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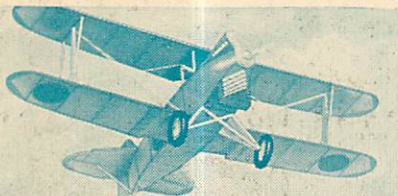
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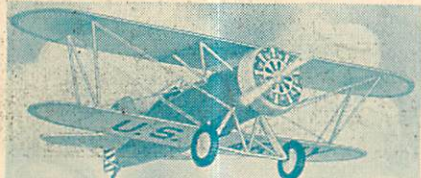
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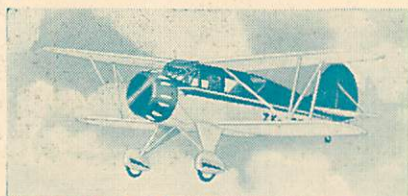
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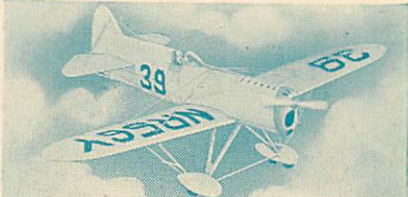
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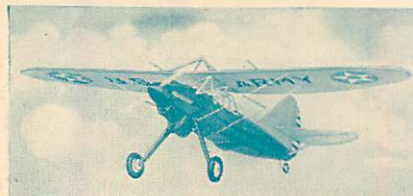
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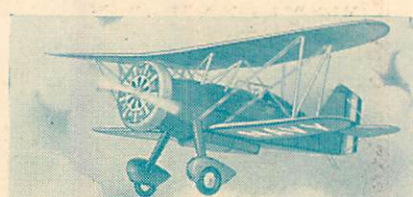
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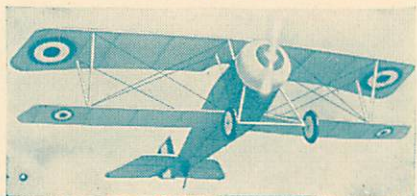


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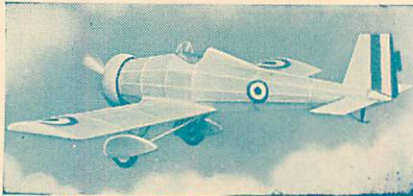


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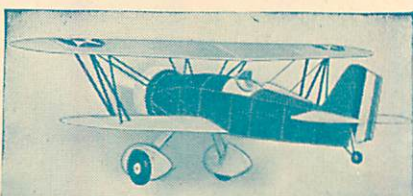
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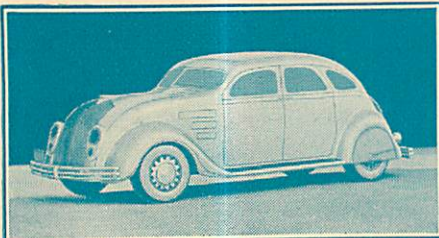


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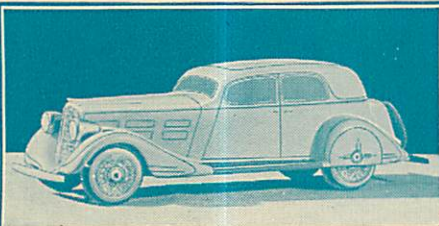


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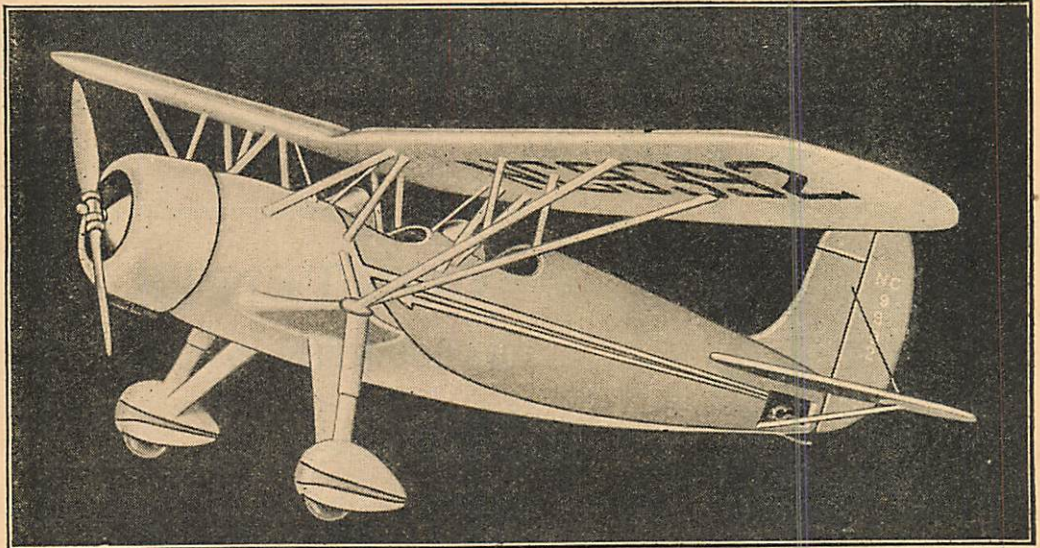
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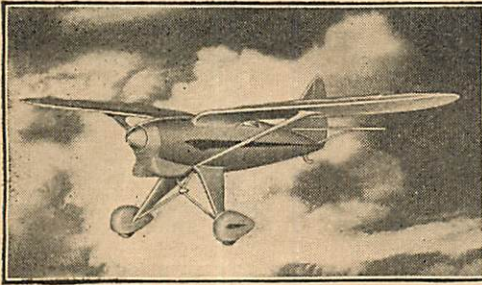
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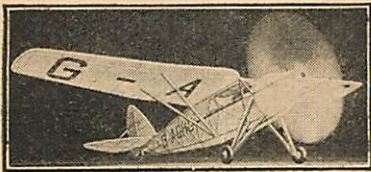
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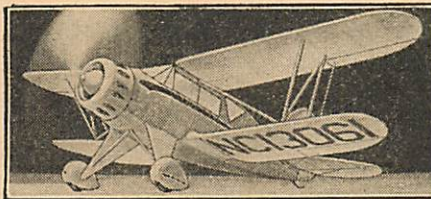
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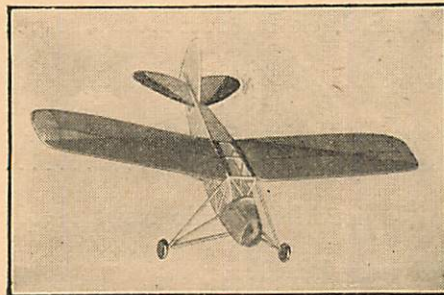
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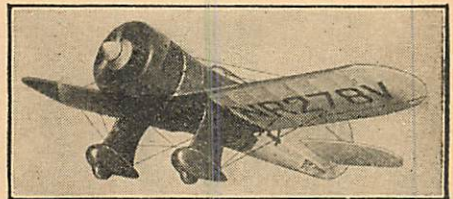
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Universal Model AIRPLANE News

VOL. XI

NO. 3

Edited by Charles Hampson Grant

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In Our Next Issue

"Q Ships" of the U. S. Navy, gives you some interesting high lights on experimental airplanes that you have never heard of, and how these ships are tested, by Fred Bamberger.

Lieut. H. B. Miller tells you more about the origin of stunts and how they are executed in Acrobats of the Sky—Part No. 2.

We have a surprise for you. Howard McEntee comes out of hiding to tell you how to build a neat compressed air model in When Air Conquers Air.

Lawrence McCready gives plans and instructions to build a miniature flying scale model in Build and Fly This Bristol Fighter.

Adolph F. W. Pfurr presents detail plans of the Curtiss F11C-3 for builders who delight in building detail scale models.

Our regular instalments of The N. A. A. Junior Membership News, Frontiers of Aviation, The Development of the Fokker Fighters, The Aerodynamic Design of the Model Plane, Air Ways, Slipstreams, the Illustrated Aviation Dictionary, and Advisory Board, also appear and help to make the November issue indispensable to aviation enthusiasts.

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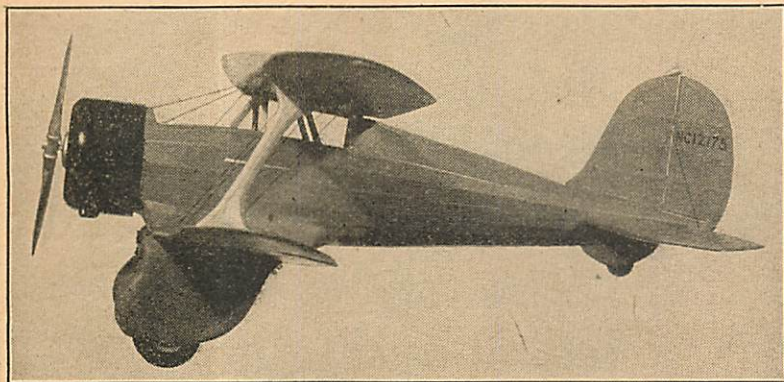
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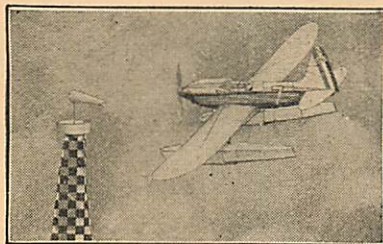
NATIONAL'S FLEET OF NEW AND REDESIGNED FLYING SCALE MODELS Are Ready! Providing Every Model Builder With a Wide Selection . . .



THE LATEST! NATIONAL'S NEW MODEL OF THE MONTH—THE BEECHCRAFT 17-E

A new commercial high speed ship. A true $\frac{3}{4}$ " scale model. Wingspan 25 $\frac{1}{2}$ ", length 18", wgt. 2 $\frac{1}{2}$ oz. This authentic model includes the interesting set back wing, the wide clear vision enclosed cockpit, full adjustable controls, its deep cowl and especially designed parts. As you study the illustration, which is a photo of the model as built from this new National Kit, you will note even its complete set of navigation and landing lights. The fully detailed plans with instructions are laid out for simplified construction. Kit contains printed stations and ribs, Jap tissue, ready formed cowl, wheels and pants. Formed wire parts. This is a ship every enthusiastic model builder will enjoy **\$2.50** building and can exhibit or fly with pride. Kit complete.....

Plus P. P. 25c

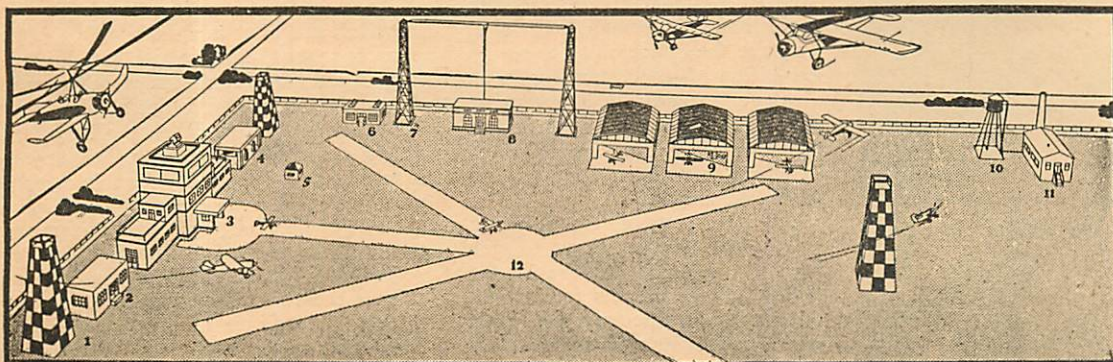


18 FAMOUS MODELS—

50c Each Here National offers 18 unusual ships in exceptional detail, for 50c each (plus P.P. 10c) all of which are faithfully designed for realistic appearance and best flying performance as illustrated by the LOCKHEED VEGA (WINNIE MAE) shown here. All are 12" flying scale models and include HAWK P-6-E, BOEING P-12, CURTISS FALCON, CURTISS HELLDIVER, BRITISH HAWKER FURY, POLISH P-6, SIKORSKY AMPHIBIAN, BELLANCA AIRBUS, TEXACO 13, GEE BEE SPORTSTER 1931, LOCKHEED SIRUS, LOCKHEED VEGA, LAIRD 400, ALBATROS, PFALZ, NIEUPORT SCOUT.

5 OUTSTANDING MODELS

\$1 Each These National \$1 (plus P.P. 15c) models include the BRITISH SUPER-MARINE S-6-B (Illustrated), a faithful reproduction of the actual ship noted for its tremendous speed in an 18" wing span model. Colors are blue and white. Is a picture in appearance with reasonable flying ability. Other models in this group are the famous American modern defense ship, ARMY BOEING P-12-E and the NAVY F-4B-3, the CURTISS CONDOR BOMBER and the CURTISS A-3 ATTACK. Each of these kits, in addition to all the regular National features, includes Balsa turned wheels ready made, cowlings as required.



National, in addition to announcing new models, are also redesigning their full line to accurate $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1" to the foot scale models, to give the model builder a set of planes in relative proportion to each other and faithfully and accurately scaled to the original ships. In addition, all National Kits include these unusual features which make for simple and accurate construction. 1. Fully detailed drawings with instructions. 2. Selected Grade A Balsa Wood. 3. Japanese tissue in correct colors. 4. Colored insignia. 5. Formed wire parts. 6. Neatly printed stations and other parts. 7. Finished wheels. 8. Metal hubbed propellers. You can't go wrong with a National Kit. Make your selection from those given here or write for complete catalogue of over 50 models.

25c KITS. National offers you in this group 6 interesting model planes at 25c each (plus P.P. 10c). The



Curtiss Robin, illustrated: A 12" flying scale model of the well known cabin monoplane. Other 25c kits in this group include FOKKER D-8, BELLANCA LIBERTY, HEATH PARASOL, TAYLOR CUB, and PUSS MOTH. All kits complete as described above.

4 FAMOUS WARTIME MODELS—

35c Each. In this group National offers 4 outstanding numbers at 35c each (plus P. P. 10c). The S.P.A.D. (Illustrated), Capt. Rickenbacker's famous wartime fighting ship, 12" midget model. Other famous planes SOPWITH CAMEL, BRITISH S. E.5 and the FOKKER D-7. These four famous wartime ships in 12" flying scale models are easy to build, attractive in appearance, and excellent flyers. All kits complete as described above.

Every Experienced Model Builder Knows

And the beginner will learn that the Construction Kit designed to an accurate scale and laid out for faithful detail assures a finer model for appearance and flight than the purchase of kits which feature only size. **DON'T BE FOOLED BY THE YARDSTICK APPEAL.**

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This kit gives you a complete airport consisting of 28 parts as listed here. An accurate scale

model with ground plan, 44" x 62". Complete in every respect. Fun to build and a great many boys make money by selling finished job or renting for advertising or display purposes. An excellent school or club project. Complete to the last detail, as the picture shows, or each kit separate as listed below.

1. Three Pylons\$3.5
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 7. Radio Towers50
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 10. Water Tower50
 11. Power House50
 12. Field Mat50
 13. Six Commercial Model Kits35
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- Airport construction kit, complete, as shown and listed above (plus P. P. 35c) **\$5.00**

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Canadian prices 40% higher to cover duty.

Acrobats of the Sky

How Aerial "Stunts" Originated and Some of the Difficulties Encountered by Pilots in Executing Them

By LIEUT. H. B. MILLER

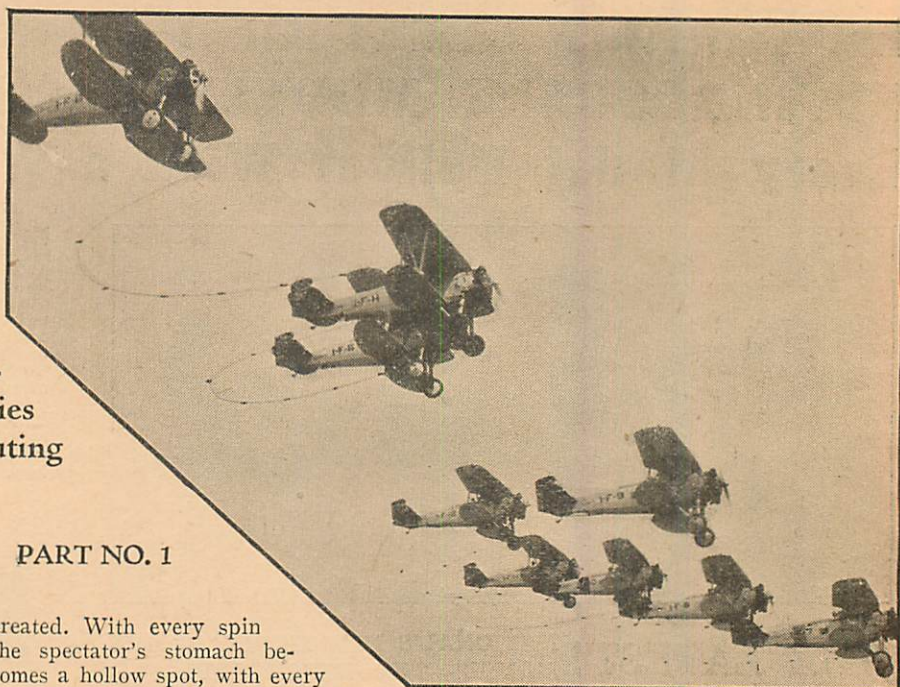
PART NO. 1

PILOTS of long distance and endurance flights receive the approval and admiration of people young and old. These flights are the pioneering ones which will later lead to the establishment of regular commercial airlines, drawing the important cities of the earth closer and closer together. But in spite of their admiration of the aviators involved in these hazardous flights, the spectators' excitement is not aroused to fever pitch. The reason for this is that the non-aviator is unable to visualize the dangers encountered when flying through the many types of bad weather and over the treacherous lands which must be covered when flying around the world or into its far corners.

