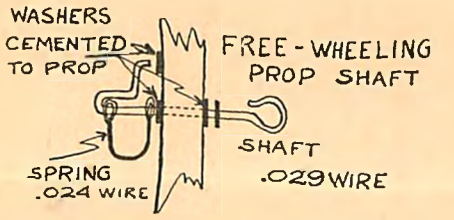
ALL SPARS 1/16" □

ELEVATOR RIB ~ FULL SIZE

RIBS FROM 1/32" BALSA

HALF-RIBS SHOWN AT DOTTED LINES





THIS PERMITS PROPELLERS TO SPRING FREE DURING GLIDE

DUFLON N.A.A. TWIN PUSHER

BUILT AND FLOWN BY ALTON H. DUFLON, JR.

ESTABLISHED OFFICIAL JUNIOR RECORD.

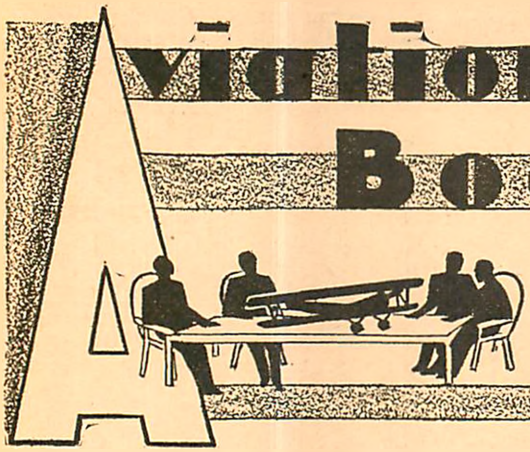
FLEW OUT OF JUDGES' SIGHT AFTER

7 MINUTES 02 SECONDS AT

1933 NATIONAL CHAMPIONSHIP MEET.

~ SCALE 1/4" = 1 INCH ~

PROPELLERS ARE CUT FROM BLOCKS 1" X 1½" X 13". BE SURE TO CARVE ONE RIGHT AND ONE LEFT HANDED. THEY SHOULD BE MOUNTED TO TURN OUTWARD AT THE TOP. POWER EACH PROP WITH 12 STRANDS 1/8 X 1/32 RUBBER. MAY BE WOUND WITH WINDER ABOUT 1200 TURNS. NOTE THAT PROPS OVERLAP.



Aviation Advisory Board

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

It is very encouraging to note the number of questions that our young aviation engineers are asking; they show a great deal of intelligent thought. Thinking for oneself is an art and the more questions one asks the more we know that young men are actually using their minds instead of taking things for granted and believing what they are told without question. It is the purpose of this column not only to answer questions of our readers, but to encourage individual thought and expression. We have some interesting questions this month, which follow.

Mr. C. Rogers of 2856 N. Avers Ave., Chicago, Ill., has asked several questions which we were unable to answer in the last issue. They are as follows:

Question: What is the throttle?

Answer: The throttle of an airplane is the lever in the cockpit by which the speed of the engine is governed.

Question: Is the throttle kept open when gliding?

Answer: No; the throttle is shut so that the engine idles. If the engine were propelling pulling the ship, there would be no glide; for the definition of the word "glide" is, "flying without power except for the pull of gravity."

Question: What is position for take off?

Answer: This question is a little ambiguous. The machine rests usually on its tail skid and wheels headed into the wind down the runway. As it gains speed, the tail is raised so that the body is nearly horizontal, the tail being slightly lower than the nose. When sufficient speed has been attained, the stick is pulled back slowly until the plane rises from the ground. When the plane starts to move at the beginning of the take off run, the stick should be pushed forward in order that the tail is raised into the proper position. Great care must be used in manipulating the rudder or else the tail will start to swing from side to side, eventually causing a ground loop.

Question: How is the motor stopped?

Answer: The motor is stopped by throwing off the spark switch.

Here we have a question from Dominick Osmulski of 3279 E. Thompson St., Phila., Pa., which shows very serious thought.

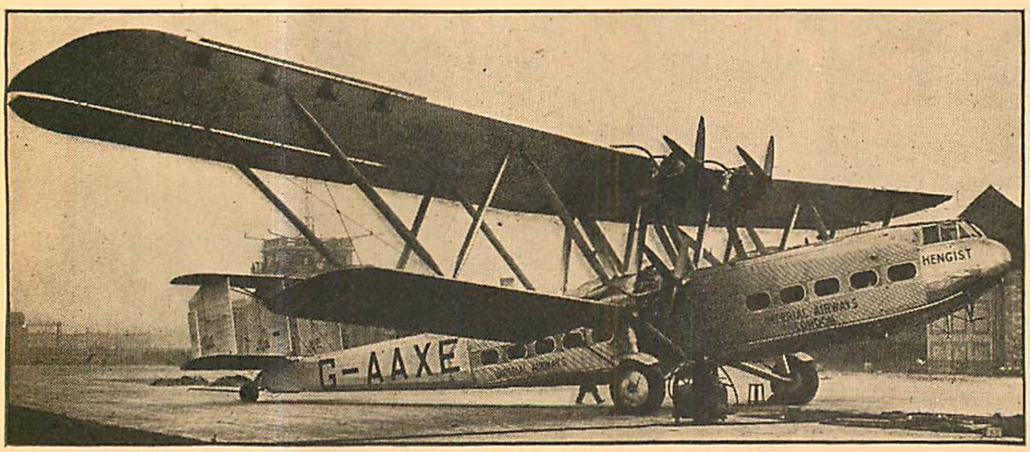
Question: What is the relation between the designing of model airplanes and the designing of real ships? Compare for instance, the similarity of the "Course in Model Airplane Designing" with the designing of large ships. Are the formula on wing area, wing loading, empennage area, etc., similar to the ones used in the designing of large planes?

Answer: The fundamental principles in model airplane designing are exactly the same as in large planes. The only difference is that these principles must be applied in a different manner. Let us take for example the fact that the propeller of a model is larger in proportion to the plane than is the propeller of a large ship. The same principles underlie both cases. The difference is caused by the fact that the model flies faster in proportion to its size than does a large plane. A model could be made to fly with a scale propeller, but due to the excessive proportionate speed of the model, the propeller would have to spin at an extremely high speed. This is obviously impractical when a rubber band motor is used. In order to have the propeller spin more slowly and better serve our needs, the pitch must be increased to about three times the proportional pitch of a large ship. This makes it necessary for us to increase the blade area in order to prevent excessive slip. In turn, the blade area being larger as well as the pitch, it is necessary that we increase the diameter in order that the angle of the blade at the tip will not be too large and our propellers consequently act as a paddle.

The formula on wing loading and empennage area may be accurately applied to models as on large ships. In fact, large ships would be very much more stable if the designers would apply these principles to their "brain children." At the present time the stabilizer area of full size planes is much too small to have the plane right itself quickly and rapidly without the guiding hand of the pilot. Stabilizer areas of large planes are usually 15 to 18% of the wing area. In making them this small, the designer is taking it for granted that the pilot who is controlling the airplane will correct any deviations from the normal flying course. Obviously a model must correct this without a pilot's guiding hand.

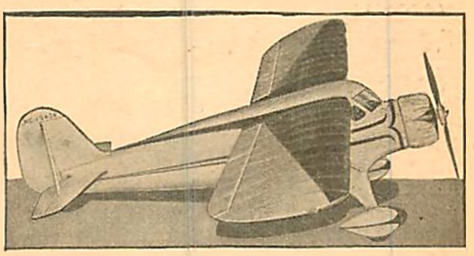
The wing loading on a model is much less than on a large plane, though this fact does not deny the principle upon which it is founded: the principle being that the lift on any wing is proportional to the square of the speed. The speed of a model being much slower than a large ship, naturally the wing loading must be less.

If a model builder thoroughly understands the principles contained in Mr. Grant's course on Model Airplane Design, he will also know the principles governing the aerodynamics of a large ship, for they are the same. The one thing he will not know is how to calculate the stresses and design the parts of the structure. This is structural design, not aerodynamic design.



One of England's greatest air liners, the Handley Page "Hengist" which flies the London-Cape Town route weekly. The trip is made in 11 days. Thirty-eight passengers are carried. Immense bombers of this type are giving England an unexcelled air defense

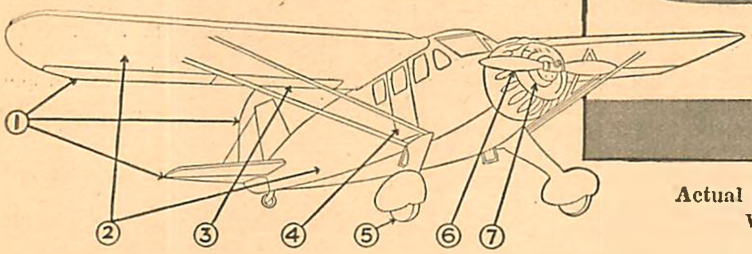
IDEAL presents the greatest advance ever made in Model Engineering . . .