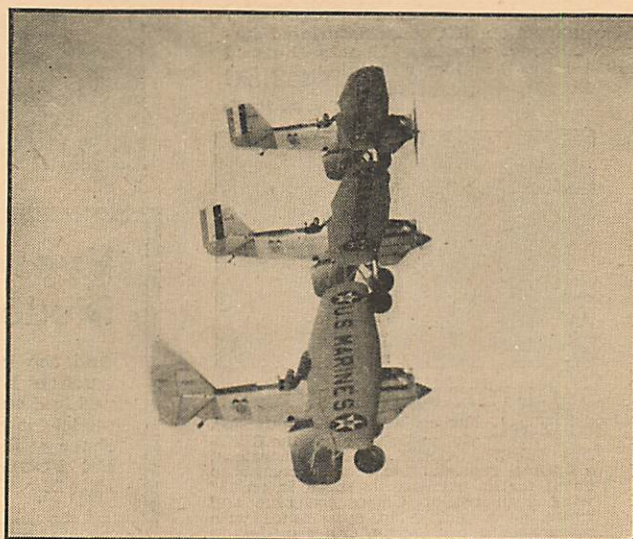
On the other hand, when a person sees a tiny plane cavorting about in the sky, looping until the onlooker is dizzy, rolling over and over, flying through graceful maneuvers, his imagination permits him to climb into the tight cockpit with the pilot to enjoy the thrills that are being

created. With every spin the spectator's stomach becomes a hollow spot, with every loop he holds tightly to his imaginary seat.

When the performance is over the



Navy fighters loop without difficulty while wings are lashed together



Three Navy Hawks in line, speeding up preparatory to looping

on-looker's nerves will be quite as exhausted as the pilot's muscles. And so it is that all of us obtain more than the normal thrill when we have the opportunity to see an exhibition of good stunting in an airplane. In addition, the varying roar of the powerful engine tingles our nerves and causes us to build up a tenseness seldom experienced vicariously.

As the pilot of the stunting craft noses his plane down to pick up extra speed, the noise of the racing engine begins to increase until it is a terrific roar. The craft goes through its maneuvers but it is an instant later when the roar begins to vary in pitch to those on the ground. It reaches a crescendo as the airplane reaches its maximum speed. Here it blends with the scream of the flying wires to

blot out all other sounds. As the craft is pulled upwards and perhaps the power is cut off, the roar suddenly ceases only to pick up again as the plane quickly goes over the top of the loop.

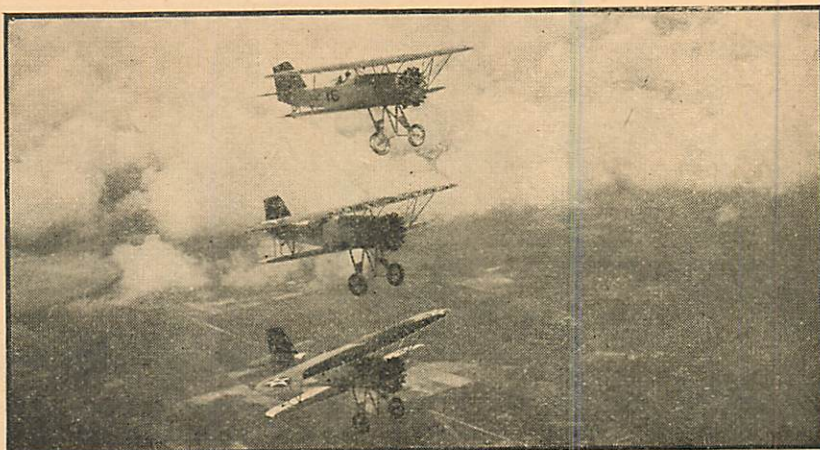
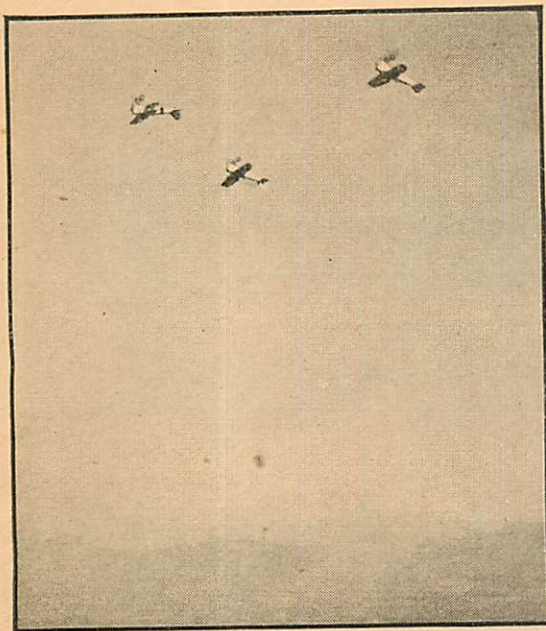
What about the pilot? He is seldom as perturbed as many of those with two feet planted firmly on the ground. Before taking off he will have made certain that his safety belt is securely in place and sufficiently taut to prevent him from being thrown from his seat. If a wise pilot, he will have spent considerable time practicing stunts in this particular airplane in order to learn its peculiarities. He must learn just when to begin to recover from any given maneuver and just how much speed is necessary to carry his craft through the evolution. No matter how proficient he is at stunting, he must learn the peculiarities of each airplane for no two are exactly the same in balance and alignment.

It goes without saying that before going aloft the pilot must ascertain that his plane is in good flying condition. He must inspect all wires for slack which may indicate that the plane is out of alignment. He must make certain that all nuts are safely wired. His control wires must be in perfect condition. The fabric must be unbroken. Obviously, his power plant must be in perfect condition and tuned up to maximum power with no vibration.

Technically, the term "stunting" applies to those maneuvers in which the pilot intentionally places his craft out of control, that is to say, when his plane is stalled. Since this expression does not cover the execution of a loop or a slow roll, they cannot properly be termed as stunts. A better expression would be that of "aerobatics" which is partially arrived at from the word "acrobat," which in turn



Hawks in close formation, showing actual distance between the planes



This formation is known as a "pancake"; one plane above the other. It is very difficult to execute

Here are three Boeing Fighters upside down, in formation, at the top of a loop

is borrowed from the ancient Greeks. Interpreted strictly it means "to go high," but common usage has made it mean "one who practices daring gymnastic feats." Consequently, the word aerobatics means "daring aerial feats."

After watching a skilled stunt pilot perform, some observers will declare that he performed many a new aerobatic maneuver. Of course, it is possible that the spectator had never before seen the entire "book of tricks." However, it is more probable that the aviator was sufficiently imaginative to combine several well known maneuvers with the result that the combination appeared as an entirely new stunt.

As a matter of fact, there are only a relatively few aerobatic maneuvers which can be performed with an airplane. At first thought this does not appear to be a correct statement but a little thought on the subject will convince the reader of its truth. All aerobatics are based on but two maneuvers—the loop and the spin. Every other maneuver is a modification or a combination of these two. The only possible exception to this is the slow or aileron roll and this, as we have seen, is not a stunt at all for the airplane is flown through the maneuver.

The loop is probably the oldest maneuver intentionally done by pigmy man. As soon as the reality of actual flight had become an established fact, the more daring fliers immediately began to wonder how they best could make use of the freedom offered by the glorified third dimension—altitude. Of course, they had been restricted until the development of the gasoline engine reached the point where surplus power became available. It was not until 1913 that the loop actually became possible and on the first of September of that year we find a loop being made on a specially strengthened Bleriot. Diving his craft, Pegoud, the famous French aviator, pulled it up and up until he finally found

himself on his back. The nose-heavy craft completed the maneuver of its own accord.

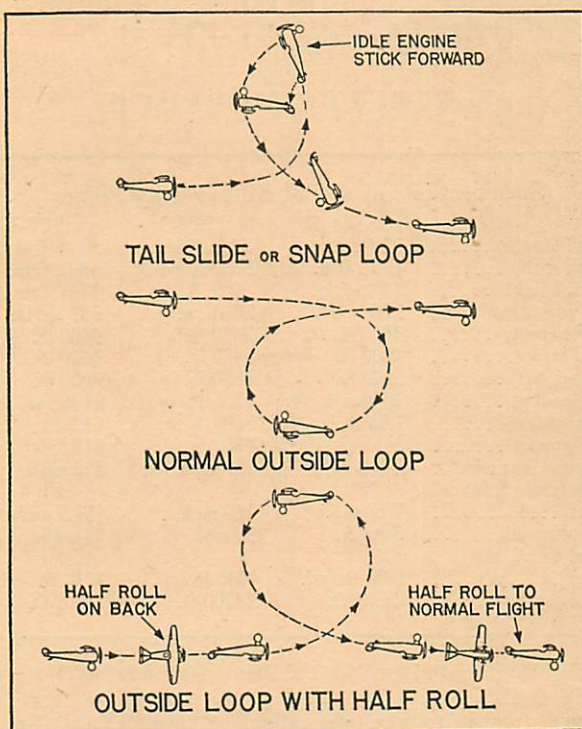
Entranced with the thought, Pegoud pulled his safety belt even tighter and on the top of the next loop he pushed the controls forward and actually flew a short distance on his back. Much publicity was given these feats and on the following day Pegoud repeated the new maneuvers for the benefit of a huge audience gathered near Paris.

At this same time, Glenn Curtiss had his flying school at Hammondsport, New York. He not only taught

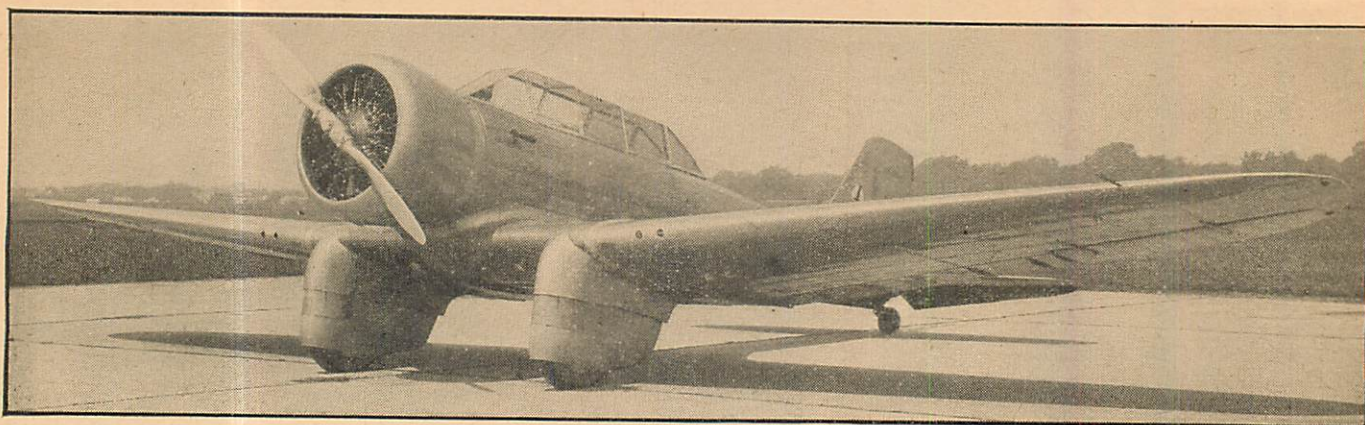
his students, but he manufactured planes and tested out new aerial devices, to say nothing of constructing the power plants he used in his aircraft. One of his fliers who was shortly to become famous throughout the country as a skilled aerobatic pilot, was Lincoln Beachy. He, too, had been studying the possibilities of the loop and was about ready to apply his studies to actual practice when word arrived of Pegoud's success. This was too much for Beachy and he ran out to his plane. Warming up the engine he took off the tiny field alongside Lake Keuka.

Sitting far forward on the extended outrigger, Beachy presented a grim figure, indeed. Goggles were not considered necessary in his equipment, and a plaid cap turned backwards was sufficient aviation gear. Circling around near the airport, Beachy at last got his craft up to 3,000 feet. Picking up speed in a long dive, he started upward on his great adventure. Since no part of the plane was in front for him to see, it was not an easy maneuver to perform, but his mass of bamboo sticks and heavy wire pulled the airplane up and over for a successful loop.

(Continued on page 36)



A "squirrel cage" being executed above the clouds. Planes are all in the same vertical plane



The new Northrop experimental attack plane, powered with a Wright R-920 engine. (Off. Photo U. S. Army Air Corps)

On the Frontiers of Aviation

PROBABLY the most interesting news of the month is that we may soon see some more Seversky high-speed planes in circulation. Major Alexander P. de Seversky, famous Russian war pilot, holder of the world's amphibian speed record and designer of Seversky planes, has announced his intentions of building a five-place amphibian (Sev-5) and a ten-place transport amphibian (Sev-7), both of which can be converted into land planes with retractable landing gears. Major de Seversky's record-breaking Sev-3 will also remain in production as a three-place sport plane.

All the new ships will have lines very much resembling the Sev-3L, plans of which are included in this article.

The cabin of the Seversky transport is in two compartments. One can be easily converted into a freight compartment. The operator may thus decide on the day of flight whether the plane shall be used as an all-passenger ship or a combination passenger and freight ship.

As stated in a previous article of this series, Major de Seversky has revamped his famous amphibian, changing the plane to a land plane, and it is known as the Sev-3L. In a letter sent by Major de Seversky, he states the following: "The Sev-

High Lights on the Latest American and British Airplanes and How You Can Build a Scale Model of the Seversky 3L

By ROBERT C. MORRISON

Specifications of the Three Seversky Planes

	SEV-5	SEV-3	SEV-7
Overall length	33 ft. 0 in.	25 ft. 8 in.	39 ft. 0 in.
Overall span	45 ft. 0 in.	36 ft. 0 in.	49 ft. 0 in.
Overall height	11 ft. 6 in.	9 ft. 9 in.	14 ft. 0 in.
Total wing area	260 sq. ft.	208.3 sq. ft.	385 sq. ft.
Weight empty	3600 lb.	2450 lb.	5400 lb.
Useful load	2000 lb.	1150 lb.	3600 lb.
Gross weight	5600 lb.	3600 lb.	9000 lb.
Wing loading	20 lb./sq. ft.	17.2 lb./sq. ft.	24 lb./sq. ft.
Power loading	7.86 lb./sq. ft.	7.74 lb./sq. ft.	13.3 lb./sq. ft.
Horse-power	645	420	675
Top speed, sea level ..	200 mph.	187 mph.	190 mph.
Cruising speed, sea level	175 mph.	160 mph.	158.5 mph.
Landing speed	60 mph.	55 mph.	65 mph.
Rate of climb, sea level	1600 ft./mi.	1640 ft./mi.	1010 ft./mi.
Service ceiling	25000 ft.	20200 ft.	15500 ft.

3L as equipped for the London-Melbourne Race will have special gasoline tanks installed to take 600 gallons of gasoline; a cruising radius of 3000 miles at critical altitude, at 240 m.p.h. The initial climb with adjustable pitch propeller with a full load of gas will be 800 ft. per min., and it will have a double row 1510 Wright Whirlwind motor developing 770 h.p. The high speed at critical altitude will be

260 m.p.h."

Michael Gregor, designer of the Bird biplane and former engineer for the Seversky Aircraft Corporation, is now at work building a two-place open sport biplane of his own design.

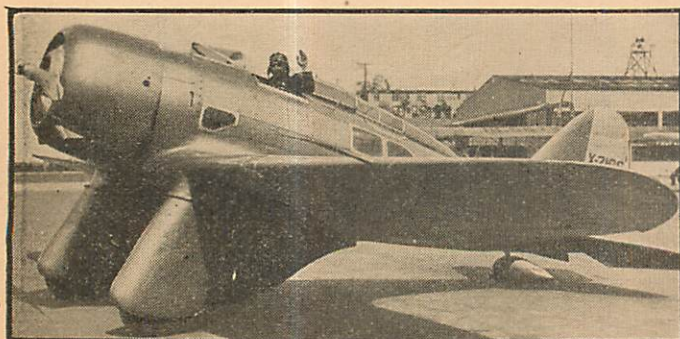
The first of the new Luscombes and Kinner four-place sport planes has been completed. Another new high-speed sport plane recently completed is the Ryan low-wing. Its astonishing performance is as follows:

Engine	Menasco B4	Menasco C4
Horse-power	95 h.p.	125 h.p.
High speed	142 m.p.h.	152 m.p.h.
Cruising speed	122 m.p.h.	131 m.p.h.
Rate of climb	808'/min.	1220'/min.
Service ceiling	16500'	19450'
Absolute ceiling	17650'	21200'
Landing speed	38 m.p.h.	38 m.p.h.
Gas capacity	24 gals.	24 gals.
Cruising range	403 miles	370 miles

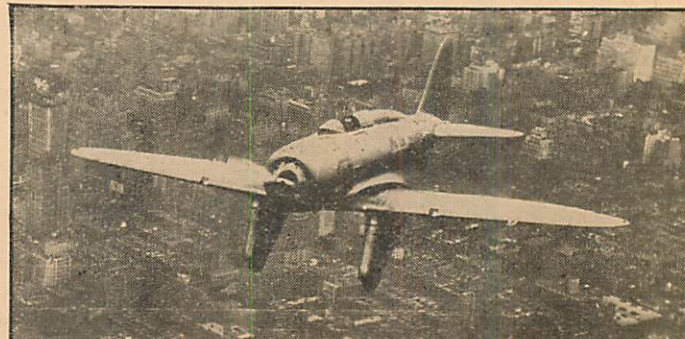
The ship is a low-wing, wire-braced monoplane seating two people. A Department of Commerce approval certificate has been already obtained for the plane.

Another new sport plane is the Fahlin high-wing monoplane designed by Swen Swanson, noted sport plane designer. The ship is powered by a 80 h.p. geared Pobjoy engine, an English engine now being sold in this country. Another new Pobjoy powered plane is a Monospar built in England. The plane is a low-wing cabin monoplane with a retractable landing gear.

The three Boeing 247s built for Luft



The Seversky 3L. Speed 260 m.p.h. with 770 h.p.



The Sev. 3L with 420 h.p. makes about 220 m.p.h.



Here is the Army's newest pursuit plane, officially designated P-30. It is constructed entirely of duralumin, with the wings faired directly into the monocoque fuselage. The wings of this plane are a considerable advance over previous monoplane pursuit designs, for unlike those heretofore produced, they have no external wires or struts for support.

The landing gear is of the single strut type and is retractable, folding up into a compartment in the lower part of the wings during flight. Wheel brakes, operated by auxiliary pedals attached to the rudder pedals, are provided to bring the speedy plane to a stop in a short space. The pilot's and gunner's cockpits are enclosed by a streamlined, transparent cover, which is made to slide open very rapidly so that the crew can bail out in a hurry if necessary.

Armament consists of two machine-guns firing forward through the propeller and twin Lewises mounted on a swivel about the gunner's cockpit. Power is furnished by a Curtiss Conqueror V-1570 675 horse-power engine driving a 3-bladed Hamilton steel propeller. The propeller is of the variable pitch type so that the blades may be adjusted for high altitudes. A side-type supercharger is standard equipment. It seems probable that the ship will be used as an altitude pursuit.

Performance data is regarded as confidential, but the plane is reported to have an unusually high ceiling and to cruise at well over 200 miles an hour.

Hansa of Germany are almost identical to those being used by United Air Lines. The only noticeable change is the windshield. It slopes aft instead of forward as on United's Boeings.

Mr. Richard C. du Pont, holder of the world's glider distance mark, is now flying around in a new Kinner Sportwing.

The new line of Wacos ranges in prices from \$5,225.00 to \$16,100.00. New Waco air brakes have become optional equipment on all models.

Specifications of the new Waco S3HD

Make of Engine . . .	Pratt & Whitney
Horse-power . . .	420
Length overall . . .	25'
Height overall . . .	8' 11 1/2"
Span . . .	32' 8 3/8"
Pay load . . .	348 lbs.
Top speed at 1000' . .	191 m.p.h.
Cruising speed . . .	166 m.p.h.
Landing speed . . .	60 m.p.h.
Service ceiling . . .	21,000
Climb . . .	1750 ft. per min.



Here is the new eight passenger Vultee transport. Top speed 241 m.p.h.

A photo of the high-speed Waco "D," which may be fitted as a sport plane, trainer or fighter, was included in the April issue of UNIVERSAL MODEL AIRPLANE NEWS on page 15.

In answer to the Department of Commerce's demands for a light inexpensive sport plane, the National Advisory Committee for Aeronautics has designed and built a small pusher high-wing monoplane with tail on outriggers. It will be used in testing the practicability of an airplane of that type. August 27th was the closing date for all bidders who have built light planes in hopes of getting the commerce department's order for twenty-five ships. Many new designs of light planes will make their appearance.

Sixteen various new fighting planes

were on exhibition at the Royal Air Force display at Hendon, England, this year. They are described below.

The Hawker High-Speed Fury is a single-place biplane fighter and is a development of the Super-Fury. The plane has a 30' wing spread and is powered

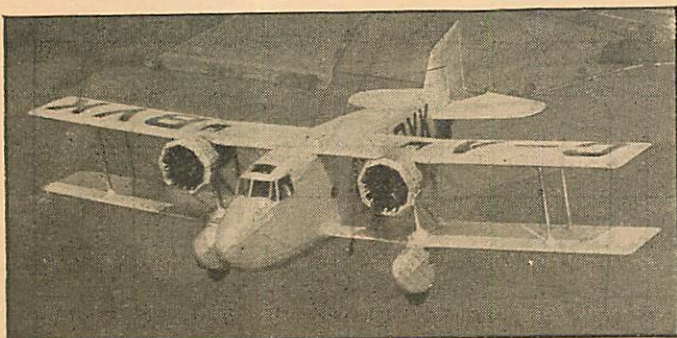
by a Rolls-Royce Goshawk engine.

The Supermarine Fighter is of interesting design. It is a low-wing with the landing gear enclosed in a nacelle as on our Northrops. The pilot sits above the wing directly in back of a Rolls-Royce Goshawk. It is of very clean design and has many American characteristics.

The Hawker Private Venture Day and Night Fighter is a ship similar to the Hawker High-Speed Fury.

The Westland Day and Night Fighter is a large biplane of unusual design. The engine, a Goshawk VIII, is located in the center of the fuselage and is connected to the prop in the nose by a long shaft! With the engine in the center of the fuselage, there is plenty of room in the nose for

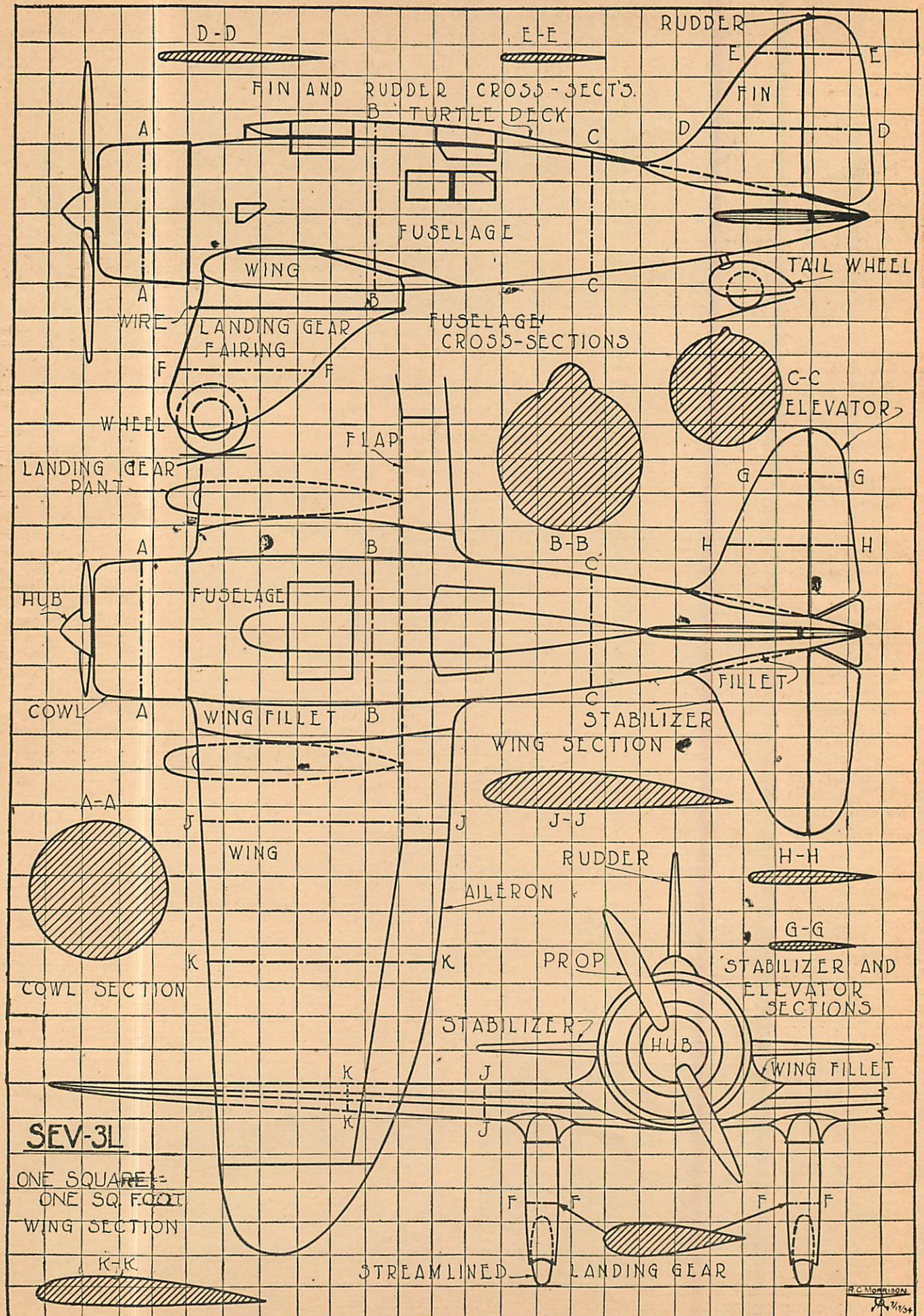
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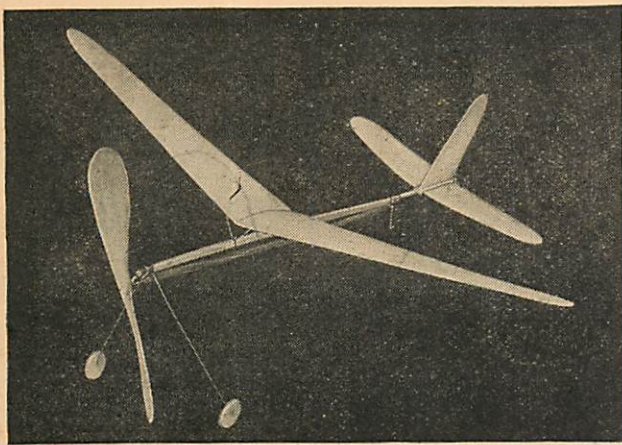


This British plane carries 1000 lbs. of mail 1000 miles non-stop. High speed, 200 m.p.h.

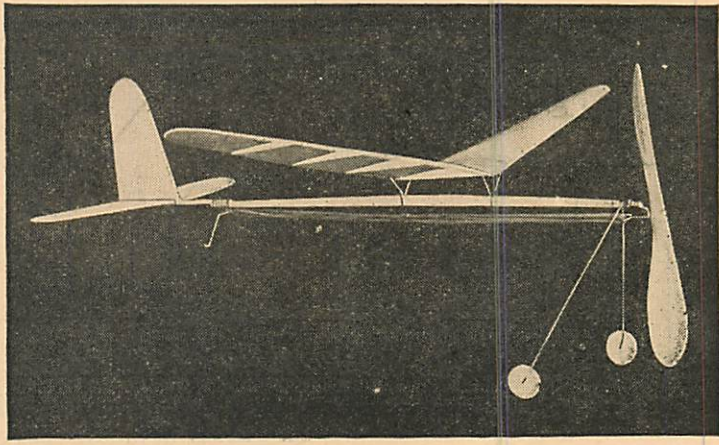


A Russian A.N.T.-20; eight engines, 200 ft. span, 75 passengers, speed 150 m.p.h.





A stable all-balsa model with contest performance



The finished model. It will fly for 100 seconds or more, consistently

Fundamentals of Model Airplane Building

HERE is the sixth model of this series. Mr. Grant has designed, built and tested it with two major considerations in mind. The first of these is to bring the reader additional building steps, as has been done with the preceding five. In this progressive manner, the reader will gradually master all construction details and operations in the building of model airplanes.

The second consideration is to give the reader as fine a model as possible. In this all-balsa, R.O.G. (rise-off-ground) tractor, Mr. Grant has produced one guaranteed to out-fly any others so far designed in this particular class. How well he has accomplished his task will become evident to all who build and fly the model presented here.

On actual flight tests, its behavior was remarkable. With its motor only two-thirds wound by hand, it rose to an altitude of some two hundred feet and covered a distance of eight hundred feet. Without the aid of air currents, but wound with a winder, it is capable of a flight distance of over twelve hundred feet and a total duration of from ninety to one hundred seconds!

Given a slight up-draft, it will fly indefinitely to give a performance similar to the finest of outdoor contest models. Its large stabilizer, long stabilizer moment arm, and the combination of dihedral, sweep-back and low center of gravity, gives to this model a stability second to none. Rising from the ground in a beautiful sweep, it will quickly adjust itself to existing air conditions, although it is not advisable to fly it in extremely rough and windy weather, as it weighs only 1 1/8 oz.

So let's get busy and build this latest creation of a designer who is not afraid to guarantee his product to beginners and experts alike.

Motor Stick

The motor stick is shaped from a stick of medium hard or hard balsa wood. It should measure 3/16" thick, 3/8" wide and 18" long after being cut and sandpapered smooth. As will be seen in the plans under

A Complete Course for Beginners Who Wish to Become Expert. How to Build an All Balsa Endurance Model—Part No. 6

By EDWIN T. HAMILTON

Results of Contest appear on page No. 10

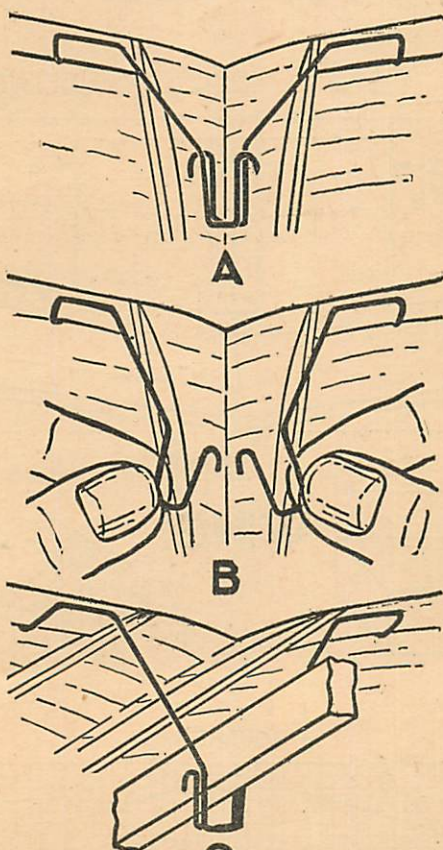


FIG. 3

"Top View," it retains its original thickness along its entire length, but its width varies from 3/8" to 3/16". This is shown in the plans under "Side View."

Note that this variation in width is obtained by shaping the upper edge of the stick only, while the bottom edge remains perfectly straight. It is in the form of a taper and is now ready for laying out. Choose either end as the front or leading end of the stick and so mark. From this end, measure a distance of 7" along the stick. From this point, the stick is tapered from its original width of 3/8" to a width of only 3/16" at the front end. Cut this taper and sandpaper smooth.

A distance of 8" is now measured from the rear or trailing end of the stick. From this point the stick tapers from its original width of 3/8" to a width of 3/16" at the trailing end. The remaining 3" between these front and rear tapers remains 3/8" wide. Cut this second taper and sand smooth.

The upper front edge of the stick is now rounded, as shown in the plans under "Side View."

Tail Boom

The tail boom is of the same grade of balsa wood and when sandpapered smooth, should measure 1/8" thick, 3/16" wide and 6" long. Choose either end as the front and so mark. From the front end, the boom retains its original 1/8" thickness for a distance of 2 5/8". Lay this out and mark. From this point to the rear end of the boom, the thickness is tapered from 1/8" to 1/16". Note that this taper is cut on one edge only, which becomes the bottom edge, while the other edge which becomes the top edge of the boom, remains perfectly straight. Cut this taper and sandpaper smooth. The upper front edge of the boom is now rounded, as shown in the plans.

Two small balsa blocks measuring 1/8" x 1/8" x 3/4" long are now cut and cemented on both sides of the boom 2 1/4" from its front end, as shown in the plans under "Top View." These are to add strength to the boom at its weakest point, as well as



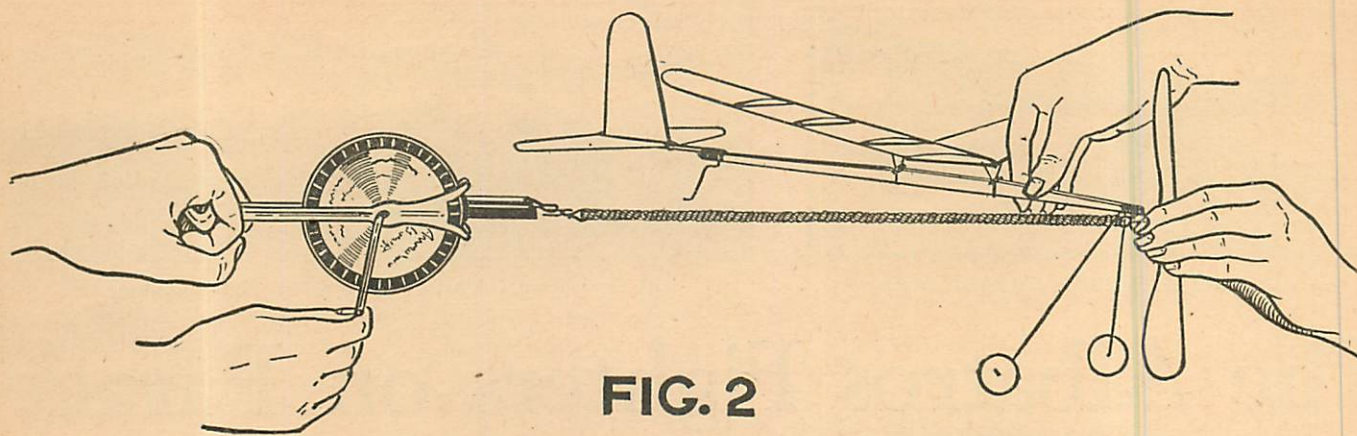


FIG. 2

to steady the elevator. Shape their bottom edges to match the taper of the boom.