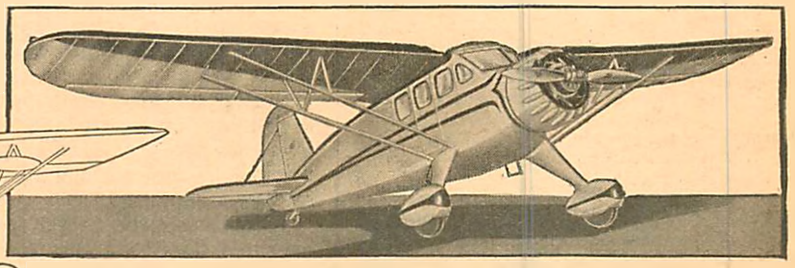


New SuperDetail Model Stinson Reliant Airliner

100% Scale

with exclusive features never before included in Model Kits!





Actual Photograph of the Ideal "Super-Detail" Stinson Reliant
Wing Span—32 5/16; Length—21½; Weight 3½ oz.

The Entire Model designed in exact ¾-inch scale, every detail accurate and with weights shifted for flying to compensate for differences in the center of gravity.

1—Ailerons, Rudder and Elevator can be set in any position desired for flying, and controlled by cables from cabin (see diagram).

2—IDEAL High Lustre Finish on entire model; the new dope that duplicates the finish of the big plane.

3—Adjustable Speed Arresters built into wings to be operated by hand.

4—Movable Door, with SuperDetail Cabin Interior (see small photo) with 4 seats, Control Column and Wheel and Foot Pedals. Cables to movable control surfaces actually operate these controls exactly like the real airplane.

5—Exact Scale Wood Wheels with streamline pants.

6—Two, new design, adjustable pitch propellers; one for exhibition, another for flying.

7—Polished Metal Motor Plate and Balsa Exhaust Ring.

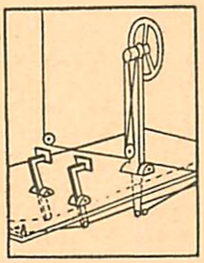
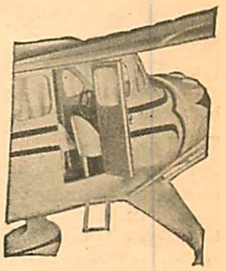


Diagram of Controls which actually operate Ailerons, Rudder and Elevator in exactly the same manner as they do on the real ship. Assembled in one unit and inserted into fuselage during construction. The "SuperDetail" plan shows every operation and explains all the details.

AGAIN IDEAL has put a new thrill into model building and flying with this "SuperDetail" Scale Model. This is no ordinary model airplane! FIRST:—it is an absolutely accurate scale reproduction of the new Stinson Reliant Airliner. Every construction feature of the original is duplicated, and in exact scale! SECOND:—the model has fittings and equipment detail never before attempted in any model. You'll be amazed when you study the diagrams above and read the specifications at the left! THIRD:—this is both an exhibition and a flying model. That's something never heard of before! It is guaranteed to fly when built correctly! And its beautiful, clean-cut appearance, with the yellow and black colorings and glittering high-lustre finish, will challenge the admiration of the most expert model builder.



"Close-up" photo of cabin, with movable door open showing interior arrangement of seats and Control Column. This "SuperDetail" model is 100% perfect—has everything except gas tanks and a gas motor!

Guaranteed to Fly:

AND to build this wonderful model we have designed the most complete and perfect construction kit you will see in a long time. The plan is carefully reproduced from an accurate, engineering blue print, 34" x 44" in size. This plan shows every detail of construction and assembly; with every part indicated and explained fully. The materials and fittings are complete, too. 7 sheets of plainly printed balsa; 45 balsa strips of various sizes; 3 sheets of silk tissue; cement, both colored and plain dope, propeller shafts, two propellers with adjustable blades and separate hubs, motor plate, rubber motor, wheels, exhaust ring, cable cord, and all the other hooks, pulleys, control horns, hinges, eyelets, washers, sand paper, tape, celluloid, reed, wire and other small but necessary things to make the complete model exactly in accordance with the plans and instructions.

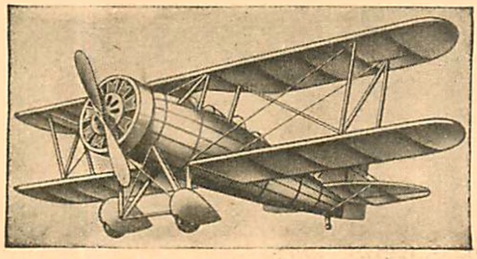
This "SuperDetail" Model is the result of our determination to develop a really superior type model airplane. We believe that when you have completed this Stinson Reliant you will have one of the most advanced models that has ever been designed. The complete Kit containing everything to build and decorate the model, with all the fine details as shown above, sent to you fully postpaid for only **$2.50**

(West of Denver, Colo. price is 25c extra)

Ask your regular Model Airplane Dealer for the new IDEAL "SuperDetail" Stinson Reliant Airliner. If he hasn't this remarkable model in stock, send your order direct to us.

Send a 3c Stamp for Bulletin-Catalog

containing full descriptions of the entire IDEAL line of Model Airplanes, Model Boats, Supplies, Parts and Materials.



"Tru-bild" takes trouble out of Model Making!

Build models the "Tru-bild" way and save time, trouble and broken parts. Your choice of four, large 16-in. Flying Models, each in a "Tru-bild" Kit with everything required. Select from these popular ships and get a real surprise when you see how easily and quickly you can build this new, simple way:—

NORTHROP GAMMA — VOUGHT CORSAIR V-65
BELLANCA MONOPLANE — CURTISS CYCLONE HAWK

Any Kit 50c—plus 10c postage

Ideal Aeroplane & Supply Co., Inc.

20-24 West 19th Street, New York, N. Y.

Pacific Coast Branch: Model Boat & Aircraft Co., 1356 Fifth Avenue, San Diego, Cal.
Canadian Branch: Canadian Model Aircraft, 3007 St. Antoine Street, Montreal.

Russia Spreads Her Wings

(Continued from page 5)

was the Personnel Section of the Red Air Force to find 5500 young men, all aviation enthusiasts, from whom they could get 1100 fit to train as fighting pilots? And beside this, there was the question of finding more aviation enthusiasts for observers, machine-gunners, designers and experimental pilots who would tinker with new and queer-looking mechanical bugs before they were pronounced safe for the average flyer.

It was in cases like this that the Soviet organization came in handy. The Red Air Force reported to the Supreme Economic Council that it was important that the people of Russia should become air-minded. The Supreme Economic Council's first short-cut was to offer airplane trips, at the government's expense, as prizes for good work in school, for good work in factories, for good work on farms—for everything in fact, as long as they made it an honor to fly. Then they passed the rest of the report along to the Commissariat for education.

Now, under the Soviet system, everyone goes through a three-year course in what is called the Technicum, like our high-schools, with the difference that the Technicums are trade-schools. Graduation from the Technicum is followed by three years' practical experience in whatever branch of industry the student chooses, before he is allowed to enter a university.

With this set up in mind, the plan adopted by the Education department was both wonderfully simple and simply wonderful. They added courses in airplane modeling to the studies in the Technicums.

At first it was clumsily and haltingly done. The first year students in the Technicums began with stick models and as their instructors didn't know any more about the business than they did, the models mostly wouldn't fly. But the Russians were not afraid to make changes, and things improved rapidly. Meanwhile the general Russian aviation society, the Osoaviakhim, was organized. It opened a branch for the promotion of model planes, and offered prizes for the best models and longest flights; some of the prizes being airplane trips, of course. Meets among the students were organized, one school against another, like athletic meets, and finally a big annual meet, where the prize models and model builders from all over the country came together. Last year this annual meet was at Moscow and hundreds of students participated. And with all this competition going on, it was just too bad for a model-teacher who didn't know his business. The teachers began to burn the midnight oil in an effort to improve their models.

Meanwhile the students were progressing through the Technicums, advancing from the stick models to genuine flying models, which had to be really carefully designed, with all the attention to aerodynamics, weights and balances that full-sized planes demanded. Toward the close of the five year plan, things were moving so well that the first courses in model building were moved down into the primary schools and the three year course in the Technicums devoted entirely to flying scale models.

The result of this system is that after his three years in the Technicum, the student comes out with a good working knowledge of aerodynamics, and as he has probably been taking mechanical courses at the same time, he knows a good deal about aviation engines, too. The real enthusiasts, who wish to go into aviation, now go into an airplane factory, or join the ground crew of a flying field, or if they can pass the tests, become student aviators right off the bat. And a remarkable feature of it is that girls as well as boys are accepted; in the Red flying services you will find as many girl pilots as men.