The boom is attached to the stick at its rear end with cement reinforced with thread binding. Note that its $3/16$ " width continues the $3/16$ " thickness of the motor stick. Care must be taken to cut away the top edge of the motor stick, so that when the boom is attached in place, its straight top edge will be parallel with the straight bottom edge of the motor stick. At the same time, the sides of the boom must be in a straight continued line with those of the stick. The front end of the boom overlaps the rear end of the stick 1" as shown in the plans under "Top View."

Cut the top of the stick as required. Before the boom is attached, however, the combination rear hook and tail skid must be bent, as these three parts—the stick, boom and this metal fitting—are all cemented and bound together.

The combination rear hook and tail skid is bent from No. 13 piano wire. As it is shown in the plans full size, it should be bent to match the one given at the top of the plan perfectly. Cut a small groove along the top-center of the boom slot in the motor stick, so that the top bend of the skid will fit into it perfectly. When in place, coat the slot with cement and place the boom in position on the stick. Now coat both the stick and the boom with

cement and then wrap with thread until all three parts are held tightly. When completed, the thread may be given an outside coat of cement to further strengthen it.

Elevator

The elevator is cut from a piece of $1/32$ " sheet balsa measuring 3" wide and 11" long. Note the elevator shown in graph at the bottom of the plan. Rule paper with $1/4$ " squares, copy the elevator full-size on this paper, trace it on the balsa sheet and cut out. Slightly round and smooth all edges and then carefully sandpaper the piece until slightly thinner than its original thickness.

Rudder

The rudder is cut from a piece of $1/32$ " sheet balsa measuring 3" wide and $4 3/4$ " long. It is shown in graph at the bottom of the plan. Proceed to cut this piece in the same manner as was the elevator. Finish with sandpaper in the same manner. As the rudder is cemented to the elevator, it may be assembled at this time.

Two sheet balsa strips are added to the sides of the rudder to increase the thickness of its edge for cementing purposes. These are shown in the plans under "Side View." Each should be cut to measure $1/32$ " x

(Continued on page 40)

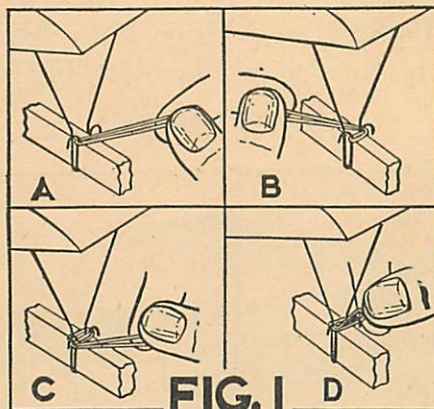


FIG. 1

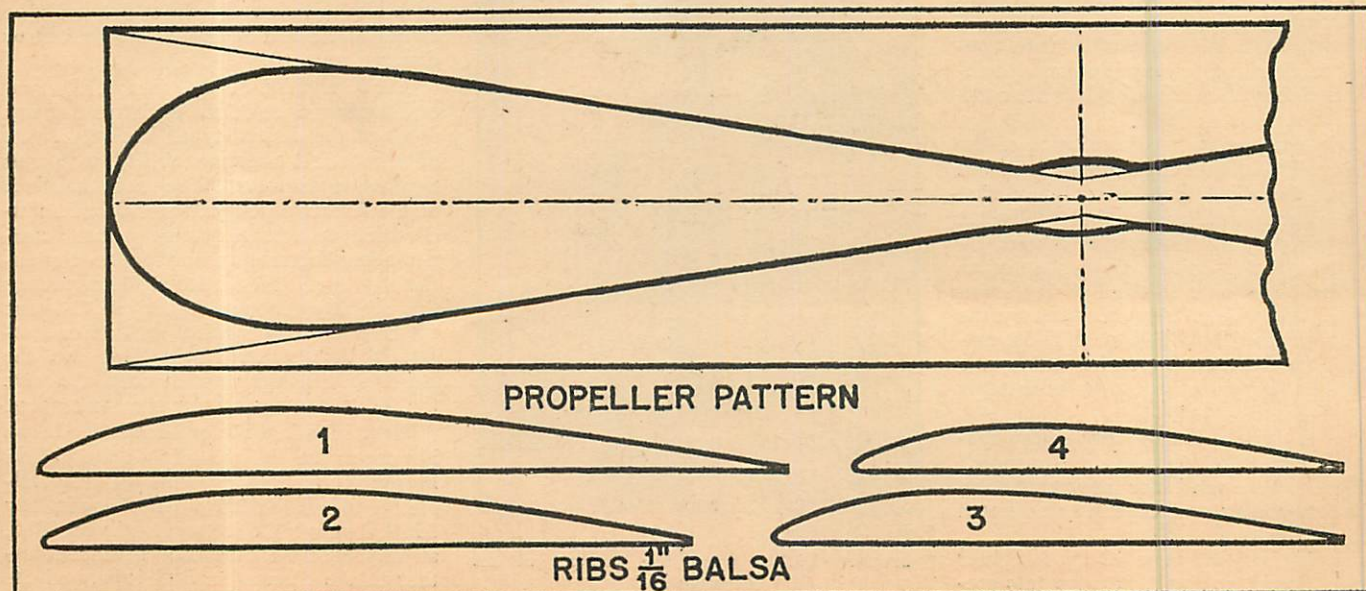
WINNERS OF JUNIOR MODEL AIRPLANE BUILDERS CONTESTS NO. 1, 2 AND 3

It seems that there are some young men who are interested in learning how to build model airplanes. Some very neat presentations have been made as entries in the first three monthly contests. The five young men who receive awards in each of the three contests, are as follows:

Contest No. 1—George A. Senior, Junior, Bloomfield, New Jersey; Robert Glover, Providence, Rhode Island; Arthur Wright, Bayville, New Jersey; John Ferrara, Minneapolis, Minn.; Hugh Burns, Atlanta, Georgia.

Contest No. 2—Robert N. Kernahan, Trenton, Missouri; Phil Burwick, Rutland, Vermont; C. H. Worthington, Boston, Mass.; Fred Pilson, St. Louis, Missouri; Roger Plant, Dayton, Ohio.

Contest No. 3—Cornelius Metzong, Orwigsburg, Pa.; Jayson Whipple, Elizabeth, New Jersey; Isadore Brodski, Asbury Park, New Jersey; Merton Parks, Racine, Wisconsin; Charles Philbin, Fort Worth, Texas.





The Albatros C-5, (1916), 220 h.p. Mercedes



The experimental Albatros C-1, (1916), 170 h.p. Mercedes

The Albatros Fighters on Parade

Part No. 3

Interesting Features of the Albatros Two Seater Fighters and How They Met the Threat of the Allied Planes of This Type

By JOE NIETO

THE "driedecker periode," being the German term for the reign of the triplane, began in the middle of the year 1917.

It is remarkable to note how the German warplane producers met the avenging opposition of the advancing Allied fighting planes of that time. "Bloody April" was fresh in the tortured minds of the surviving Allied pilots. The Albatros D-3 had won complete control of the air for Germany. More than 175 British planes had been brought down that month, the French losses were incalculable.

Subsequently, the avenging S.E.5 and Bristol Fighting machines were met and severely dealt with by the D-5 and D-5a Albatros Fighters. The German Supremacy however, was beginning to lose its hold.

At that stage of aerial history, the British and French Air Services seem to have placed great confidence in their Sopwith and Nieuport triplane designs. The gallant attitude of the Allies however, was unfortunately quashed by Germany's repulsive counter-action with the Albatros, Roland, Fokker, D.F.W., Sablatnig and Schutte-Lanz s.s. triplanes. Probably as a last and vain resort to conquer the German dreidecker, the Sopwith and Nieuport s.s. triplanes, were later converted into two-seater triplane fighters equipped with armaments firing from the fore and aft cockpits.

Before taking up the description of the Albatros Dr-1, some little attention should be given to the fact that during that period of the aerial war, the two-seater fighter was again playing its dependable part, especially with the British. Subsequently, as additional fortitude to the fighting stand of the Albatros s.s. brought about by the success of the D-3, D-5 and D-5a machines, the Albatros C types were keeping right in the pace of progress with their protective "brothers."

The C type Albatros two-seater machines, generally termed "all-purpose" machines, were used for reconnaissance, tactical bombing and especially as noted here, for fighting.

The earliest Albatros C type fighter would take us too far back to go into spe-

that could scarcely be classed above the ratings of other 3000 ft., 60 m.p.h. warplanes, used before aerial warfare was considered an effective asset.

The first of the four C types which should be mentioned in this brief review leading up to the important Albatros C-12 machine, was the Albatros C-3.

This outstanding machine was produced in the early months of 1916 and served all through 1917. It is important to note that the C-3 was powered by a 170 h.p. Mercedes engine with which it could attain a speed of but 85 to 90 m.p.h., but boasted of a 12,000 foot ceiling, four times that of the earlier C-1. Later models were tried out with the 150 h.p. Benz, but finally the 200 h.p. Mercedes was adopted with the

result of a 100 to 105 m.p.h. speed and a ceiling of over 16,000 feet.

The C-3 was primarily designed for reconnaissance and photographic work, but its excellent performance subsequently developed the true characteristics of a light day bomber and fighter. This machine was first of the Albatros series to be equipped with stationary guns. The pilot seated in front, had one (sometimes two) synchronized machine-guns to fire through the propeller, the observer in back was obliged with a ring-mounted gun which could be swung in an arc of fire across the tail or directed upward.

For a machine of that period, the general performance of the Albatros C-3 was much of the desired type. The speed, rate of climb and maneuverability compared favorably. However, like most machines of the Albatros design, the C-3 had an inclination to nose heaviness without compensating factors provided in the conventionally large tail surfaces. Disregarding this slightly obvious defect, the C-3 was the forerunner of the deadly Albatros two-seaters that succeeded it. This was the sturdiest little fighter of its class, and gave the Allied flyers a lot to write home about.

Baron Manfred F. von Richthofen began his career at the controls of the C-3 in March 1916. This machine was responsible for the death of Raoul Lufbery in May 1918. During the latter months of 1916, an improved Albatros C type added further to the discomfort and injury of the



The famous Albatros triplane, Dr-1. Speed 130 m.p.h. with 160 h.p. Mercedes, 155 m.p.h. with 200 Benz 3a

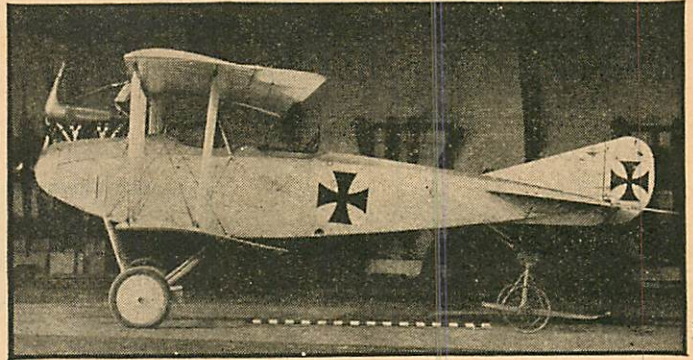
cific detail describing each of the complete series actually used in Front Line service. However, brief mention should be made of those among the number which in reality had served mostly in a historical sense than in effectiveness. These were clumsy affairs



Baron Manfred von Richthofen assists his brother Lothar from the cockpit of an Albatros D-3



Here is one of the later Albatroses, the C-10. It appeared in 1917, powered with a 260 h.p. Mercedes engine



The ship in which Richthofen began his career, the experimental Albatros C-3, 150 h.p. Benz, later 170 Benz

patched up Allied morale. This machine known to us as the Albatros C-5 was powered by a 225 h.p. Mercedes engine and could fly at the rate of 115 to 120 m.p.h. The C-5 was somewhat larger in dimensions than the C-3, being $3\frac{1}{2}$ feet greater in wing span and 2 feet greater in length. The C-3 had a span of 38 feet, 6 inches and was 28 feet long, standing over 10 feet in height.

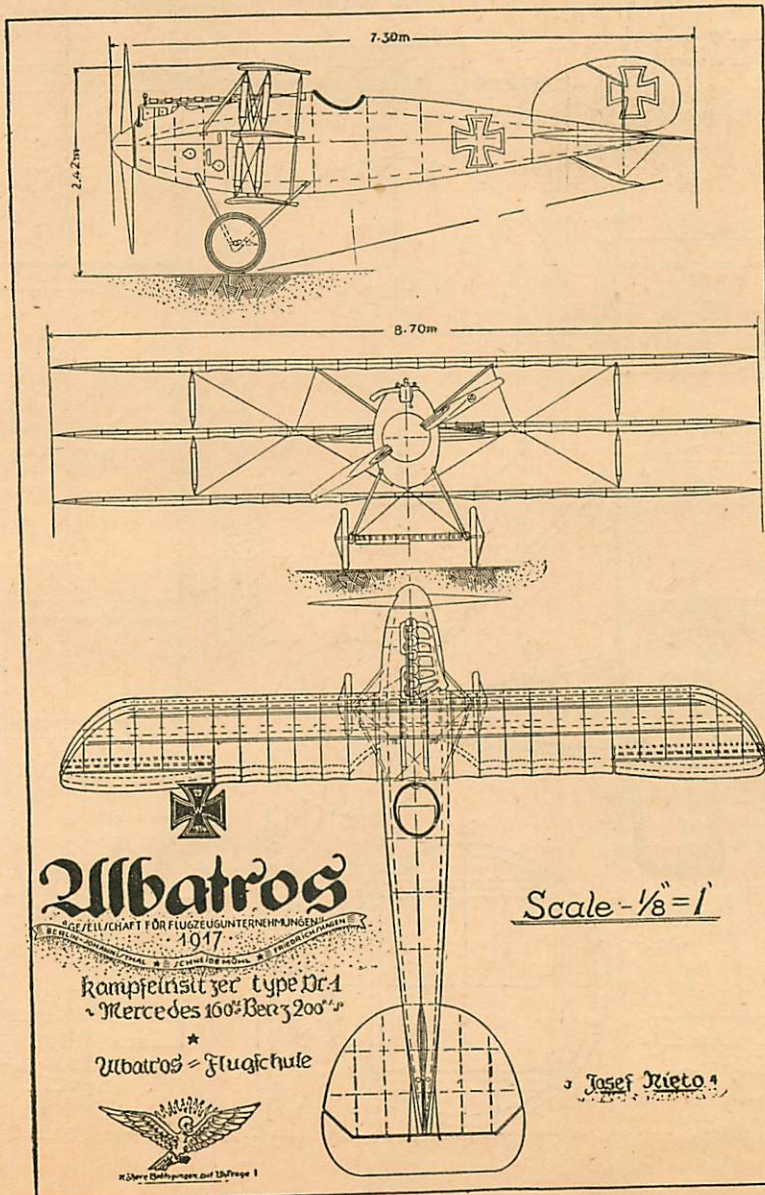
Due to the fact that the Albatros C type was an "all purpose" plane, it is not generally known that the C-5 was one of the first German two-seaters to be used as a firefighter. Aerodynamically speaking, the Albatros C-5 was considered more than lightly as the first in line in respect to value not as a photographic, reconnaissance or firefighter, but in regard to its merits, co-operating with the faster fighters classified as the D types of the same name. Running up to the Albatros C-10 and C-12 produced about the same time as the Dr-1, the C-5 perhaps is chiefly interesting on account of its sharp contrast to the more advanced C-12, which in turn held such a marked resemblance to the Albatros D-5a.

Interesting to note in the C-5, is the evident attempt to provide as good a streamlined body as was possible in regard to such external fittings as machine-guns, etc., and where the gunner frequently had to stand up with the upper portion of his body exposed above the fuselage, detracting to a certain extent from the efficiency of the body lines.

This effort to streamline the C-5 is noticeable especially where the aluminum cowling over the engine was carried right across leaving



The beautiful Albatros C-12, (1917), 260 h.p. Mercedes

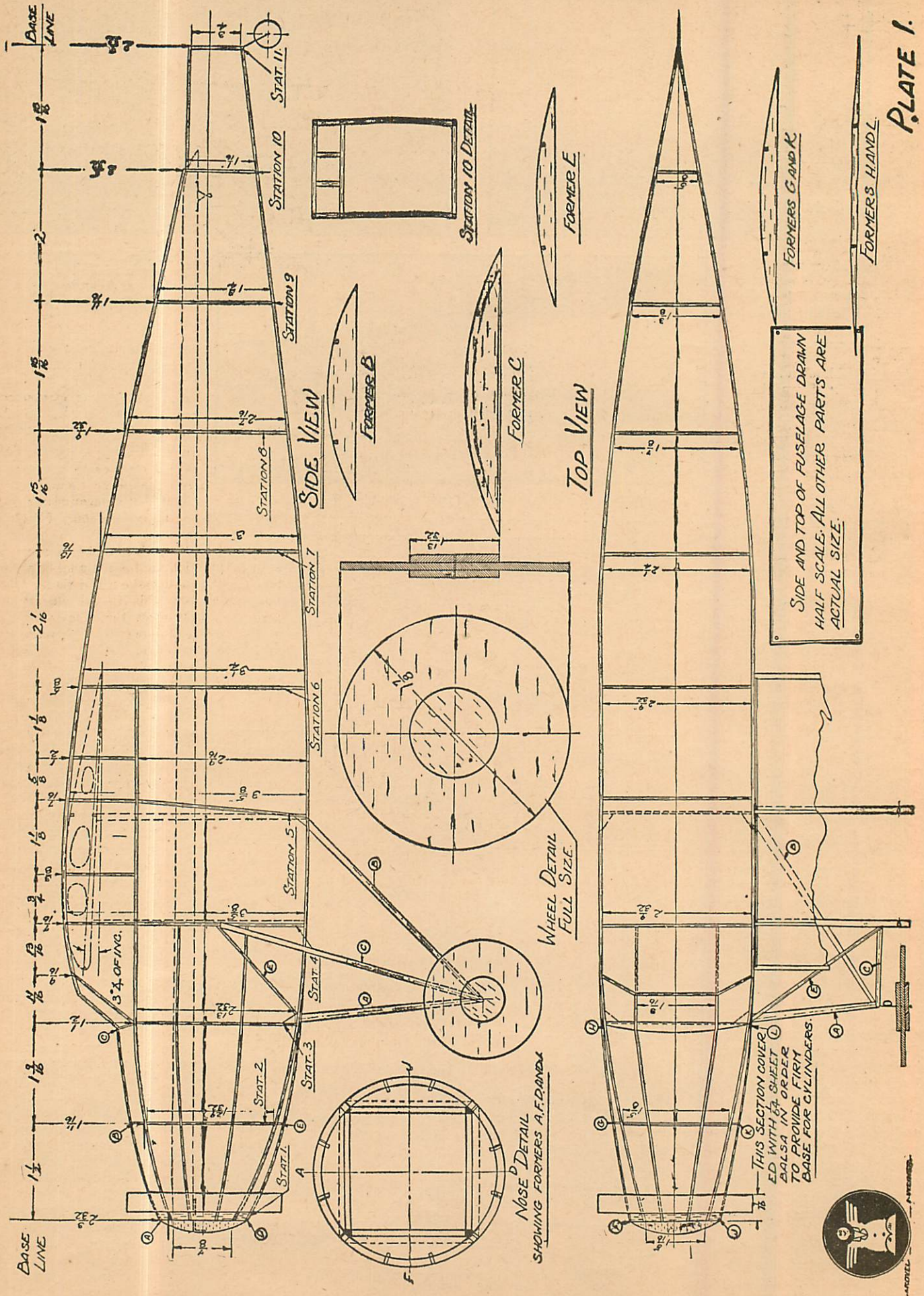


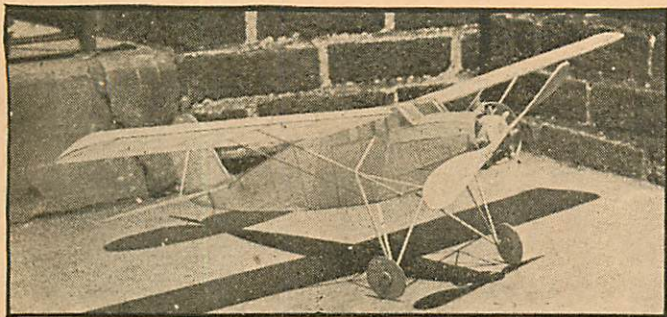
only the exhaust line exposed. In front of the covering of the body proper was a cowl shaped as a truncated cone, which served to enclose the nose and reduction gear of the engine, and carry the body lines into those of the spinner at the root of the propeller.

Fundamentally, the C-5 body construction was the same as that employed in building light boats and hydroplanes. The very light construction consisted of four main longerons of wood placed at the corners of the rectangular body sections, and two auxiliary longerons mounted thereon about half-way up on the sides. Bulkheads of varying shapes and thicknesses were placed along the body at intervals.

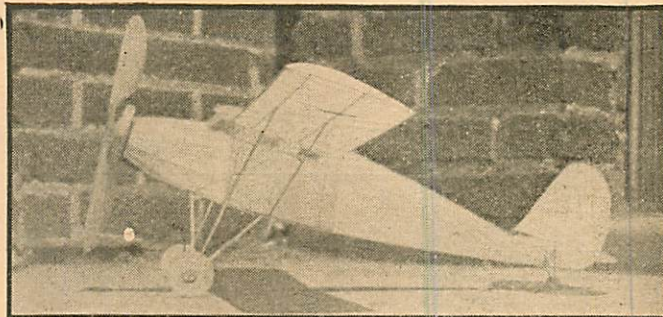
According to the safety factor of the C-5 body construction as experimented by the Deutsche Versuchsanstalt für Luftfahrt engineers, the rating proved to be about 60 and the resistance to bending 2.5 times greater than that of a diagonally wired body of the same outside dimensions. The pilot's seat in front was disregardedly placed on the main benzine tank which had two small annexes on top and one on each side of the seat. The pilot operated a stationary M.G. gun mounted at his right in front, by means of a hand-grip trigger on the control stick. The observer in back was equipped with a machine-gun mounted in fork method to a 3 ply wood ring which in turn was mounted on rollers to reduce friction.

The wing construction of the C-5 is characteristic of the Albatros design. The front spar of the one piece upper wing was placed well forward close to the leading edge (Continued on page 39)





A trim-looking ship with a fine performance



Scale proportions are well carried out

Build This Prize-Winning Stinson

Complete Data From Which You Can Build
This Flying Scale Contest Model With
a Flight Endurance of More Than Two
Minutes

By JOSEPH KOVEL

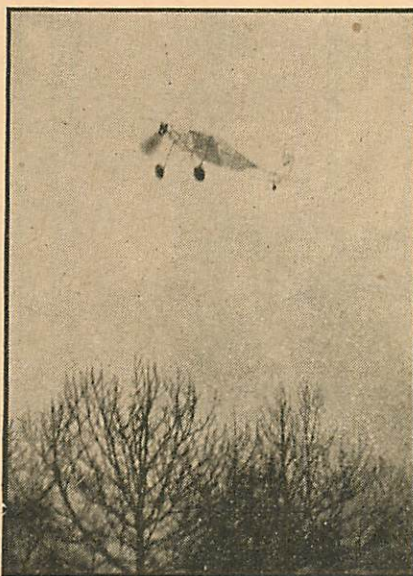
DECEMBER 27th, 1933, The Brooklyn Daily Eagle's "Junior Aviation Club" held its annual indoor meet at the 106th Infantry Armory, at Bedford and Atlantic Avenues, Brooklyn, N. Y.

The featured event of this meet was the "Replica" or "Flying Scale" event. It was a long time since an event of this type was held in this vicinity and it naturally incited a great deal of interest. There were over a hundred entries in this event and the air was filled with all sorts and sizes of miniature aircraft.

The models were first viewed by a board of inspectors, which was headed by Roger Q. Williams, the famous trans-Atlantic flier. After the entries were inspected and approved, the official flights started and were watched with a good deal of interest by both the contestants and the many spectators who came to watch this novel spectacle.

The "Stinson Junior" entered by the writer took the lead from the start with a flight of 47 seconds. After a slight adjustment, the model was wound up, launched and climbed to an altitude of about 55 feet. On this flight, the ship cruised around for 1 min., 32 2/5 sec. This flight caused quite a bit of comment and the preparations for the next flight were watched with more than ordinary interest by the timing officials, as well as by the contestants.

On its third flight, the ship unfortunately drifted to the side of the armory and was caught in the girders. However, Freddie Bergen, one of our up and coming model enthusiasts, was kind and agile enough to retrieve the model. Having the model well adjusted, your writer wound the motor of the ship to its limit and launched the model. It climbed away to a good start and soon reached an altitude of 70 feet. In fact, it was just barely missing the lights in the armory, and caused the proud builder of this ship many an anxious moment. It circled around gracefully, looking for all the world like its big brother, the original Stinson "Junior." Due to the fact that the winds in the motor were exhausted, the ship finally decided to come down. It was "dead-stick" about 15 feet up and glided down to a beautiful landing. The elapsed time of the flight was 2 min., 1 3/5 sec., which was



Though a scale model, it flies as well as one of the contest fuselage type

announced as a world's record for "Indoor Flying Scale" models.

General Instructions

Study the plans and read instructions carefully before starting work on the model. Take plenty of time in building the model in order to insure good workmanship. When building the ship, be sure to use the grade of wood specified, as this has a great deal to do with the balance of the finished model.

Sandpaper each piece of wood that goes into the model. This removes the "whiskers" which have no structural strength, yet burden the ship with useless weight. Remember that this is an indoor model and that every bit of unnecessary weight will detract from its flying time.

Fuselage

In order to make the fuselage, select a soft board to work on (about 8" x 30") and tack a sheet of drawing paper over it.

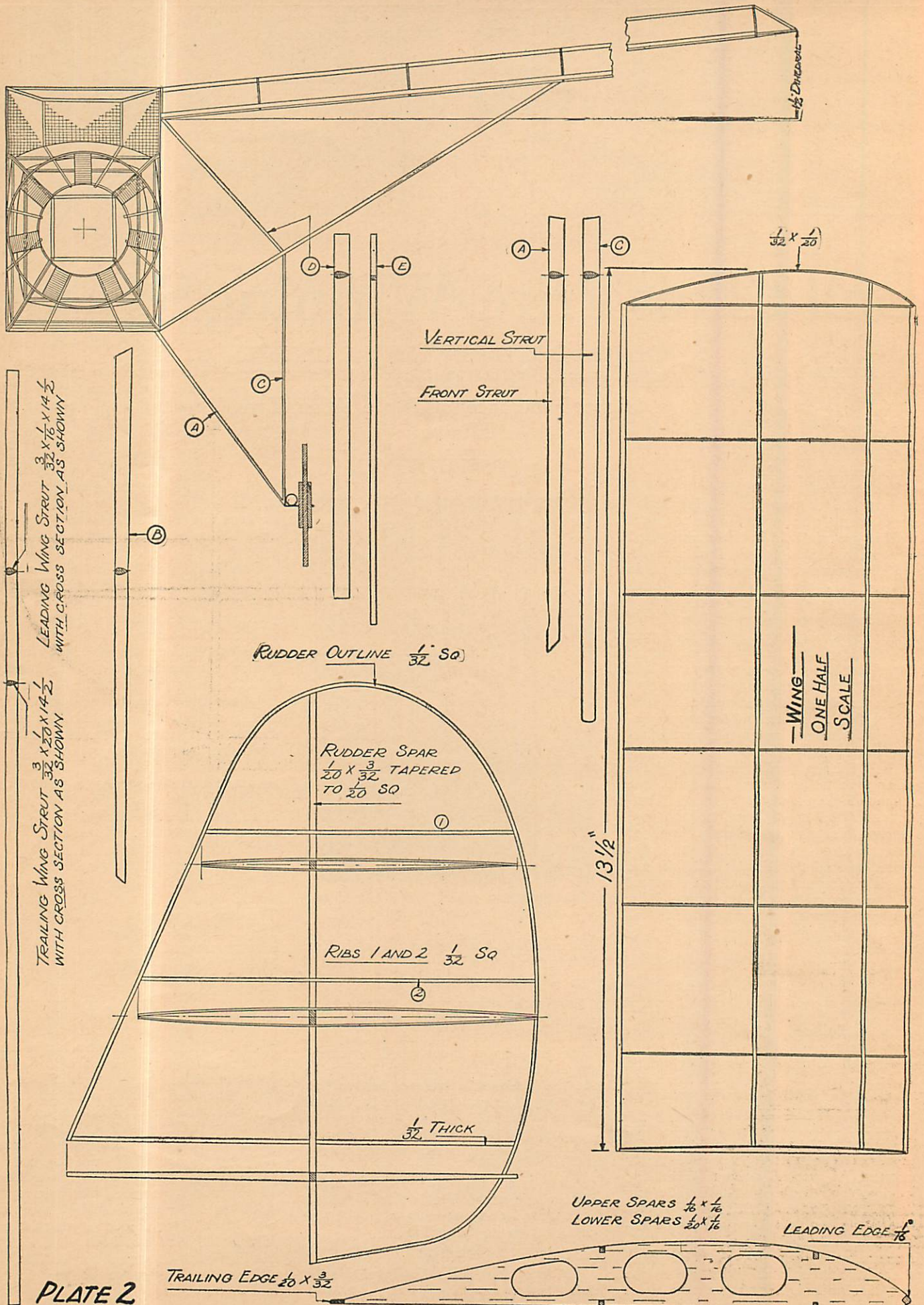
Draw the base line of the fuselage about an inch from the long edge of the board, then drop a perpendicular from that line about 6" from the left side of the board. This perpendicular to the base line will determine the position of station 1. Drop the perpendiculars from the base line that will determine the positions of the other ten stations, (Plate 1, Side View).

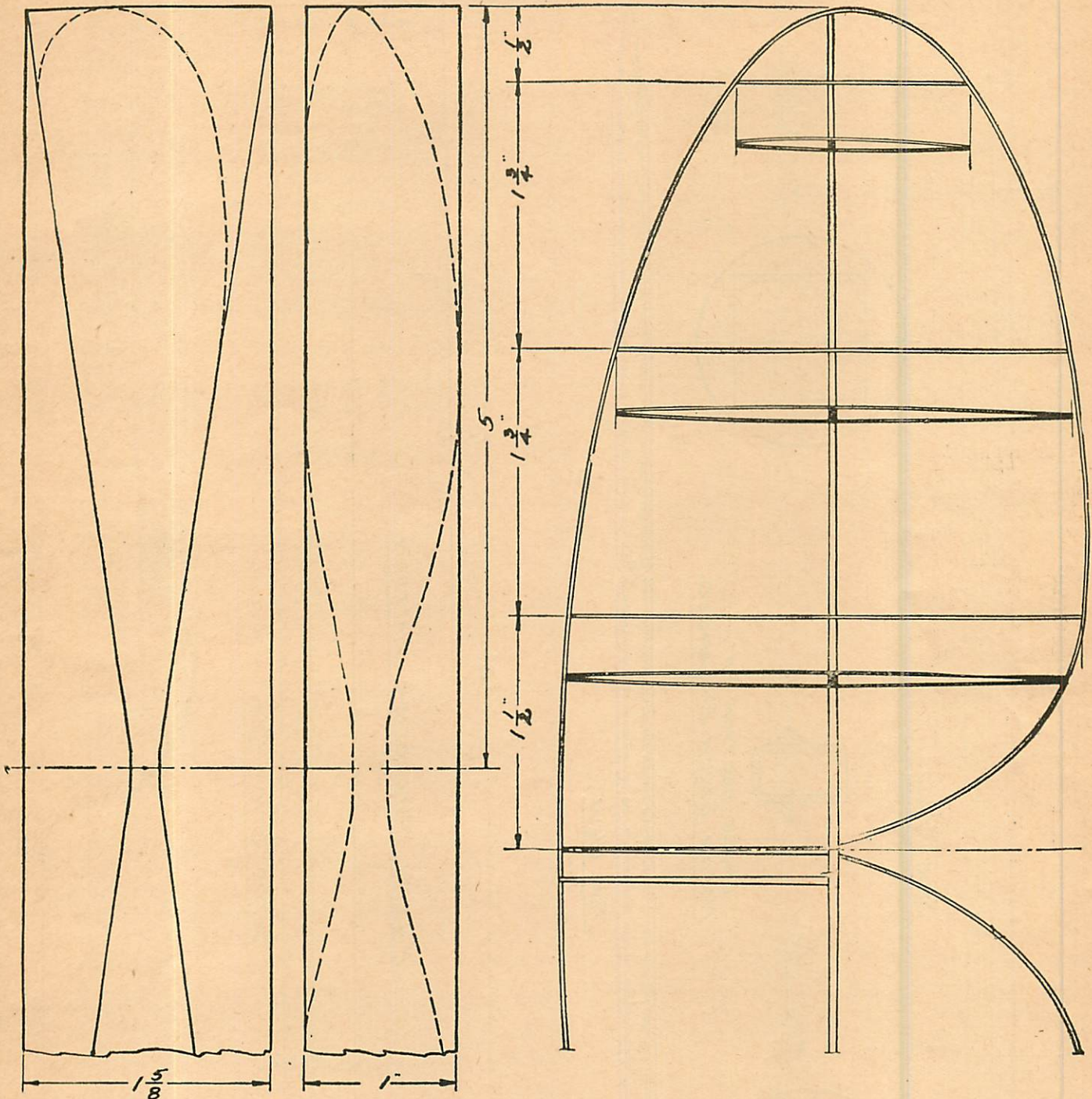
From the base line, measure down on each perpendicular, the distance indicated on the plan, and make a dot there. When you have done this to all eleven perpendiculars, connect the dots, using the same curve as shown on the plan, and you have the top outline of the fuselage side. In order to obtain the bottom outline, measure down on each perpendicular from the top outline, the distance indicated on the plan. Make a dot there and when this has been done to all eleven stations, connect the dots with a line, using the same curve as shown on plan. When the top and bottom outlines of the fuselage sides have been obtained, draw the various struts into place and you are ready to start work on the model.

The longerons of the fuselage are made of 1/20" sq. balsa, medium grade, and sanded to a slightly round cross-section. The struts are 1/32" x 1/20" medium balsa, with the exception of the struts located at station 1, which are 1/20" x 1/8". Make the two fuselage sides as shown in the side view of Plate 1. When the two sides have been made, put them together as shown in the top view of Plate 1.

Make the various formers, which are a scant 1/32" thick, with the exception of those at station 1, which are 1/8" thick (medium balsa), notch them and cement them into their proper positions. When this has been done, cut the stringers to size (1/32" x 1/20") and cement them into place. Cement a sheet of balsa, a scant 1/32" thick by 7/16" wide, around the nose of the plane, as shown in Plate 1. (This serves to provide a firm base for the cylinders). Cement the landing gear lugs into place. If you so desire, you may give former "C" a coat of dope, sand lightly, then draw an instrument board. This will add to the appearance of the finished model.

(Continued on page 38)



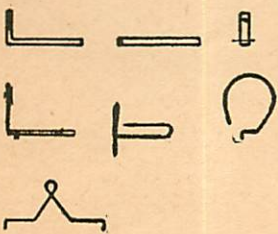


SIDE TOP FRONT

FRONT.

TOP.

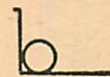
SIDE.



THRUST BEARING

CAN

REAR HOOK.