Thus all these young air enthusiasts reach the age of university courses with several years of model building, several years' training in motors and aerodynamics, and a couple of years' flying experience behind them. The star pilots are drafted off into the fighting services at this point; the others become test pilots, instructors, or work on the commercial airways that now crisscross Russia in every direction and have already made it second only to the United States in the extent of its commercial air lines.

Of course it's easy to see that with this background the Soviet air service is going to be one of the best and most elaborately trained in the world some day. But it is also a good idea to remember that most Russian plans sound great in the telling, but are a little apt to develop kinks when they are put into practice, and this one is no exception. The first kink is that the plan was started only five years ago and the first crop of model-trained flyers is just getting into the factories and pilots' schools now, and it's rather a small crop.

That is one kink time will cure, but the second one is more serious. And it is this—that nobody knows or can find out just how good the Russian aviation service is, not even the Russians themselves. The factories, airports and research institutes are all established at different places around the country and each one operates under its own power exclusively. Since there is no competition in prices, the Soviets have them compete for honors to keep them on their toes. Now the Russians are a secretive race anyway and with every factory competing against every other factory, every training field against the rest, each of these organizations carefully guards all the secrets it has, hoping to surprise all the rest some day with a sudden and startling exhibition of efficiency.

The result of this sort of thing became apparent as soon as the new planes began to come out. The first machine to be put in mass production was the D.H.9. Everything went as smooth as silk; within a couple of years over 2000 D.H.9s were out of the factories and the newly trained Soviet pilots began to fly them. And then came the pay-off—they cracked up right, left and in the middle. Was it due to faulty construction, inexperienced pilots, or poor ground service? Nobody knew, nobody could find out and all the organiza-

(Continued on page 40)

ALREADY OVER HALF

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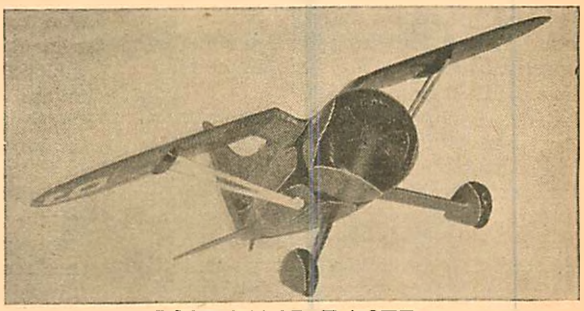

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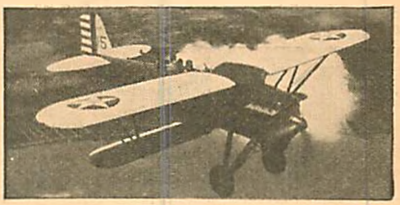

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How the Aeroplane Was Created

(Continued from page 24)

struction and falls free independently and having attained some success with his last model, there arose a friendly rivalry between the two. Farman proved his mettle, however, by beating Bleriot in a race from Bouz to Rheims, Oct. 30th.

Santos-Dumont came forward with a very distinct innovation in his tiny Demoiselle, when on Sept. 14th, he made his first public flight in it, attaining a speed of four and three-quarter miles in five minutes. It was just seventeen feet in spread and hardly more than a pair of wings, rear rudder outriggers and a small basket contrivance for the pilot, slung underneath. Equipped with a Darracq twin cylinder motor, it took off in the short distance of only sixty-five feet and showed fine stability and ruggedness. Later in the year he made a new duration record of better than eight minutes in the same Demoiselle, and from this point on new records were made in rapid succession.

Levavesseur, a Frenchman, in this year also, designed a very fine type of monoplane similar in general appearance to that of Bleriot, and equipped with an Antoinette motor; it became known generally as the "Antoinette." It was in this machine that Hubert Latham made a new duration record of more than 37 minutes.

So rapidly did the new art of flying progress, that at the Rheims Aviation Meet in 1908, there were 38 machines assembled with representatives from many countries. It was at this meet that the Wright machine made a new duration record of two hours and twenty minutes, beating all previous marks, and Curtiss defeated his rival Bleriot, in a new record for speed.

Louis Bleriot, always alert to new ideas, developed something entirely new when he built the first taxi-plane in 1909. This was conventional enough in general design but it had a box-like cabin entirely enclosed to house the passengers, placed behind the pilot's seat and equipped with windows; it certainly was of a prophetic trend. That it had other qualities was demonstrated when he carried Santos-Dumont and Farman, both as passengers on June 12th.

This same year saw a keen rivalry arise between Latham and Bleriot for the honor of being the first to cross the English Channel. After long preparation, on July 19th, Latham made the first attempt to cross the Channel, but after negotiating only seven miles of the course, he was forced to descend to the water by reason of motor failure. He was picked up by a vessel detailed to guard against such an emergency, and his machine salvaged. After a complete overhaul it was made ready for another try. Meanwhile, Bleriot, who had disappointedly witnessed his rival's first attempt, was being held to the ground nursing a broken ankle which he had sustained as the result of a crash. Latham's Antoinette was ready and the pilot only awaiting better weather, while Bleriot, fearing that further delay was advantageous to his rival, decided to tarry no longer and on July 25th, despite his painful injury, he arose at daybreak and after carefully checking his motor and aeroplane, took off and soon was in the air above Sangette, headed for the chalk cliffs of Dover. His motor ran faultlessly and within thirty-seven minutes he had crossed the English Channel and landed at Dover, England, to receive the plaudits of an astonished world.

This feat was all the more outstanding when it is considered that it was practically all over the water and was made by dead reckoning alone. Without question, this single flight of Bleriot's alone was enough of a claim to fame, but aside from this, he was a great man. Undoubtedly, this flight did much to place the flying machine in a new and important position as an invaluable adjunct to a new era just dawning.

As proof of this, witness the action of the British Government in appointing a scientific committee as a consultative board to further the development of the science in England and British territories.

So, with this epoch-making feat, the aeroplane seemed now to be an established success and from this time forward, the science grew by leaps and bounds, with new designs of machines and motors the order of the day. As a result, each year brought forth new feats of daring and accomplishment. Our next chapter will show just how rapidly these changes took place.

Fundamentals of Model Airplane Building

(Continued from page 9)

cardboard and the curve of the wing are alike. When both match each other all along the wing, it has been properly shaped. At the same time, sand its curved ends and taper the top side of the wing down to meet these edges, as shown in the edge view of the wing in the plans.

Study this edge view of the wing. Note that at the left appears the dimension 1" with the word "Dihedral" following. This means that the wing is given a 1" dihedral or if given in degrees, as shown in the plan also, it indicates that each wing is set at a 6 degree dihedral angle. This means that the tips of the wing are 1" above its center, or that the angle formed by raising the tip is a 6 degree angle. This is done to promote stability. Dihedral angles are usually given in inches for models, as such dimensions are easier to work from.

To obtain such an angle in the wing, it must be cut in the center to permit the tips to be raised. Find the exact center of your wing, and draw a line from edge to edge at right angles to the front (leading) edge or rear (trailing) edge. A knife cut is now made along this line, sinking about two-thirds through the thickness of the wing. Care must be taken not to cut all the way through. This cut is then widened into a V with sandpaper. Note the enlarged view of this in the plan just above the edge view of the wing. This V permits the tips to be raised and will slowly close the slot as they are brought into position.

The easiest method of obtaining a dihedral in a wing is to hold one side flat on a table and raise the other until its tip is twice the required dihedral above the surface. For example, our wing calls for a 1" dihedral meaning that both its tips must be raised 1" above its center. By holding one tip on the table and lifting the other until it is 2" off the table, both tips will have the required 1" dihedral when the wing is in level flight position.

As it is often difficult to hold a wing in such a position while the cement binding it is drying, the author has designed the small dihedral block shown in Fig. 3. Cut a block of wood 6" square and saw along a diagonal line drawn from one corner to another. Lines are then ruled along its tapering top to indicate 1", 2", 3", 4", 5" and 6" heights with other lines drawn between these one inch lines to indicate half-inches. To obtain the dihedral of our wing, place the wing flat on a table, hold one side flat in place and push the dihedral block under the tip of the other until the tip rests at the 2" line, as shown in Fig. 3.

Cement is then applied along the V-shaped cut in the center of the wing and the wing left in place until dry. The cement may be applied with a sharpened match stick in this case. In the plans under "Section A-A," a front view of the joint formed by the wing and the top of the nacelle is shown. The straight top portion of the nacelle must be cut in the form of a shallow V to fit the shape of the wing. This is done with sandpaper.

The model is now assembled. Cement the nacelle in place on the stick. The foremost tip of the nacelle must be in line with the front end of the stick, as shown in the plans under "Side View." In the same view, note the position of the wing on top of the nacelle, which is shown in dotted lines. The groove in the top of the nacelle is coated with cement and the center cemented portion of the wing placed in the exact center of the nacelle with 1/8" of the wing protruding beyond the front of the grooved section. This is also shown under "Wing Position" of "Plan." When the cement is thoroughly dry sand the whole assembly with No. 00 sandpaper. The rudder is now cemented in the exact center of the elevator and should be tested to see that it and the elevator form right angles. Then this tail assembly (the elevator and rudder) is held in position with a rubber band. The notch made in the trailing end of the stick is to accommodate the rear end of the rubber band. If you do not know how such a band is attached, refer to the May article in which this is described.