AXEL



TAIL WHEEL



PROP SHAFT.



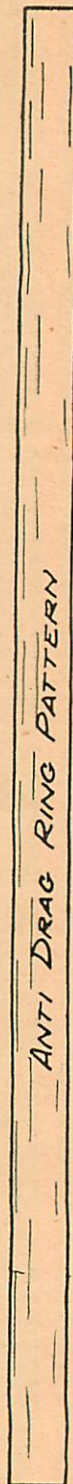
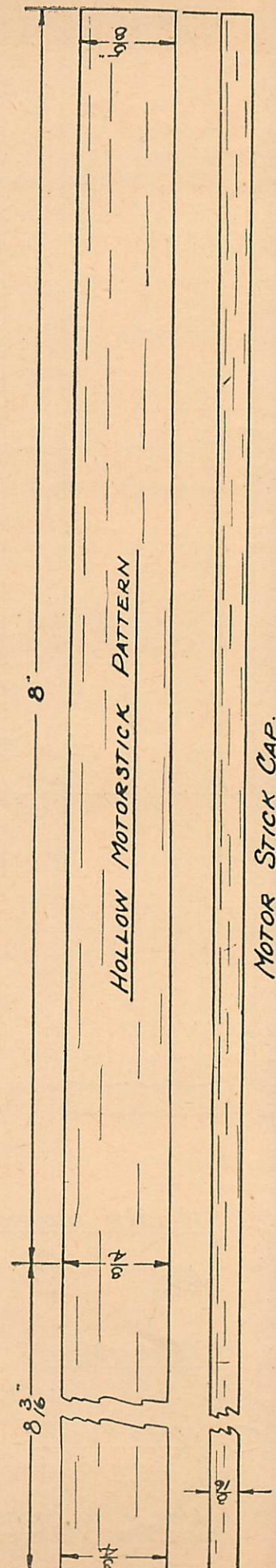
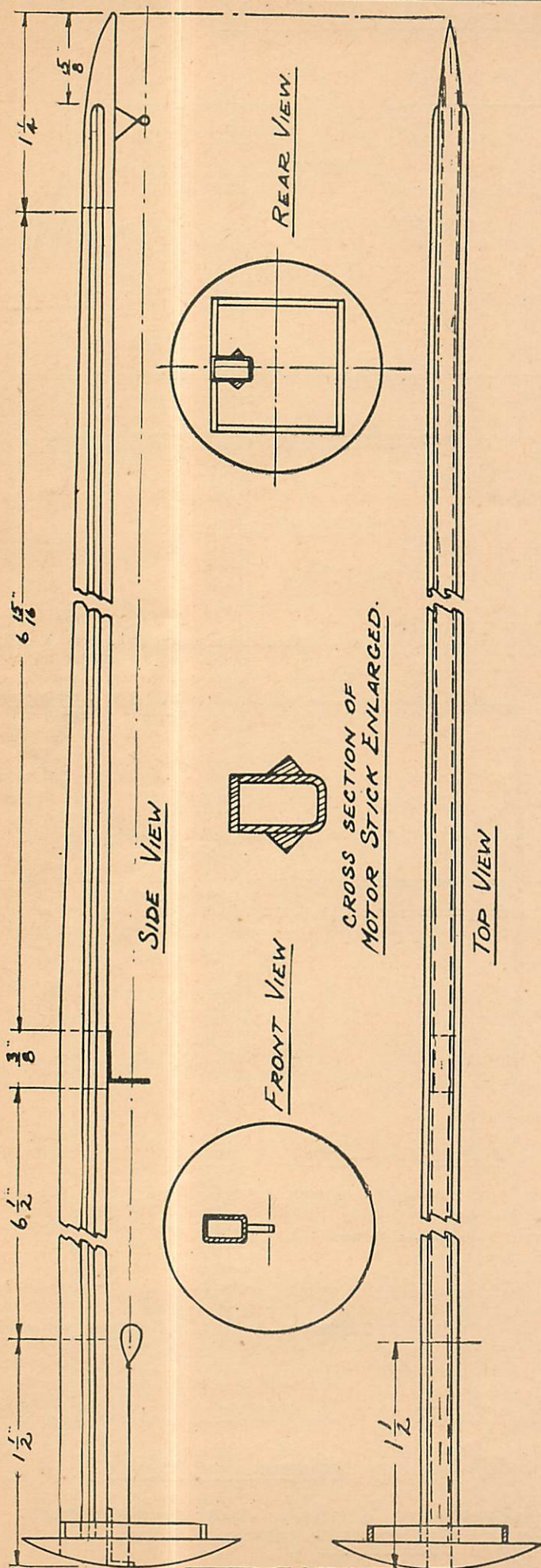
'S' HOOK



MOTOR STICK PIN.

PLATE 3

USE .026 MUSIC WIRE FOR 'S' HOOK AND PROP SHAFT.
USE .020 MUSIC WIRE FOR OTHER WIRE PARTS.



How the Aeroplane Was Created

How Many Unusual Planes Were Produced in the United States Under the Stimulus of War, Which Formed a Nucleus for Our Commercial Aviation

By DAVID COOPER

Part No. 10

NO HISTORY of operations of the Great World War could possibly be complete without an account of the part played by the United States, both in design and construction. Most of the ships were the direct outcome of experiences gained at the front by our own and allied airmen and engineers, but alas, for all their careful design, almost all of them never reached the sector of fighting. Doubtless, the aircraft of this country was at the time of their construction, second to none anywhere in the world.

Foremost among these came the justly famous Curtiss JN training ships upon which most of our pilots were trained and also those of Canada. This model lent itself admirably to the purpose because of its sturdiness and reliable power plant, the well known Curtiss OXs.

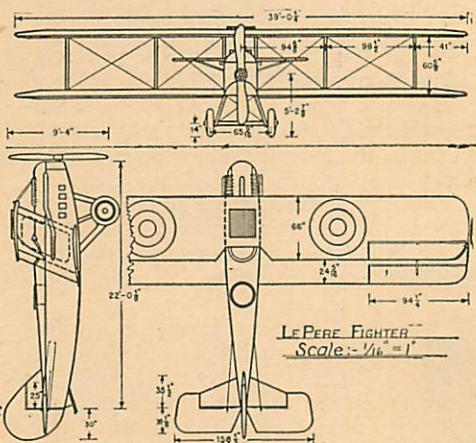
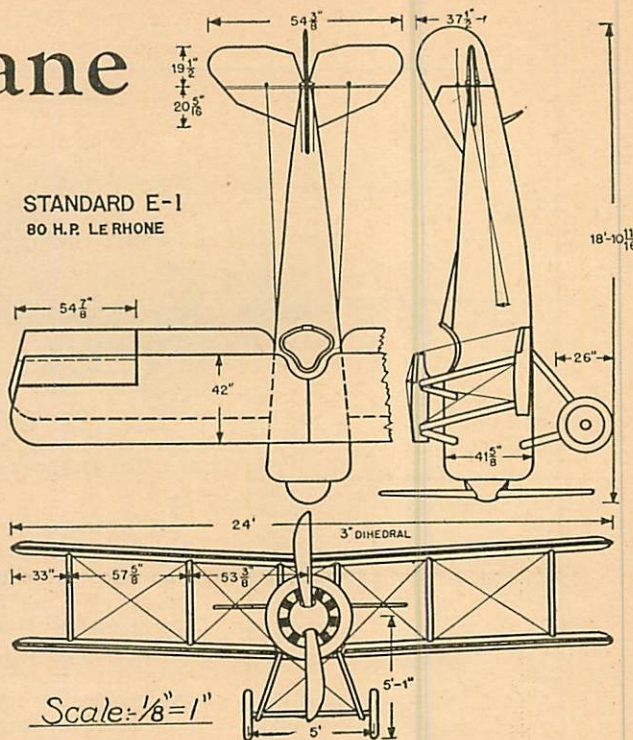
Later came the Curtiss R8 designed around the JN model. This was intended as a bombing plane but only a few were turned out.

Of especial interest was the Curtiss 18B, a two-place fighting and observation ship powered with a K12 motor, with a very fine performance. It had a monocoque type fuselage of fine streamlining and later this was changed to a triplane, the 18T, which gave better performance.

Another Curtiss model of which mention should be made is a single seater biplane fighter of exceptional merit, though

it was smaller than a average fighter and rather short, giving the appearance of being fat. A 400 h.p. K12 engine was used. Too bad it never reached the front.

Since Curtiss was the inventor of the flying boat, it was only



first crossing of the Atlantic Ocean.

American engineers had ideas also concerning monoplanes as against biplanes, and perhaps our foremost exponent was Grover C. Loening. The Loening had some very fine features to commend it, such as single solid struts which, of course, being streamlined, cut down resistance and at the same time permitted of exceptionally rigid construction. An especially narrow fuselage made for improved visibility, a great advantage in combat. This machine's load carrying and climbing ability put it in a class all by itself. Powered by a Hispano-Suiza 300 h.p. motor, it had a landing speed of 48 miles per hour while its top speed was 146 m.p.h., an amazing ratio in those days.

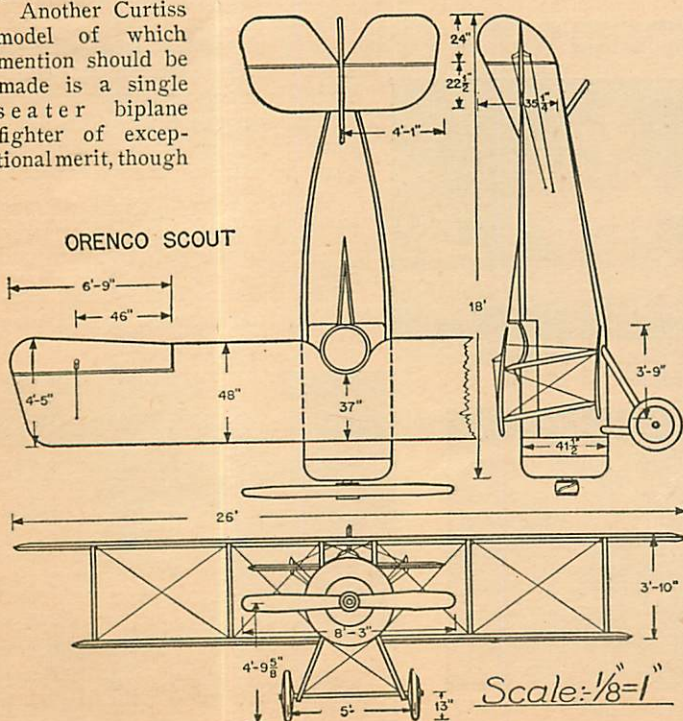
Let us take note of another group of combat planes developed in the United States for foreign service. Foremost among these were the Orenco, LePere and Thomas-Morse. We have given here a group of plans covering these three models so that the reader may see how their design compares with those of today.

The Orenco was built by the Ordnance Engineering Corporation and was possessed of fine clean lines comparable with those of today. Note that the span was only twenty-six feet and by virtue of its size was easily maneuvered and housed, making it ideal for foreign shipments.

Very similar in appearance was the Standard E1 biplane of only twenty-four foot span. To be sure, these models were not perfect and were possessed of certain tricky inhibitions, but once the pilot learned these, they became a factor that the enemy could not ignore.

Among this group was an excellent biplane possessed of some rather unusual features. The LePere fighter was constructed in the plant of the Packard Motor Company at Detroit, and of this model a few did manage to reach the front. They were used in an observation capacity.

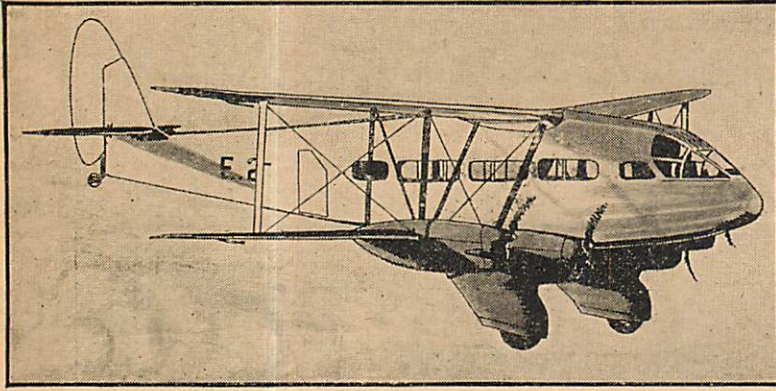
(Continued on page 40)



reasonable to expect much from his flying boats and with experience in constructing them for other nations earlier in the conflict, he was able to turn out several models of great value.

Foremost among these was the H-12, a rather large machine with twin motors and intended for operation in coast defense.

All of Curtiss' experience in this type of construction stood him in good stead in later days when called upon to design for commercial work, and also in advising during the building of the famous NC boats by the Navy, for the



The DeHavilland 86

AIR WAYS HERE AND THERE

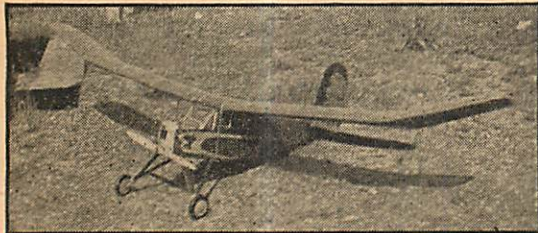
What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Send Pictures and Details of Your Experiments



Pict. No. 1. Start of the 2½ hour flight

IT IS impossible to do full justice to the amount of material which has come into the office for our Air Ways section this month. We can merely give you a brief presentation of some of the most unusual features received. However, in our next issue we will make provision to give you an enlarged Air Ways section.

One of the most important events which took place recently was a remarkable flight made by the Brown-powered Bassett model of Philadelphia at Camden, New Jersey, on May 28th. This model flew from Camden and landed at Middletown, Delaware, two hours, thirty-five minutes, thirty-nine and one-fifth seconds later. This is, by far, the longest flight ever made by a gasoline-powered model plane. It was followed by a large airplane piloted by Jack Byrne of Camden; otherwise it would have been impossible to keep the model in sight. It rose to a height of eight thousand feet. When the motor ceased, the machine reached the ground after a twenty minute glide. Mr. Fritz of Philadelphia, who followed the model in the full size airplane, remarked that when the machine began its descent, it



Pict. No. 3. Bassett's gas job which won at the National Meet



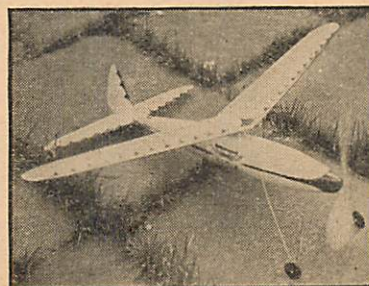
Pict. No. 6. At the Wakefield contest the model of A. E. Howell takes off. Note the rainy weather



Pict. No. 4. Joe Kovel's gas job at the National Meet



Pict. No. 2. Mike Kostich with his model "Macon"



Pict. No. 5. Frank Zaic's Wakefield model which placed third though water-soaked



Pict. No. 7. Miss Doris Carolan with her models

was all they could do to make their own ship dive fast enough to keep it in sight. With superior gliding qualities, this little machine might have stayed up indefinitely. A thirteen ounce load of gas was carried by the model.

Picture No. 1 shows the gas model at the start of its remarkable flight. Bill Brown on the right and Bassett in front of him, are passing through some tense moments while the ship gets under way.

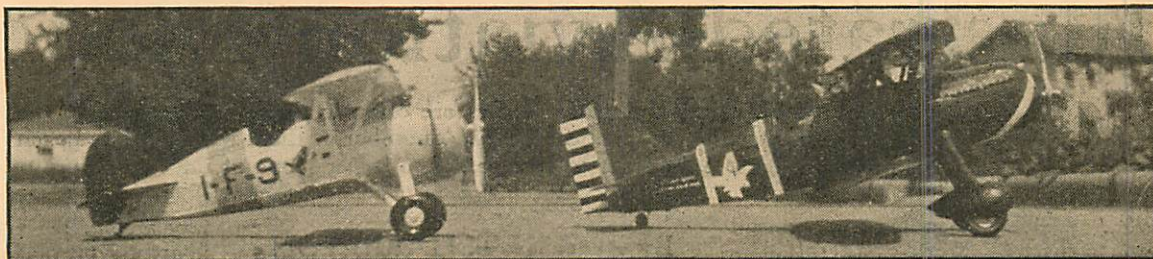
One of the unusual features of the National Model Airplane Contest recently held at Akron was the exact scale model of the dirigible, U. S. S. Macon, which was built by Mike Kostich of 390 Wabash Avenue, Akron, Ohio. Picture No. 2 shows Kostich with his model which won first place in the Lighter-than-Air division of the Scale Model Contest. This ship was built to a scale of 1/200. It took two hundred hours of work to complete and Kostich won his prize with ninety-six points out of a possible one hundred; so you can judge for yourself how fine this ship is. Anyone wishing to know any more about this model, may write to Kostich who will be glad to give more details.

Now we come to another bit of news for which Maxwell Bassett is responsible. Perhaps this is not news, for those who read last month's issue saw that Bassett won the Texaco Trophy with a flight of over twenty-one minutes with his gas job. Picture No. 3 shows his prize-winning ship, which landed four miles from the starting point.