In the "Side View" of the plans, the letters "C.G." appear with an arrow pointing down the side of the nacelle. These

(Continued on page 42)

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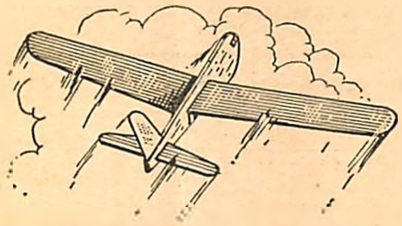

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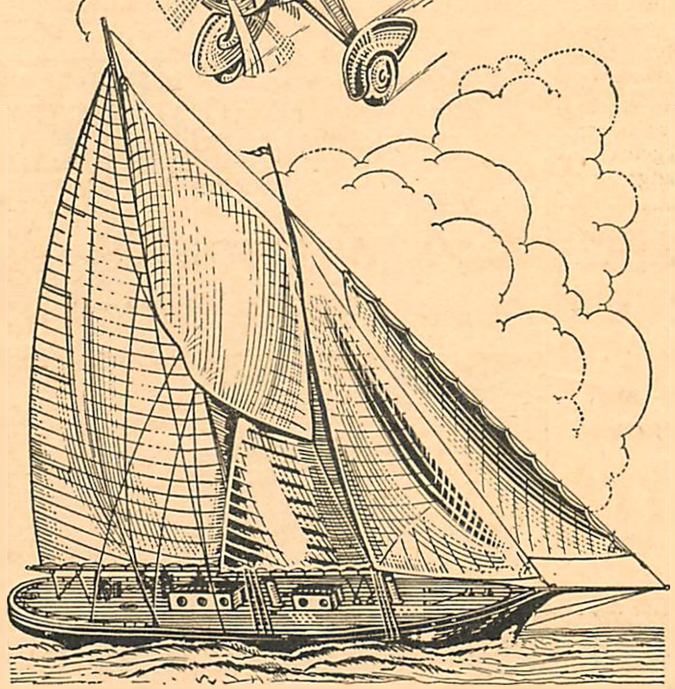

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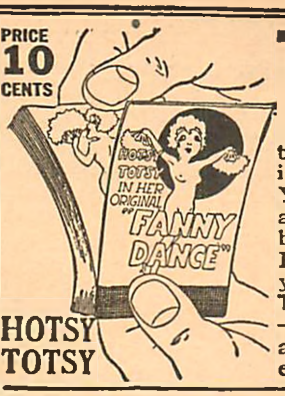

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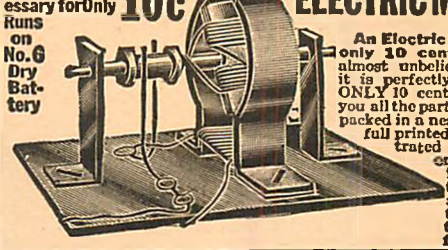

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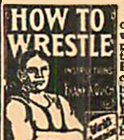

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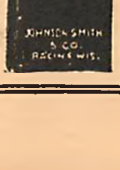

The Albatros Fighters On Parade

(Continued from page 12)

Ailerons were employed on all wings, two on the upper and one on each lower wing. A steel strut was attached to the upper and lower ailerons. At the tail a steel brace joined the vertical and horizontal stationary fins.

The landing gear was composed of two pontoons of 1100 liters each, air capacity (1100 cubic decimeters), shaped flat underneath in front, stepped and tapered rearward to a point.

This machine was also equipped with the 160 h.p. Mercedes engine and attained a horizontal speed of approximately 100 m.p.h.

The capacity of the fuel tanks carried was 73 liters in each of its two tanks (app. 37 gals.), and 13 liters of oil (app. 3¼ gals.), with which it could fly for three hours. The machine-gun arrangement was the same as in the foregoing types. The weight of the W-4 was 775 kilograms (app. 1550 lbs.) and considered noteworthy in being capable of carrying 250 kilograms (app. 550 lbs.) "pay load."

The L.20, better known to us as the Albatros D-3, was produced in the fall of 1916, during the time when the French single seater Nieuports had become a real menace to the morale of Germany's pursuit pilots. The D-3 is quite familiar to most of us, for this machine became famous by having participated in many important battles from the date of its production up until the close of the war, even after succeeding D types superior in speed had been produced. Manfred and Lothar von Richthofen used this type very effectively. With no injustice to the Albatros types, however, the D-3 was the last Albatros Manfred used in pursuit flying before the famous Fokker triplane was presented him.

The D type Albatros begins to appear more like the smooth streamlined fighting craft that is most pleasing to the eye as we notice the D-3. This machine rather suggested its capabilities by its appearance. The nose of this pursuit may remind us of the modern Ryan monoplane made famous by Lindbergh. Quite a similarity existed between these two ships at this section.

The fuselage of the D-3 was of the same construction as the D-2.

The wings of this type presented a marked improvement over the preceding types. The trailing edge was now exceeding the length of the leading edge on both upper and lower wings, contrary to the squared effect of wings on the D-1, D-2 and W-4. The chord of the lower wings was shorter, and this arrangement was similar to the "wing and a half" effect of the French Nieuport.

The wings on the D-3 were supported by V struts, also similar to the Nieuport struts. Now to make the demands on the point of contact, the V strut had very little depth. It should be pointed out that, due to a special arrangement of the guy wires, this machine could fly without the nose cables in case these were shot away.

This machine displayed considerable ability in flying with a muffled engine, it was well liked for its ability to climb and for its ease of navigation. The engine employed in this type was also the 160 h.p. Mercedes, and the speed was approximately 125 m.p.h. The fuel tanks contained 78 liters in the main tank and 24 liters in the auxiliary (app. 20 gals), with which it could fly for about 1½ hours.

The radiator, a Teves & Braun design, was also set in the upper wing just as in the D-2. In every other detail this type was the same as the D-2. Probably owing to the similarity in wing outline this type was dubbed "the German Nieuport."

Eastern States Outdoor Contest

(Continued from page 24)

resumes flight within ten seconds, time shall not be interrupted.

Fuselage Endurance Contest

The model must have built-up fuselage covered over at least 90% of its surface. The fuselage must have a maximum cross section area at least equal to 1/10 of the model's length squared or $(L/10)^2$. Length in this case is taken as the overall length of the model, not including the propeller. Model must have main supporting surfaces (wings) of 100 sq. in. or more, but not more than 150 sq. in. in effective area. The complete model, ready to fly, shall weigh not less than 1 oz. avoirdupois for each 50 sq. in. of effective wing area. The motor shall be contained entirely within the model. Outriggers and boom may be used on fuselage type models. The fuselage should be a construction which supports the motor, wings, empennage, and landing gear.

Stick Model Endurance

Any model which does not come under the classification of fuselage model, gas model or scale model, may be flown in this event, subject to the following qualifications:

It must have 100 or more sq. in. and not over 150 sq. in. of wing area. It shall weigh, complete and ready to fly, not less than 1 oz. avoirdupois for each 50 sq. in. of effective wing area. This model must be hand-launched.

Gas Model Endurance

Any model powered with an internal combustion engine may be entered in this event, with the following limitations:

The total weight of the airplane shall not exceed 7 lb.

The amount of fuel carried is not to exceed ⅛ oz. per lb. The term "fuel" is interpreted as the mixture which is forced into the cylinder or cylinders.

Let your model building friends and club members know of this All Eastern States Outdoor Meet. Send to Universal Model Airplane News, 551 Fifth Avenue, New York City, or to Mr. Irwin Polk, c/o Bamberger Aero Club, Market St., Newark, N. J., for registration blanks and further information. Stamped, return addressed envelopes must be sent with your request.

Russia Spreads Her Wings

(Continued from page 32)

tions concerned passed the buck along to the rest.

It is the same with the other machines and the flying lines. One factory, when it gets the plans for a new plane, will introduce some small modification, to make it fly better or build easier. This brings out a difference in performance between these planes and the same type of plane built in other factories, though outwardly they are just alike. So that if you take fifty Russian D.H.9s, you will have as many as four different sets of performance.

This much is certain, however—that the service has been going ahead at a rapid rate. They have removed the grief from the D.H.9 in one way or another; there are few crack ups now. The ground crews have steadily improved; both army and navy planes have gained experience at formation flying, especially at long distance formation flying. And most important of all, the new machines designed by Russians, have been coming into production.