The young man who placed second to Bassett, with a flight of fourteen minutes and five seconds, was Joe Kovel. Joe seemed to be hounded by bad luck throughout the whole day, until six o'clock. He had built a new ten foot span job which was a beauty and pronounced the best on the field by



Pict. No. 15. A Boeing F4B-3 by Harold Krueger and a Curtiss P6-E by Bill Shaw. Some fine ships!



the experts who saw it. However, on its first test flight when it was gliding beautifully into a landing, the timers who were following it in an automobile, inadvertently ran into it while it was still in the air. The collision took the chassis off the machine, broke the wing and mutilated it in other places to a more or less degree. This put Joe in a very bad spot; here was his best machine ruined and he had hoped to win first place from Bassett. Through diligence commendable in an older person, and although the sun was beating down to a tune of 130°, he uncrated his old gas job with an eight foot wing. This took some time to assemble and adjust and it was not until between five and six o'clock, when the air currents had ceased, that he was ready to get his ship into the air. This was done with dispatch, however. Upon the first attempt the plane went up for ten minutes, thirty-three seconds. Not satisfied with this Joe changed his propeller slightly, which was of new design and incidentally less efficient than the one he usually used. This resulted in a slightly longer flight. On his second flight, the plane made a duration of fourteen minutes, two seconds. The effect of the cooling air and lack of air currents was obvious. Nevertheless, under these difficult conditions the model glided for approximately seven minutes from a thousand foot altitude. It landed three miles away.

Picture No. 4 shows Joe's gas job. Joe is in the background testing his rubber-powered plane which he entered in the Mulvihill Event. While Joe is thus engaged, Mr. Grant, the designer of the gas job, acts as "watch dog." He is shown near the tail of the ship.

Through the courtesy of Frank Zaic of 328 East 6th Street, New York City, we are able to present one of the most remarkable rubber models, in picture No. 5, that we believe has ever been built. This is Frank's Wakefield model which was sent to England to take part in the Wakefield Contest. On the day of the Contest, it rained very hard so that all of the models

became more or less water-soaked, especially the balsa body of Frank's plane. This condition caused the weight of the model to be increased about three ounces. The weight when flown was nine ounces. However, even with this handicap, he placed third among the winners with an average time of one minute, twenty-five seconds, for three flights. The fuselage of this ship is made of solid balsa hollowed out to paper thickness. On it is mounted a sweptback and tapered high wing. The motor is doubled with gears at the rear end. This arrangement allows a double length of motor; the front end of the first motor being fastened to the propeller shaft and the front end of the second motor being fastened to a fixed hook.

Picture No. 6 shows the Wakefield model of Albert E. Howell, Junior, being launched during the Contest, in the rain, by L. G. Lucani. Howell lives at 54 Richmond Avenue, Worcester, Mass. The moisture resting upon the starting platform will give you some idea as to the weather conditions. Howell's model made an average duration of sixty-four seconds for three flights. This model took second place among the United States entrants. We would say that Howell

(Continued on page 43)



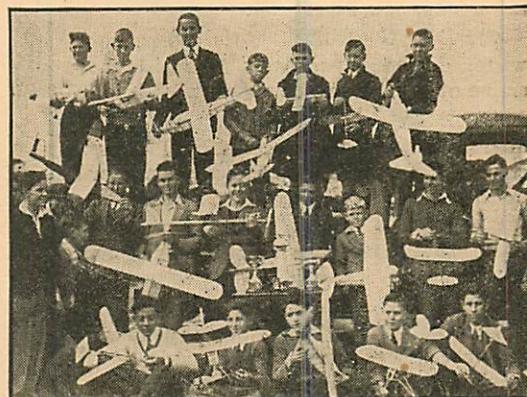
Pict. No. 8. Edward Poremba who won the Comet contest with a scale Boeing F4B-4



Pict. No. 10. The British Wakefield Team: J. B. Allman, winner, left, front row



Pict. No. 11. Essendon Model Club of Melbourne, Australia. Best official flight, 25 min. 18 sec.



Pict. No. 12. Some of the contestants at a contest recently held by the M.F.C.A. for Wakefield eliminations



Pict. No. 14. Jim Throckmorton with John Ginnetti's gas job, minus engine



Pict. No. 9. Alex Horbach who won second place in the Comet contest



Pict. No. 13. Winners of the Hartford model contest. Herbert Owen, high point winner is in the center

Illustrated Aviation Dictionary

Many model builders and other readers are often in doubt with regard to the meaning of common aeronautical words. A number of them will be defined each month, therefore, in order to give readers a larger scope of understanding

By EDWIN T. HAMILTON

85. **DOPE.** A waterproof varnish used to cover the fabric of aircraft. Usually consists of cellulose acetate dissolved in a solvent such as ether, alcohol or acetone. The liquid material applied to the cloth surfaces of aircraft to increase strength, to produce tautness by shrinking, and to act as a filler for maintaining air-tightness.

86. **DOPE, PIGMENTED.** Dope to which a pigment has been added to protect it from the effects of sunlight, and to give it color.

87. **DRAG.** The total resistance, from any source, to an aircraft's motion through the air. (2) The component parallel to the relative wind of the total air force on an aircraft or airfoil. In the case of an airplane, that part of the drag due to the wings is called "wing drag"; that part due to the rest of the airplane is called "structural drag" or "parasite resistance."

88. **DRAG, INDUCED.** That portion of the wing drag induced by, or resulting from, the generation of the lift.

89. **DRAG, PROFILE.** That portion of the wing drag which is due to friction and turbulence in the fluid and which would be absent in a nonviscous fluid.

90. **DRAG STRUT.** A fore-and-aft compression member of the internal bracing system of an aircraft.

91. **DRAG WIRE.** All cables, or wires, designed primarily to resist the action of drag forces on aircraft.

92. **DRIFT.** The lateral velocity of an aircraft due to air currents. (2) Cross currents of wind which produce an angular deviation from a set course over the earth.

93. **DRIFT ANGLE.** The horizontal angle between the longitudinal axis of an aircraft and its path relative to the ground.

94. **DRIFT METER.** An instrument for measuring drift in relation to the angular deviation from a set course.

95. **DRIFT WIRE.** A wire which extends between two compression members. Its function is to add strength and stability to the wing structure.

96. **DURALUMIN.** An aluminum alloy comprising strength and lightness which is used in the structure of aircraft.

97. **ECONOMIC SPEED.** See Speed, Economic.

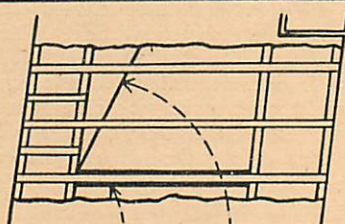
98. **EDGE, LEADING.** See Leading Edge.

99. **EDGE, TRAILING.** See Trailing Edge.

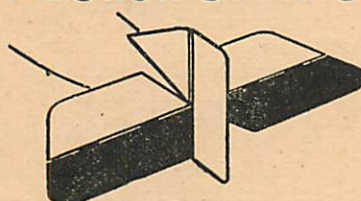
100. **EFFECTIVE THRUST.** See Thrust, Effective.

101. **ELEVATION.** Any height above sea level.

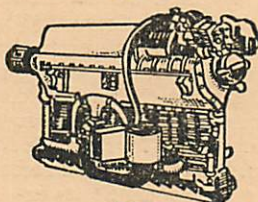
102. **ELEVATOR.** A movable auxil-



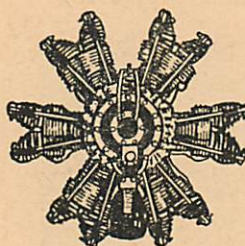
90 AND 91
SECTION OF WING



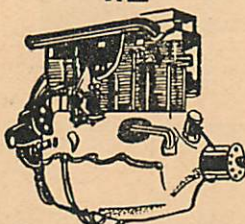
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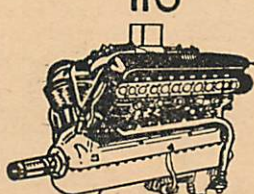
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112



116



117

ary airfoil, the function of which is to impress a pitching movement on the aircraft. (2) A hinged or pivoted, auxiliary, horizontal surface or wing which controls the up-and-down direction of an aircraft. It is usually part of the tail unit, and is attached to the stabilizer.

103. **ELEVATOR ANGLE.** See Angle, Elevator.

104. **EMPENNAGE.** Same as tail.

105. **ENDURANCE.** The maximum length of time of flight of an aircraft at a given altitude and speed.

106. **ENGINE.** The power plant of aircraft which rotates the propeller.

107. **ENGINE, BARREL-TYPE.** An engine having its cylinders arranged equidistant from and parallel to the main shaft.

108. **ENGINE CONTROLS.** See Controls, Engine.

109. **ENGINE, DRY WEIGHT OF.** The weight of the engine, including carburetor and ignition systems complete, propeller hub assembly, reduction gears, if any, but excluding exhaust manifolds, oil and water. If the starter is built into the engine as an integral part of the structure its weight shall be included.

110. **ENGINE, INVERTED.** An engine having its cylinders below the crankshaft.

111. **ENGINE, LEFT-HAND.** An engine whose propeller shaft, to an observer facing the propeller from the anti-propeller end of the shaft, rotates in a counter-clockwise direction.

112. **ENGINE, RADIAL.** An engine having stationary cylinders arranged radially around a common crankshaft.

113. **ENGINE, RIGHT-HAND.** An engine whose propeller shaft, to an observer facing the propeller from the anti-propeller end of the shaft, rotates in a clockwise direction.

114. **ENGINE, ROTARY.** An engine having revolving cylinders arranged radially around a common fixed crankshaft.

115. **ENGINE, SUPERCHARGED.** An engine with mechanical means for increasing the cylinder charge beyond normally taken in at the existing atmospheric pressure and temperature.

116. **ENGINE, VERTICAL.** An engine having its cylinders arranged vertically above the crankshaft.

117. **ENGINE, V-TYPE.** An engine having its cylinders arranged in two rows, forming, in the end view, the letter "V."

118. **ENGINE, W-TYPE.** An engine having its cylinders arranged in three rows, forming, in the end view, the letter "W." Sometimes called the "broad-arrow type."

Modeling America's Greatest Seaplane

Important Features of The Sikorsky S-42 and How You Can Build an Exact Solid Scale Model of It

By **HARRY S. PACK, JR.**

AN immense "Flying Clipper Ship," known as the Sikorsky S-42, was recently completed by the Sikorsky Aviation Corporation for Pan-American Airways.

Specifications for this ship were prepared by Sikorsky and Pan-American engineers, with the help of Charles A. Lindbergh.

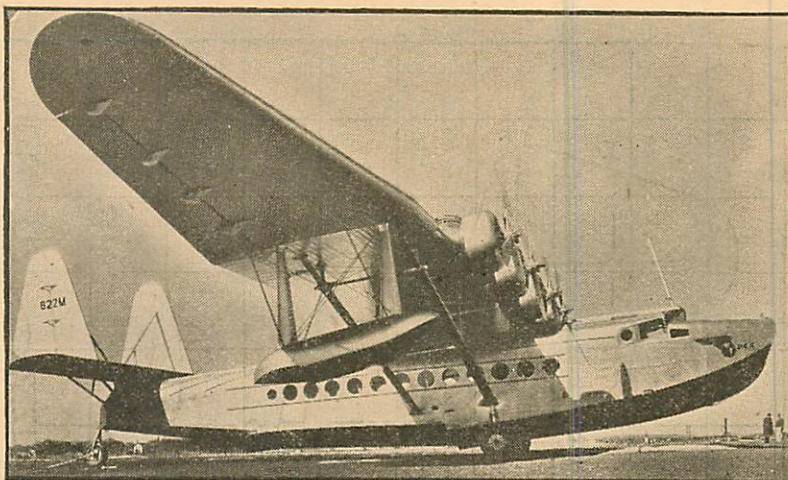
This huge plane, with a high speed exceeding 190 miles per hour, and a cruising speed of about 160 miles per hour, is without equal in the field of aeronautical transportation. It has a cruising range of 3,800 miles with a mail load and a crew, and with an additional load of thirty-two passengers, its range is only reduced to 1,200 miles. Furthermore, it weighs nineteen tons, is sixty-eight feet long, has a span of one hundred and fourteen feet, and is powered by four supercharged Pratt & Whitney "Hornet" 700 horsepower engines, driving controllable pitch propellers.

When Sikorsky received the order for these planes, they built what is called a "mock-up." This is a full size model of the hull and tail units constructed of wood and fabric. In this model, they developed such features as the windshield arrangement, control columns, motor throttles and mechanics' instrument board in a more compact unit. The baggage and seating arrangement in the passenger section of the hull was also developed to take advantage of all available space. Then work was started on the first of the three S-42s ordered by Pan-American Airways.

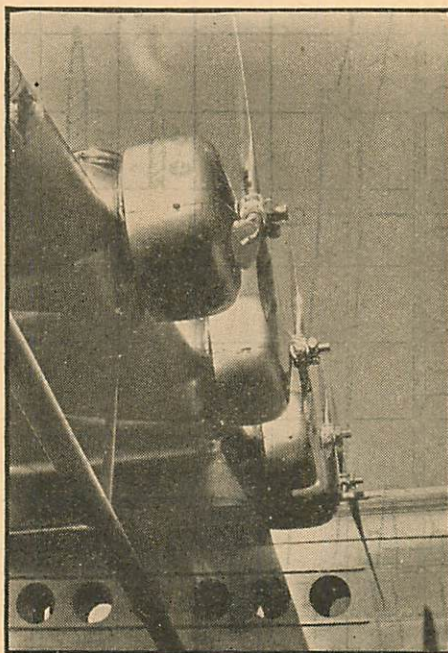
The structure of the large plane is undoubtedly the most interesting part of all. The different pieces that go into the construction of the hull, wing, stabilizer, elevator, rudders and balancing floats are assembled by bolting in a few strategic points while the rest of the rivet holes are drilled in the proper places.

Next, the whole thing is taken apart and each individual part is given a chromic acid bath as a protection against the destructive effects of salt water. These parts are then ready for the final assembly and are riveted together with a special type of flat head rivet which is flush with the surface, thereby reducing skin friction. More than 340,000 rivets are used in each S-42.

The wing construction in one piece, is



The S-42 which carries 32 passengers. Span 114 feet



The four 700 h.p. motors are well streamlined into the leading edge of the wing



The tail surfaces alone are as large as the wings of most airplanes

of all-metal structure covered with fabric. It has a one piece hydraulically operated flap which reduces the landing speed about one-third.

The interior is fitted out in the same manner as the earlier S-40 "Clipper."

It is indeed a great incentive to build a model of such a remarkable ship. Complete information and instructions follow, which will aid you in creating a miniature of it:

We will start with the hull since it will probably offer the greatest difficulties. Take a block of balsa slightly larger than the size of the hull that you have decided to build and true it up. Draw on either paper or thin cardboard squares, proportionately larger or smaller than the drawing of the S-42. Draw the outline of the side and top views of the hull on same. You can save a great deal of time by having the drawing photostated to size you desire to build. Either trace on the hull block or cut out and use as pattern. Next mark on top view of hull and cut out with knife or band-saw, being sure to cut outside of the line. Sand with medium sandpaper until down to the line. Now mark on the side outline and cut in same manner.

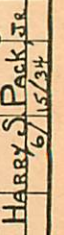
To shape the hull it is advisable to scale up and cut out the cross sections and use as templates. Mark each station on hull block and carve to proper shape. Carefully sand with fine sandpaper. If model is in large enough scale and you want to go into a little detail, you can cut out the pilots' cabin and either cut out or drill for the side windows. Cut a small groove around each window as deep as the celluloid is thick and about one thirty-second inch wide. Fit pieces of model celluloid and cement in place.

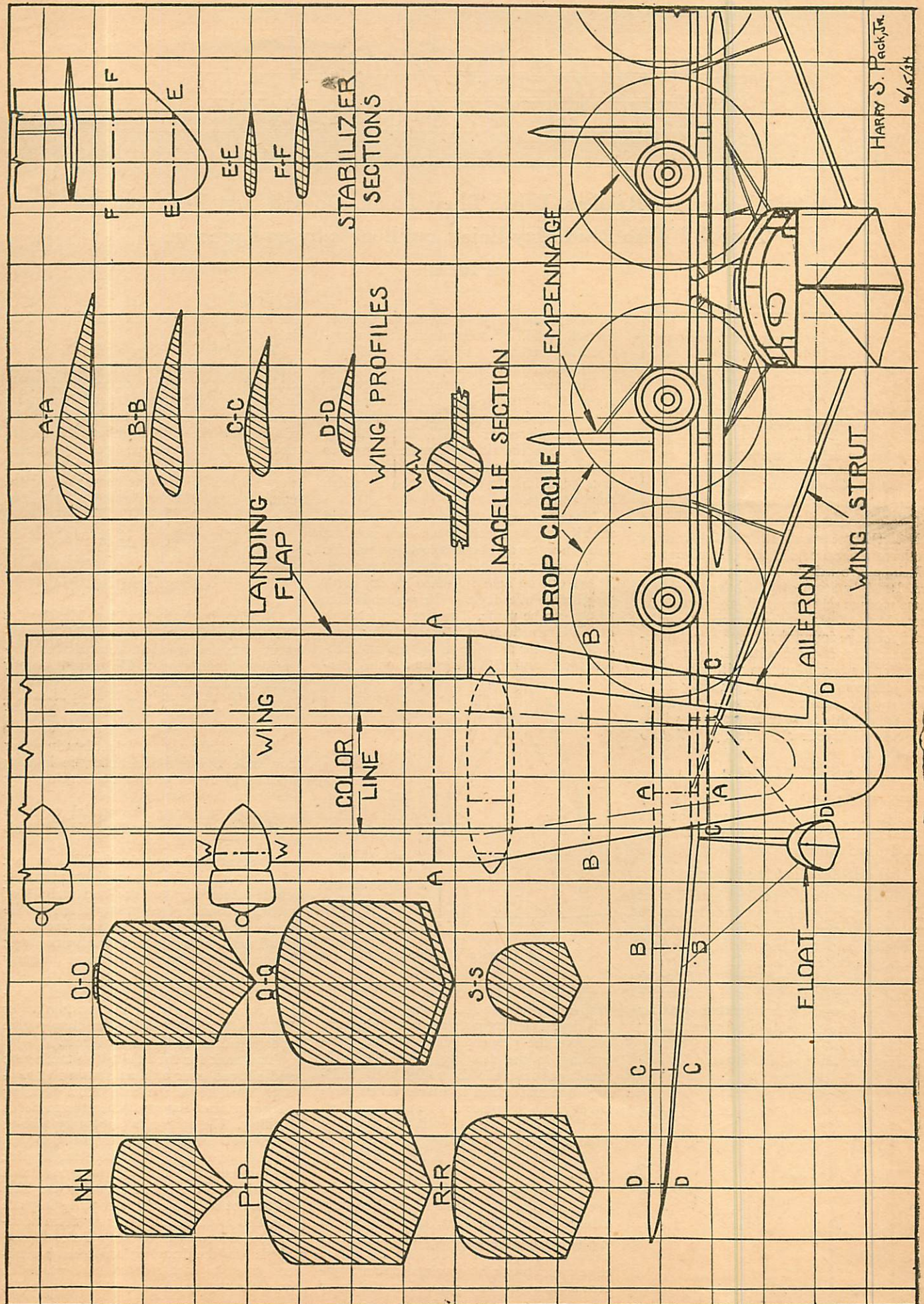
To make an exceedingly fine model of this plane, you can cut the shaped hull down the center vertically and hollow it out. It is also a simple matter to place a 1.5 volt bulb socket in the roof of the cabin and wire it so you can connect it to an external battery.