The one that has made the greatest stir is the ANT-14, a monster four-motored bomber, developed by Russia's best research man, A. N. Toupolev. It has four 650 h.p. motors and can walk off with several tons of bombs. The ANT-14 has already been in mass production for some time and the best reports indicate that there are at least a couple hundred of them ready for action. Performance data is uncertain, but it can be taken that they are an extremely airworthy craft, quite as good as the Junkers G-38s which the Japanese are using for similar work. Next in line behind them, come several hundred R3M5s, a Russian development out of the D.H.9 design, two-seater fighters and light bombers, all-metal. These mount a single Liberty or Lorraine motor and carry three guns.

In pursuit aviation, the Soviets are not so far advanced. According to the best data available, they have just about managed to keep pace with the 342 pursuit planes their five year plan called for. The machines are all of the same type, a small biplane, all-metal. Now an all-metal pursuit ship may be a bright idea but it hardly seems that their performance is good enough to enable them to match the fast pursuit planes being produced elsewhere.

But this very fact points to one of the most striking characteristics of the new Red Air fleet and affords a glimpse of the kind of aerial warfare the heads at Moscow are counting on. All the vital industrial centers, all the army bases, all the important railroad junctions in that vast land, are many miles inland, far from the frontiers, almost impossible for enemy bombers to reach. The Soviet is not worried about being bombed, so it doesn't care very much whether it has pursuit aviation or not.

But it cares a great deal about bombing other people. Thus, although there is barely enough Russian pursuit to cover the operations of the bombers, there are enormous squadrons of the light R3M5s, which can be either day bombers or observation planes, and behind them any number of the giant ANT-14s. This layout can mean only one thing—that the Soviet is planning an air war consisting of bombing raids and more bombing raids thrown in for variety. The Russian bear is going to fly like a bear with wings, slowly and ponderously, but when the bear's paw comes down it will crush anything it hits.

How to Build a Russian Fighter

(Continued from page 14)

boo for the wing tips. Now finally cement in place the upper spar and the 1/16" sq. braces for the wing tips. After these are left overnight to dry, cement the left and right top wings to the center section, giving them a ½" dihedral at both tips. Then sandpaper and cover the wings, using banana oil for adhesive.

Struts and Assembly

Cut out and streamline all struts according to plans, using medium hard balsa.

Having noticed how struts break loose from their connections, I have found that a tiny splinter of bamboo forced into the end of a strut will strengthen it considerably. You will also find this very convenient for assembling the model.

First cement in place the entire landing gear and the wire shock absorbing axle. Wind thread around axle to prevent it from twisting off on a heavy landing. Now cement in place both tail surfaces, being careful to line them up correctly. The center section struts are now cemented in place and when they have dried slightly, cement the other ends of the struts on to the center section of the wings, also being careful to line them up from the front, side and top views.

You are now ready to put on the bottom wings and outer bay struts, which you will do with utmost care.

Finally put on a pair of 1½" diam. wheels on the axle and cement washers at the end of same to keep the wheels from coming off.

You may now put in all the scale effects such as: flying wires, celluloid windshield, red stars for insignia; and for the nose, the small shutters, and the radiators which should be made of very light balsa. If you desire, you may cut out the front view of the radiator from the plans and cement it in front of the block.

The propeller is put on the motor stick and is powered with four strands of ⅛" flat rubber. If the model is made heavier, use four strands of 3/16" flat.

If this model is made exactly to plans, you will undoubtedly get unusually high performance in flying. If the model dives, warp up the elevators; if it stalls, either warp them down or add weight in the nose; if it banks over on one side due to propeller torque, warp the wings of that side up.

If the model still does not perform as you had expected, kindly write to the editor in care of this magazine, and explain to him the actions of the model in flight. He will gladly straighten out your flying difficulties.

The Aerodynamic Design of the Model Plane

(Continued from page 19)

fly faster because of the greater weight. Actually, it will fly twice as fast. Greater power has been provided to insure the greater speed. Now you wind her up and launch it, the adjustments being the same exactly as in the case of the first 1 oz. model. Well, what happens? Much to your surprise and bewilderment the ship speeds away, nosing up sharply into a steep climb and *stalls*. You think that something has been forgotten; the adjustment was slightly different perhaps, so you check up on the adjustments and try it again with the same result; the ship stalls.

There is one obvious thing to do for stalls, so you do it. That is, move the wing back a little so that the center of gravity is actually nearer the front edge of the wing. Another trial produces a good climb without a stall and you are on the point of rejoicing when the power runs out and the model goes into a very steep glide. That does not seem to be "so good." The first model didn't do that. Well you ponder and sweat over the cause of the difficulty but without avail. The model seems to be disobeying all the rules you have learned from books and experience. What is the matter? Let us see if we can uncover the secret.

First we will tell you what to do to correct the trouble, and then explain the reasons. You can do one of two things, either reduce the difference in angle between the wing and stabilizer to one-half the amount you have now, and increase the stabilizer area as explained in previous articles dealing with changes in stability angle, or you can double the length of the stabilizer moment arm, without changing the area of the stabilizer. When you have done either one of these two things, your fast model will fly exactly like the lighter and slower model in regard to climb, recovery at the crest of climb and glide.

The reason for our difficulties is obvious if you examine fig. No. 98. In the case of the first plane, the stabilizer is set at an angle to the wing of 3°, for instance, which causes the ship to nose up under speed, following the arc as shown by the dotted line. When the plane reaches point (H), its momentum is nearly spent and it slows down. This causes the nose to drop gradually until the plane assumes its normal flying position again and proceeds on its way in level flight.

What happens in the case of the second plane traveling at twice the speed? The stabilizer angle, moment arm and area are the same as in the case of plane number one. Because of this it passes along the same arc, shown by the dotted line, as the first and slower ship. However, because of its greater speed, it does not lose its momentum and stop at (H), as the first plane does. It continues on past point (H) along the arc, indicated by the dotted line, to point (H′). At this point, the momentum due to the greater speed is expended.

Now let us notice the attitude of the ship relative to its normal horizontal flight position. In following the flight arc past point (H), it has nosed up at a steeper

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Fundamentals Of Model Airplane Building

(Continued from page 36)

stand for "center of gravity," or in other words, the glider must be made to balance evenly at this point. This center of gravity comes in the exact center of the wing, as shown in the top plan view of the wing.

The nose or forward portion of the stick, is now wrapped with soft wire until the glider is properly balanced. As will be seen in the accompanying photographs, as well as in Fig. 4, a common wood screw is held on the stick with rubber bands as another means of gaining necessary weight at the nose of the glider. Either method may be used.

In Fig. 4 is shown how the glider is tested for balance. Place the finger on the exact point (marked "C.G." in the plans) on the underside of the stick. Place the thumb under one wing to aid in balancing. When the model stands level at this balancing point, enough weight has been added to the nose.

If the glider has a tendency to dive, a small elevation block should be thrust under the elevator at point "E," which is shown in the plans under "Side View." In our first glider which will be found in the May issue of UNIVERSAL MODEL AIRPLANE NEWS, complete instructions for making and using such a block will be found on Page 45 under "Balancing." This completes our second model and the builder will find it well worth the time and effort used in its building.

Next month Mr. Hamilton will give instructions and plans for building a Contest Glider.

On the Frontiers of Aviation

(Continued from page 7)

Build a Solid Wood Scale of the Curtiss Raven

Balsa wood or white pine may be used in the construction of the model. Draw the top view of the wings and horizontal tail surfaces and cut to shape with sharp chisel and razor blade, referring constantly to cross sections. Next shape out rudder, fin and fuselage in same manner.

The fuselage is probably the most difficult part of a model to construct because of its many irregularities. After having cut around the top view outline of the fuselage, you will then have to cut around the side view outline, drawn correctly on the fuselage block. Next round out the fuselage, referring constantly to cross sections. The stub wing, which encloses the retracted landing gear, may be made as a separate unit if you desire to do so. Hollow out the stub wing and fuselage so the landing gear may be retracted. A sharp chisel or pen-knife will be sufficient for hollowing out the landing gear. The wheels may either be purchased or made. The fairings over the wheels, cut out of wood with a razor blade, should be "cupped" on the inside in order that the wheels will fit "snug." Ambroid should be used for all joints except where landing gear pivots, which point is at the uppermost part of the vertical landing strut.

This pivot may be made by using a small pin as an axis and wiring the rest of the landing gear to it, the pin in turn being wired to the stub wing. Wire the landing gear firmly, but still loosely enough for the wire to slip around the pin easily.

A fine grade of thin cardboard may be used for the ring around the engine. The cardboard should be dampened and then dried so as to keep its circular shape.

Sandpaper all wood parts with coarse and then fine sandpaper to give the parts a very smooth finish. Next cover each piece with several coats of dope, waiting for each preceding coat to dry before applying a second.

Using plenty of ambroid, begin the assembly of the model. Connect the wing to the fuselage with wood struts made with a razor blade first and then the tail surfaces, one at a time. Be very accurate. Connect up the "prop." Construct the cockpit enclosure with thin strips of wood and put in isinglass for the windows. Connect all other miscellaneous parts.

Touch up all connections with ambroid and dope and the model will be finished.

Microfilm

(Continued from page 13)

different films. The amount that is usually needed to make enough microfilm to fill the larger of the two hoops mentioned, is about half a teaspoonful.

Next comes the choice of an adhesive for applying the microfilm. The ones most generally used are diluted rubber cement, gelatine and water solutions, and saliva. The last mentioned is by far the lightest of the three when dry, and is used by most of the record-holders.

When you are making your wing frames, make them in sections; two sections for a simple dihedral wing and four sections for a polyhedral wing. (Fig. 2.) This greatly simplifies covering as these divisions are covered separately and then assembled as shown. 1/32" square balsa strips are used to brace the end ribs so that the microfilm can't distort them during the covering process.

Now for the covering procedure. The method of applying film to tail surfaces and other flat or slightly curved surfaces is very simple. Take the frame of microfilm to be used and support it between two chair backs. Next coat the balsa framework with adhesive and lay it on the film. Run your finger lightly around the balsa rim to make sure that it is sticking at all points and then hang the frame of microfilm up out of the way. Leave it there for ten minutes until the adhesive dries and then cut the tail surface loose with a hot wire or solder-iron.

To cover a highly cambered wing section, wet the spars and end ribs liberally with adhesive. Put the framework on a table and then moisten the surface surrounding it with water. Now take a hoop of microfilm of the right thickness and place it over the balsa outline, so that the metal rim rests on the table. Blow down on the film outside the wing section and it will stick to the table top. (Fig. 3.) This tightens up the microfilm over the wing and brings the film into contact with the leading and trailing edges. If the microfilm does not touch the spars all along their length, either blow down on it or press it lightly to the wood with a wetted finger. Leave the wing in the same position until the adhesive dries and then cut it out as before.

Next in importance to knowing how to make and apply microfilm, is knowing how to treat and repair it, so let's take a look into this branch of the science.

When covering your outdoor planes, what do you do if you don't get a "perfect" covering job? Why you dope it, of course. Believe it or not (apologies to Mr. Ripley), you can do the same thing with microfilm without adding any extra weight. To remove any wrinkles or sags from a covering, simply play a hot iron under the affected part (without touching it) and you will get a smooth, taut surface almost at once. If you want to renovate a whole wing covering by means of "heat treatment", use the heat rising from an electric toaster or from an oven and you will get better and quicker results.

No matter how carefully microfilm ships are flown or handled, the covering usually loses some of its "skin" after a

(Continued on page 44)

Microfilm

(Continued from page 43)

few bouts with the girders or with careless coatsleeves. Repair these holes with patches. Patches are made by burning slits in the microfilm sheet with a hot wire or soldering iron around a segment of film of the size desired. To repair a tear, wet the microfilm surrounding the hole in your wing with water. Now hold the frame containing the patch so that the repair film is directly over the hole and then blow it down over the hole in the wing. Cut the strands of microfilm between the burned slits, which support the repair film and presto, the hole is gone! These repair jobs are hardly noticeable after heat treating. Emergency patching jobs can be made at contests by using a lighted cigarette as a cutter and a source of heat treatment.

And now for a few don'ts.

Don't use microfilm until all the water has evaporated from it.

Don't pour the solution on to the water from any higher than one inch. It causes holes in the film.

Don't allow the water to become dirty. It weakens the microfilm.

Don't lift a sheet until it is absolutely dry. The film tightens on the frame and breaks.

Don't cut too closely to the balsa when you are trimming microfilm or you will burn the spars.

Now that you know something about microfilm, let's see what you can do to some of those indoor records.

The Aerodynamic Design of the Model Plane

(Continued from page 41)

angle before recovery tendencies begin to act. Thus the righting *couple* of the force of gravity acting straight down, arrow (G), and the corrective force on the tail, is smaller than in the case of the slower plane at (H) which is at an angle not so steep. Also, in order to right the faster plane at (H'), the recovery forces must turn it through a much greater angle before it will resume normal level flight in direction (D).

It is possible that the faster plane might recover at the crest of its climb, but in such an event it would over-recover and dive steeply as indicated by dotted line (K). However, usually a plane would stall under such conditions. Actually, in order to have the faster plane climb and right itself at the crest of its climb, it should not assume a steeper angle than the slower plane at the crest of its climb where the recovery forces begin to take effect. We know that the faster ship has twice the speed and therefore will reach about twice the altitude of the slower plane before it loses its momentum. At this higher point, according to the conditions of our problem, plane No. 2 should be at the same angle with the horizontal as plane No. 1. In fig. No. 98, line (XY) is at the same angle as line (AB) and point (V) on line (XY) is twice the distance above the ground line as point (H). Now if we draw an arc from (P) of such a degree of curve that its tangent, where it crosses the line (H'V), is parallel with (XY), or is (XY), then this arc is the path plane No. 2 should take when starting a flight. It indicates that at any point a given distance from (P), plane No. 2 is climbing at about half the angle as plane No. 1, at a corresponding distance from (P) on arc (PM).

The only two changes in the design of plane No. 2 that will cause it to follow arc (PX) are the changes mentioned at the start of this analysis, namely:—

1. Reduce the angle between wing chord and stabilizer about one-half when the speed is twice as great, as in this case.

2. Double the length of the moment arm (M) of the stabilizer.

The latter is the best system to follow if possible, for while the longitudinal stability factor is maintained at the same value, yet the plane will climb at about one-half the angle. Fig. 98 shows the arcs along which planes of short and long moment arms will approximately travel.

This discussion indicates that there is a definite relation between the moment arm (M) and the speed of any airplane. *The moment arm must be proportional always to the speed of the plane for any particular degree of nosing up tendency caused by a difference in angle between the wing and the stabilizer.* In this way the stabilizing factor will not be changed. Of course if you wish to increase or diminish the horizontal stability factor deliberately, that is a different matter.

Here is a simple formula that will always tell you whether or not the relation of speed to moment arm of your ship is correct for any difference in angle between wing chord and stabilizer:—

$$a = \frac{20(M)}{V},$$

where (a) = the difference in angle between wing chord and stabilizer, (M) = the stabilizer moment arm in feet, and (V) = the speed of the plane in miles per hour. If you wish to calculate the speed of your ship, use the formula given in the second article of this course on page No. 11, pub-

lished in the March, 1932 issue of this magazine. Suppose we work out a practical example, using the formula, in order to clarify your understanding of the problem, for at best the characteristic of an airplane to react as explained, will stand considerable study for complete comprehension.

We will take as our example the case of a gas engine model, particularly because the dimensions of such planes are generally larger than ordinary rubber powered models. The length of (M) will therefore be longer and if the speed of such a ship does not exceed the speed of rubber models, the stability factor will be small.

We wish to determine the difference in angle between wing chord and stabilizer when (M) = 4 ft. and (V) = 20 miles per hour.

$$\text{substituting:— } a=\frac{20\ (4)}{(20)}, \text{ or } a=4^\circ$$

Thus, when the wing is at the line of thrust, there should be 4° difference between the wing chord (straight line through leading edge and trailing edge) and the stabilizer. However, if the model is a high wing or a parasol type, then we must apply the formula for such cases, given in the first part of this article. It is:— $a=12\left\{\frac{X}{M}\right\}$. In the formula, (a)= the number of degrees of angle to subtract from 4° in order to make allowances for the high wing. (X) is the distance of the wing above the line of thrust. In this case we will suppose it is six inches. (M) is the moment arm which is forty-eight inches. Then substituting these values in the formula, we have:—

$$a=12\frac{6}{48}=\frac{6}{4}=1\tfrac{1}{2}^\circ$$

Then $(4^\circ-1\tfrac{1}{2}^\circ)=2\tfrac{1}{2}^\circ$, the correct angle of the stabilizer relative to the wing chord.

The case clearly illustrates why it has been found necessary to raise the wing high above the thrust line on gas engine models. Many builders of this type of ship have placed the wing down close to the thrust line and have set the stabilizer at 3° with the wing chord. This is too small an angle for proper longitudinal stability in most cases. Here we found 4° was correct, until the wing was raised 6" above the thrust line. Then it was shown that only 2½° was necessary. Perhaps this will explain some of the causes of trouble to readers who have built and flown gas models.

There does seem to be a lot to this problem of model design after all. Next month we will consider other important factors that contribute to or detract from the effect of the stabilizer!

Boeing-U. S. Army PW-9

(Continued from page 25)

squadrons in quantity. It is built of a welded fuselage and wooden wings and powered with a Curtiss D-12 motor. This plane employed a tunnel radiator and only a single wire truss in the plane of the front wing spars. The plane was equipped with two machine-guns firing through the pro-

peller arc, and was capable of diving at speeds up to 275 m.p.h. In fact the first high speed dives for army combat work were exercised on this airplane. It was very sturdily built.

Refinements in the later series up to the PW-9D were mainly of a minor nature and the exterior appearance of the ship remained the same. The navy also had fighting airplanes built that were prototypes of this army ship. The top speed was over 165 m.p.h. with a landing speed of 57 m.p.h. The fuel supply was for 2½ hours and provision was made for a fuel belly tank. This plane employed the Gottingen 436 wing section and was the type employed by the N.A.C.A. in deriving data on the air pressures on wings in dives at close to terminal velocity.

The lower wing is sharply swept back elliptically while the top tapers evenly from the center chord. The trailing edges were slightly scalloped. The lower plane had 15 ribs while the upper plane had 23 ribs per panel. All dihedral is due to taper. These planes did not employ much stagger although a later model the XP7 had more. This original design had a number of variations for the varied army and naval use and furnished the services with a good performing sturdy airplane. The climb was 1700 f.p.m. with a service ceiling of 20,000 feet and a cruising range of 500 miles. Several of these aircraft are still in active service.

A very nice appearing model can be made either of solid or flying type. The fuselage can be built of stringers and bulkheads while the wings, landing gear and tail can be made in the usual way. The motor should be made of carved balsa and faired into a neat nosing.

Airways Here and There

(Continued from page 22)

CLUB NEWS

Bamberger Aero Club

Two big events appear on the calendar of the Bamberger Aero Club. The first one is the Eastern States Outdoor Model Airplane Contest which this club is sponsoring in conjunction with Universal Model Airplane News. It is to be held May 19th at Newark Airport. Details and rules of the contest appear on page 26. The second event in the Official New Jersey State Championship Scale Model Contest to be held from May 26 to June 2nd. Events are as follows:

1. Models not over 6" wing span. 2. Models over 6" but less than 12" wing span. 3. Models with wing span over 12" but not over 24". 4. Models over 24" wing span.

Rules and entry blanks may be obtained by writing Mr. Irwin Polk c/o Bamberger Aero Club, Newark, N. J. The contest is sanctioned by the National Aeronautic Association.

Bakersfield Sky Hawks Club

Great activity is taking place on the west coast. One of the most active model airplane clubs there is the Bakersfield High School Sky Hawks Club. At a recent meet two of the models surpassed all known records for this type of aircraft before the ships disappeared into cumulous clouds at an elevation of 4000 feet. The two planes were built by two young men, respectively, Arthur Thurber and David Delameter. Thurber's monoplane disappeared after a flight of 31 minutes. Delameter's ship was lost from view after 25 minutes, 30 seconds. Mr. Van Lueven, sponsor of the club, has been kind enough to send us this information together with picture No. 14, which shows the senior boys who qualified to enter the contest. The boys in the picture are, left to right, Hugh Scott, Richard Stiern, Harold Peed, Russell Blair, Commander of the Sky Hawks, Arthur Thurber, Clyde White and David Delameter. This club is a member of the Jr. N.A.A.

Hartford Aero Club

In picture No. 15 we see a group of members of the very old and active Hartford Aero Club. Members of this club have been prominent in model aviation for a number of years. Lately they have kept rather quiet concerning their activities, probably they are getting ready for a big "push" against a few records.

First Annual State Y. M. C. A. Model Airplane Contest

To Burlington, Vt., goes the honor of holding the first state model airplane contest. The activity of model building has been deemed a very beneficial sport by many of the leading men in Burlington, especially members of the Lions Club. The interest in this sport shown by the Lions Club dates from a talk given last fall before the club by Mr. Grant, editor of Universal Model Airplane News. It seems that the seed has borne fruit. The contest was held on Saturday afternoon, March 31st, at 2 P. M. The events were:

1. Scale Model. 2. Flying Scale Model. 3. Baby R.O.G. 4. Indoor Tractor.

Silver cups and blue ribbons were given to winners. A large silver loving cup was awarded to the contestant whose plane remained aloft for the greatest elapsed time. This cup remains in the possession of the winner for one year. If it is won three times, it may be kept permanently.

Jordan's Junior Aviation League

A letter from Mr. Willis C. Brown, Director of this club, tells us the good news that Bruno Marcki, senior class Baby R.O.G., turned in a new official record of 9 minutes, 24 3/5 seconds and Hewitt Phillips, junior class Baby R.O.G., broke the existing record with a flight of 7 minutes, 9 1/10 seconds. These records were shattered at a contest held by the club just prior to March 10th. These performances are remarkable considering the fact that the contestants were handicapped by the necessity of flying in an armory which had a ceiling of only 55'.

The New England Championship Contest, sponsored by the League, will be held on May 26th and 27th. There will be the customary trophies, cups and medals of high quality. The indoor events will be run off on the 26th and the outdoor events on the 27th. On Saturday night the annual banquet will be given to the contestants and prizes will be awarded the winners. Speakers of national prominence will be featured on this occasion. For further information and entry blanks, write Jordan's Aviation League, Jordan Marsh Co., Boston, Mass.

Connecticut Model Airplane Association

Mr. Julius Sobanski of Hartford, Conn., announces that the annual State Meet will be held at Hartford on June 9th at 10 A. M. It will take place at the State Armory. The meet will be conducted under the C.M.A.A. rules. Mr. Frank W. Schade of New Britain is adult adviser and contest director; J. Blair Watson, Jr., of 228 Putnam St., Hartford, is secretary of the association. All who wish to enter should write to Mr. Watson for entry blanks. The entry fee is 25c. Prizes will be offered for each event.

Model News from Other Countries

It is with great pleasure that we hear from T. J. Primrose of 17 Salisbury Road, Chorlton-cum-Hardy, Manchester, England. He is a member of the Lancashire Model Aircraft Society. This club is very active. Its chief object is to further the cause of model aeronautics in the north of England. He sends us picture No. 17 of his Fairchild "22" before it was covered. It has a wing spread of 12" and weighs 1/6 oz. All the control surfaces are movable. Readers will appreciate the excellence of his workmanship.

Japan

We will now jump to the other side of the world. To illustrate the activity in the model airplane field in Japan, we are printing picture No. 18. This was taken at one of the periodical contests held near Tokyo. The Japanese boys have gone in for model building and flying in a big way. The amount of interest in this activity may be indicated by the large number of contestants and models. Flights of Japanese models of one-half hour or more are not uncommon.

Australia

Mr. Ivor Freshman of the M.F.C.A. sends us more information concerning activities in his country. Picture No. 19 shows Mr. A. E. Brown and Mr. Freshman at a recent contest. Sixty contestants were entered.

Mr. Albert E. Hopkins of 89 Cronulla St., Carlton, Sydney, N.S.W., Australia, writes in behalf of the Model Airplane Association of Australia. The most important contests which were held recently were the Champion of Champions events and the Chief Commissioner's Cup. The former, as the name suggests, was to determine the best all-around flier for 1933. The champion was judged in all phases of model airplane building and flying. Jack Fullarton of the "Bondi Black Hawks" was adjudged the winner. Maurice Davis gave him a close run until the last few events, whereupon he slipped back to second place. H. C. MacKay of the "Mosman Moths" won first place in the Chief Commissioner's Cup event with a flight of 15 minutes, 23 seconds. If any of our readers wish to write to this club to learn of some detailed activities, they should write to Mr. Frank Furniss, Honorable Secretary at Club Headquarters, 1 Bond Street, Sydney. Furniss is shown in picture No. 20 with one of his latest models of a D. H. Moth.

New Zealand Model Aeroplane Association

We are indebted to Mr. Fred Macdonald, Chairman of the New Zealand Model Aeroplane Association, for news of the movements in that far-off country. He writes us as follows:

For many years past there have been widely separated and unorganized efforts by New Zealanders at model aeroplane building, and, no doubt, during this time some fine models were made. However, it was not until November, 1928, that the first model club was organized, this being the Auckland Model Aeroplane Club, the founder and president being Mr. F. C. Macdonald, whose articles in the various newspapers were responsible for the gradual growth of the movement throughout the country.

The New Zealand Model Aeroplane Association was formed in 1932, as it was realized that the clubs springing up throughout the Dominion were in need of a governing body to help them coordinate their efforts and to generally stabilize the sport. Records were kept and competitions fostered, and in 1933 there were 26 clubs affiliated with the Association and prospects looked bright indeed.

The officers controlling the model move-

(Continued on page 48)

Air Ways—Here and There

(Continued from page 47)

ment in New Zealand for the 1933-34 season are as follows: Patron, General Sir George Richardson; President, Mr. E. R. Boucher; Chairman of Management Committee, Mr. Fred C. Macdonald; Secretary, Mr. A. K. Alexander; Treasurer, Mr. L. Parker; Recording Officer, Mr. L. B. Hodge; Committee, Messrs. J. F. Mackley, E. McLeod, J. Williamson and H. Edwards.

Official Records—Fuselage Outdoor, G. M. Perkins, 18 minutes, 37 seconds; Spar Outdoors, A. Hobday, 18 minutes 58 4/5 seconds; Indoor Spar, W. B. Mackley, 4 minutes, 27 seconds.

Mr. Les Mayn of 22 Douglas Rd., Mt. Eden, Auckland, S. 1, New Zealand, wishes to call our attention to an error which occurred in our January issue. In that issue we published a picture of a Capt. Page Racer to which we gave Allen Rowe credit. This was a mistake, as Mr. Mayn was the builder. Mayn has recently raised the New Zealand record for flying scale models to 1 minute, 51 3/5 seconds with another Capt. Page Racer which he has built. Besides this record, he holds the indoor fuselage record of 3 minutes, 43 1/5 seconds.

Picture No. 22 shows three beautifully made D. H. Moths which have been constructed by members of the Auckland Model Aeroplane Club and the Championship Cup.

Correspondents

The following boys would like other model builders to correspond with them:

Josef Feder, 2618 So. 6th St., Philadelphia, Pa.

Ralph Najork, 105 Burt Ave., Northport, L. I., N. Y.

Grant Wilbur, Valley View Road, Manhasset, L. I., N. Y.

Ken Williams, 1421 Sixth St., Columbus, Ind.

Stanley Novice, 11 Boughton St., Danbury, Conn.

Harry Brodee, 2613 So. 6th St., Philadelphia, Pa.

Melvin Romeis, 555 N. 65th St., Wauwatosa, Wis.

Walter Seretny, Pioneer Mines, B. C., Canada.

Robert Templeton, 8 Kent Place, Northfield, Vt.

Joe Axisa, 3, Sda. S. Giuseppe, Sliema, Malta.

Bill Yeager, 3487 W. 91st St., Cleveland, Ohio.

Ernest W. Hartman, 1035 Arthur Ave., Wickliffe, Ohio.

Ted Lewand, 5209 S. Hermitage Ave., Chicago, Ill.

Eldo Klotz, Schleswig, Iowa.

Bill Fisher, 38 Oak Road, Rocky River, Ohio.

Pierre Langevin, 180 Champlain St., Hull, Quebec Canada.

A young lady would like to know if there is some club in New York City to which a girl may belong who is eager to increase her knowledge of aviation. Her name and address is:

Evelyn Fisher, 45 E. 17th St., New York City.

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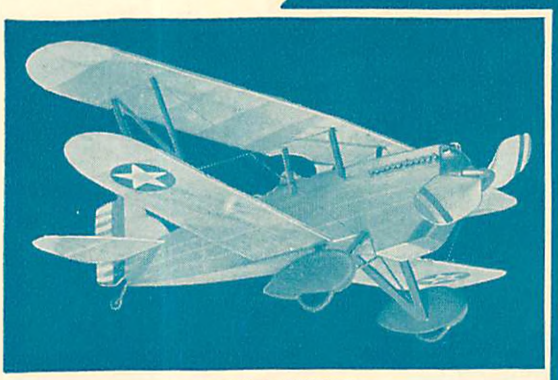
3 New



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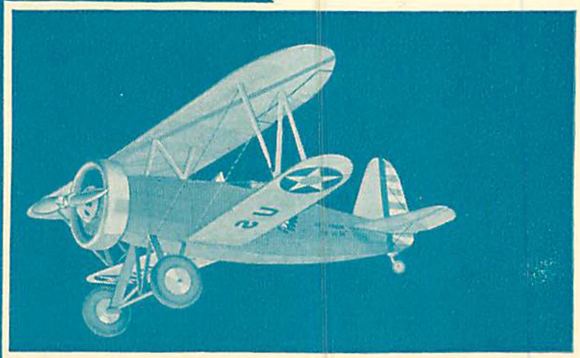

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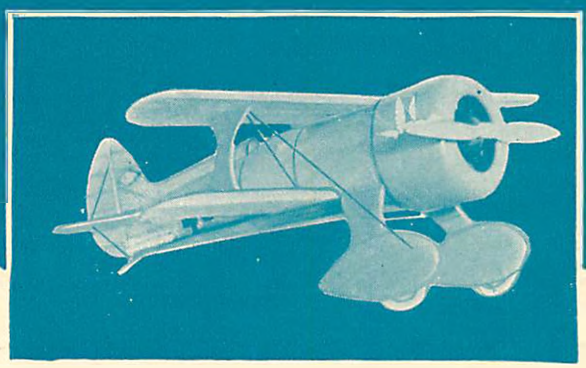

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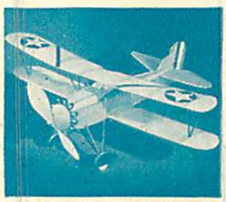
A great flying ship..... 35c post paid



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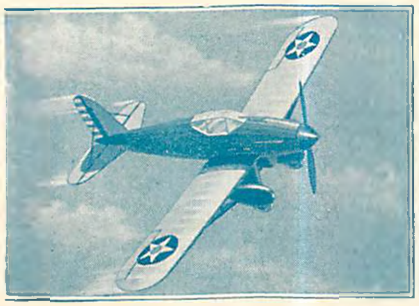

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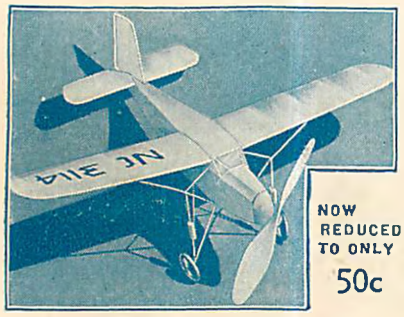

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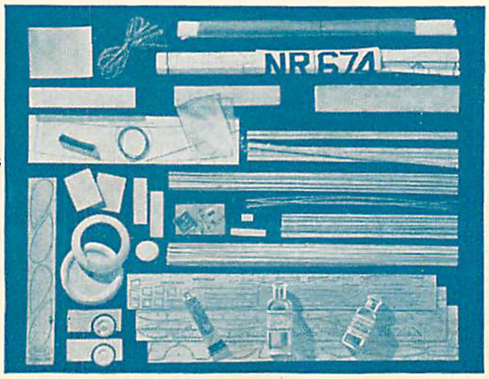

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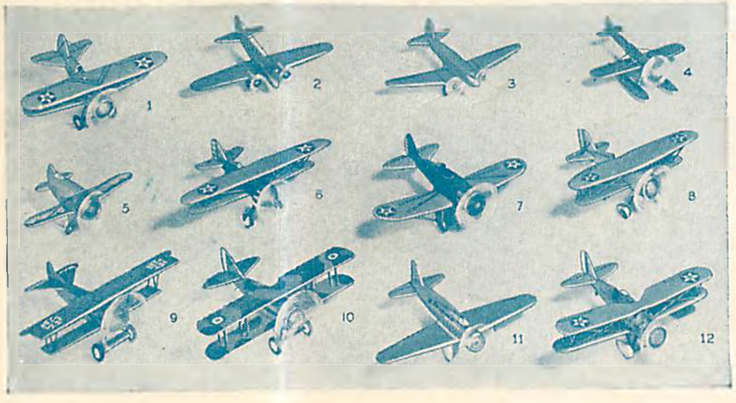

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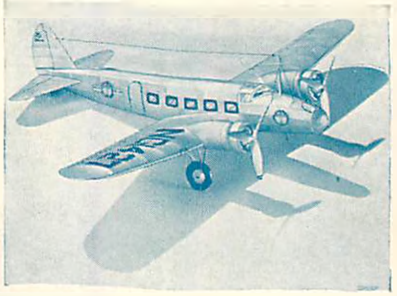

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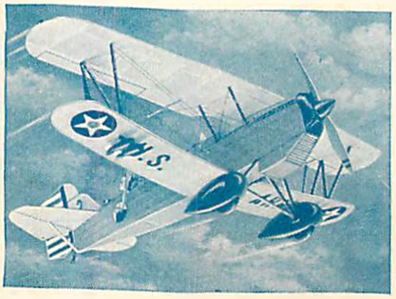

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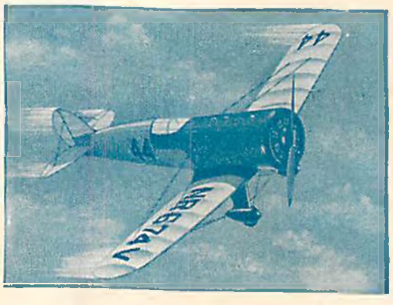

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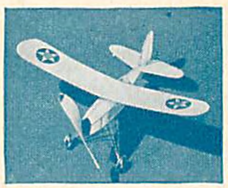

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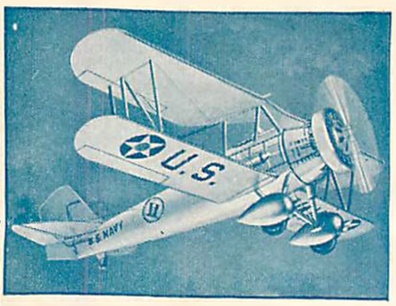

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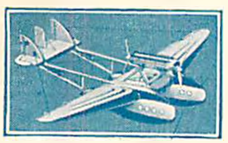

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