Next we will tackle the wing, which can be made in one or three pieces. Remember to allow for the dihedral if you make it in one piece. It can be made in three pieces. Using templates of the wing profile (cross section), carefully shape

(Continued on page 44)

ONE SQUARE = THREE FEET







An Open Forum for Readers, What They Think, Do and Say, Presented So That All Who Read May Enjoy and Benefit by an Exchange of Ideas

We cordially invite all our readers to make use of this department of the magazine to present their ideas, criticisms, arguments and commendations, on all phases of aviation. If you feel that any idea presented herein warrants commendation or criticism, write, telling what you think about it, so that by debate, "truth" may be determined. Address all letters to "SLIPSTREAMS.—The Editor."

IN THE first presentation of this column we have several ideas, the originators of which believe will be of value to our readers. Possibly some of you have tried out these various schemes, or improvements of them. If you feel that they are worth while, or if you have found that they are not practical and offer any difficulties either in construction or operation, we will appreciate your comments. Perhaps you may have some suggestions or improvements to offer. Remember, this is your column; in which you can "air" your views freely. *What do you think?*

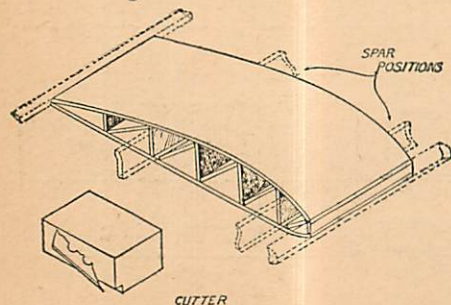


The first idea has been submitted by Fred C. Tuxworth. He believes that this is an excellent method to use in making ribs. It is as follows:

Built-Up Ribs for Models

With the method described herein, a set of ribs for the popular sized model can be made in less time than it takes to cut the solid ribs, and will use much less wood. When the wing is done it will be as strong as any other. Built-up ribs not only make a model wing much lighter but allow the ribs to be placed closer together, making the wing more efficient and a much better looking model airplane.

In making a set of ribs for a scale mod-

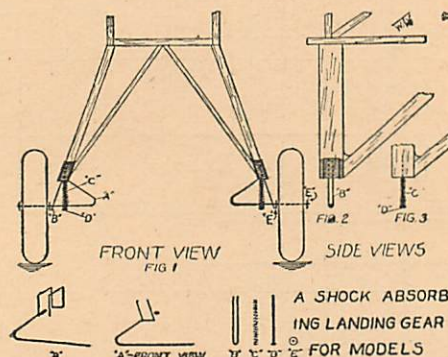


By Fred C. Tuxworth

el, exhibition or flying, the actual number of ribs should be determined. If you cannot find the exact number, you will have to use your own judgment.

For models of less than three foot wing span, 1/32" balsa can be used and the ribs should be about 1/16" in thickness. Get two pieces of 1/32" balsa slightly longer than the ribs and wide enough to allow 1/16" for each rib's thickness. It is a good idea to allow a little in width for breakage.

The first step is to draw a side view of the rib and its construction, then soak the balsa in water and bend it to shape, one for the top piece and one for the bottom piece. These can be held in shape to dry with weights. While drying, the perpendicular pieces can be made. The size of these can be determined from your drawing and should be cut as wide as the top and bottom pieces and with the grain running per-



By Charles W. Shirley

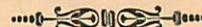
pendicularly. These can be glued in the proper position on the bottom piece when it is dry. The diagonals are next. They are cut like the perpendicular members, according to the drawing, with the grain running from the leading edge to the trailing edge and glued in place. When these are dry, the top piece can be put on. When the blank is dry, go over it and put glue on all the joints so that every piece is held solidly, then the blank is allowed to dry again.

The cutting of the ribs is not difficult, but at first do not try to rush, and be very careful unless you have several ribs to spare. The cutter is made from a block of balsa with a groove 1/16" square in one edge and a razor blade glued on an adjacent side, as in the figure. Glue the razor

so that it won't cut more than 1/16 of an inch deep.

The cutter is drawn along the top of the blank from the leading edge to the trailing edge, then back to the leading edge along the bottom. A two-edged razor is then drawn between the blank and the rib, cutting the cross members. If you are not careful in glueing, some of your ribs may not be entirely held together, and they should be fixed as soon as they are cut.

This idea looks as if it might make model building easier. Have you a better one?



Now we have another idea. Mr. Charles W. Shirley, in the course of his experiments, has developed an unusual shock absorbing landing gear. He presents it for your consideration.

A Shock Absorbing Landing Gear for Models

A very sturdy and efficient landing gear for scale flying models may be had by adding to them the shock absorbing unit shown in the drawing.

Besides allowing the model to make smoother and better landings, it also adds to the life of the model.

The materials needed to build this shock absorber are as follows: piano wire, the grade according to size and weight of model; a small wire spring which can be made by bending piano wire around a small nail or bought at a hardware store; a common straight pin and some ordinary black thread.

Start the shock absorber by first building the axle as shown in drawing under "A." After bending this to shape, glue and thread to landing gear struts.

The track for the axle "B" is made next and slipped over axle as shown in drawing. This keeps the axle from bending backward and forward when the model is landing. The spring is put on by sliding a loop of the spring over the axle and fastening in place with the straight pin; the pin sliding through the spring and fastening to the landing gear strut. This serves not only to hold the spring in place but also to prevent the spring from bending out when pressure is applied.

"E" on the drawing is two brass washers glued to each side of both wheels to hold the wheels in place. The one on the

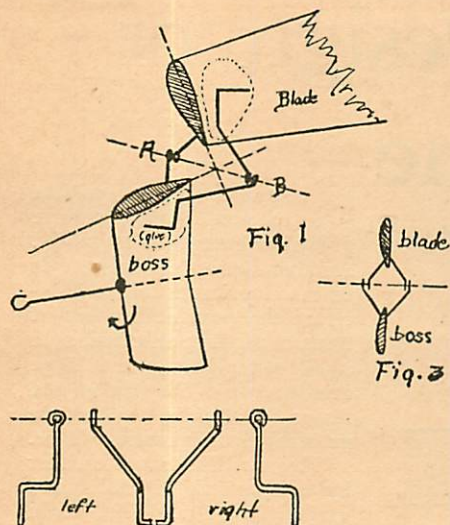


Fig. 2

By Denton Stockton

inside keeps the wheel from rubbing against "B."

This landing gear has been tested on a heavy scale flying model of a Curtiss Hawk P-1 Pursuit and has proven highly successful.

This device looks to be an excellent one. Builders have spent many hours trying to devise a simple apparatus of this type. Have any of you readers something that you feel will operate more successfully? If so, send it in and tell us why you think it is better.



A young man who has been a continuous contributor to "Air Ways," Denton Stockton, feels that he has worked out a very unique idea for a folding propeller. We will let you be the judge of it. Here it is.

A Folding Propeller for Model Airplanes

Advantages

It reduces head resistance while gliding; also reduces danger of breakage on landing. It folds into small space for storage and serves the same purpose as the popular "free wheeling" propeller. It is especially recommended for the scientific twin pusher models or any other model which has no landing carriage to protect its propeller. It sets the center of gravity further back for the glide.

The drawing (fig. 1) is a sketch of the propeller in the folded condition caused when it is no longer producing a forward thrust. However, when the model is flying under its own power, the propeller looks and acts exactly the same as if it was one solid piece instead of three hinged together. The air striking the blades on the forward side causes them to fall back as indicated; (fig. 1).

The only difficult part in constructing this folding propeller is the forming of the hinges; (fig. 2). They are made from steel piano wire which is the same (about) diameter as the propeller shaft, and are bent to the proportions shown in fig. 2. (Those in fig. 2 are full-sized for a forty

inch twin pusher using eight strands of one-eighth inch rubber in each motor).

It will be noticed that there are two left and two right for each joint. Obviously, a two-bladed propeller will require eight of the wire fittings; four left and four right. They are assembled as shown in fig. 1 and fig. 3, with the prongs of the blade fitting inside those of the boss to prevent side-play. A wire (the diameter of the eyes of the pieces just formed) is passed through the loops or eyes along line AB, fig. 1. The ends are bent over or a drop of solder is put on each end of the wire after it is in place. Two of these are required. The wire hinges should be firmly cemented in correct position to the balsa parts.



The problem of automatic stability has intrigued many model builders and various ways of securing it have been devised. Following we present a method originated by Hing Lee.

Automatic Lateral Stability on a Model Airplane

On flying scale models, especially those with very little or no dihedral on the wings, lateral stability is quite hard to obtain. However, through the simple method

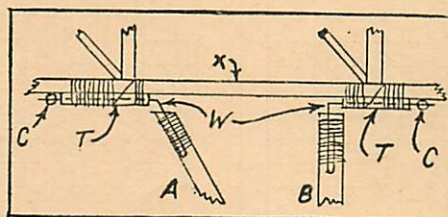


Fig. 1

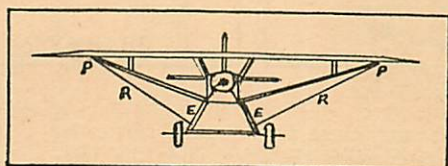


Fig. 3

By Hing Lee

shown in this article, automatic lateral stability can be had. If for instance, a plane with the device to be described should fall over on one wing, as in fig. 4, it will recover normal flight instantly. This device is not only very useful, but is also light, simple and easy to build.

Here is how it is made. The landing gear is the main thing involved. In fig. 1 is a side view sketch showing how the landing gear should be attached. A and B are the landing struts, to which wire (W) is glued and threaded as shown. A part of the wire, bent to the correct angle, is inserted into a piece of aluminum tubing (T), which is glued and threaded to the fuselage longeron (X). At the end of the wire is glued a bead (C) to hold the wire from slipping out. So far, one can see that the main idea is to have the landing gear so that it can swing on the wire axles from side to side.

However, in order to hold the landing gear to the correct form, a spreader must

be used. If the spreader is cemented to the landing struts, the landing chassis would become rigid again. This is not desired, so therefore, as shown in fig. 2, a piece of aluminum tubing (T) should be cemented and threaded in place at the point where the struts (A) and (B) converge. A wire (W) bent as shown and glued to the spreader (S), is inserted into the tubing and a bead (C) is cemented to the end of the wire to hold it in place. The loop in the wire will absorb landing shocks. One will now find that the landing chassis has been strengthened but that it can still swing from side to side freely.

Now while the landing gear is in the correct position, tie two threads (R) tightly on each side of the plane as follows: one from a point (E) on strut (A) to a point (P) on the wing, (see fig. 3); and one from a point (E) on strut (B) to the same point (P) on the wing.

Now the device is finished. An explanation showing how it works is as follows:

In fig. 4 is shown a model falling on the left wing. Since the landing gear can swing from side to side, gravity tends to pull it down and towards the left. This will cause the threads (R) on the left side to loosen a little and the threads (R) on the right side to tighten. The weight of the landing gear which is being pulled down and towards the left by gravity, causes the right wing to lower since the landing gear is attached to the wings by threads and the plane will be flying level laterally again.

Have any builders tried this system? If so, what have been your results? Do you think this device will operate in the manner described by Mr. Lee? Possibly some of you may have some questions about this. What do you think?

Next month we will have several new ideas submitted by our readers. We hope that you will write to us and tell us what you think of them. Any criticism is welcome. Remember that this column is an "open forum" for readers of UNIVERSAL MODEL AIRPLANE NEWS, in which they can discuss model building freely in all its ramifications.

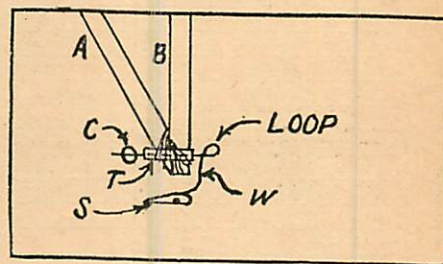
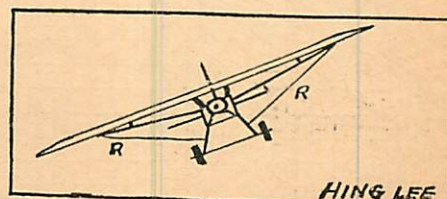


Fig. 2



HING LEE

Fig. 4

By Hing Lee

The Aerodynamic Design of the Model Plane

Article No. 32

Chapter No. 4

IN THE preceding issue, we learned that the important power factors of a rubber motor are Torque and Number of Turns that can be stored in any rubber motor. From these the amount of work and power that can be delivered by a rubber band motor can be determined. Tables were given, therefore, which indicated the value of the *torque* for any given number of turns up to the breaking point of the motor. These values for the torque have been taken periodically as indicated by the number of turns at the top of the columns, while the motor was being wound up from zero to its maximum number of turns.

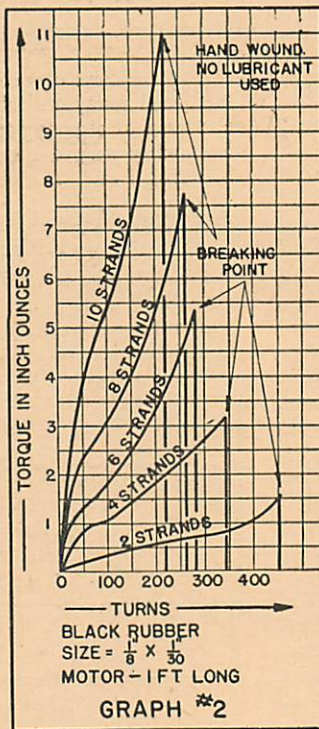
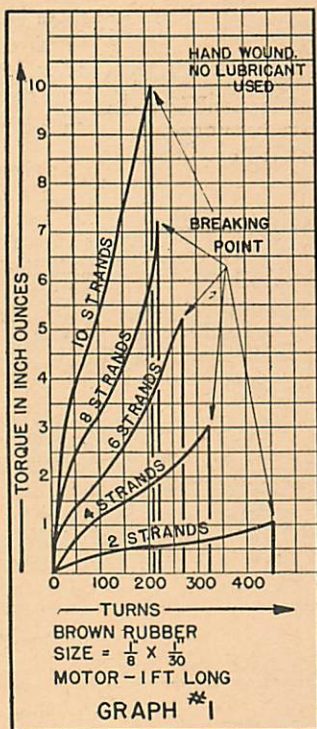
The tables given here can act as a valuable basis of calculation and a means of indicating the *relative* torque developed by motors of various quality and number of strands.

The figures shown below provide graphical presentations of the numerical values given in the tables last month. The graphs show how the torque increases with the number of turns in motors of various number of strands, quality and size of rubber used. Graph No. 1 is the graphical presentation of table No. 1, Graph No. 2 of table No. 2, etc.

Now let us see what kind of

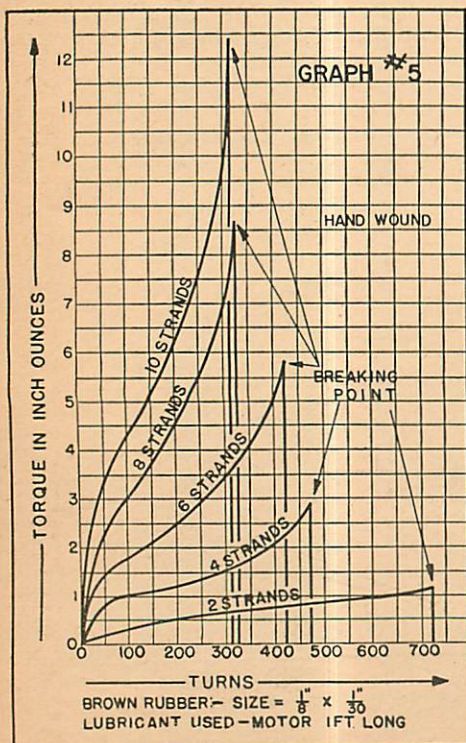
The Design of Rubber Motors and Results of Tests That Show the Relationship of Important Factors of Design

By CHARLES HAMPSON GRANT



strands are used with a lubricant, there is a much greater increase, about 35%. Another point of interest is that a lubricant does not increase the possible number of turns to as large an extent with small strands as when large ones are used. The smaller and fewer the strands, the less the percentage of increase will be.

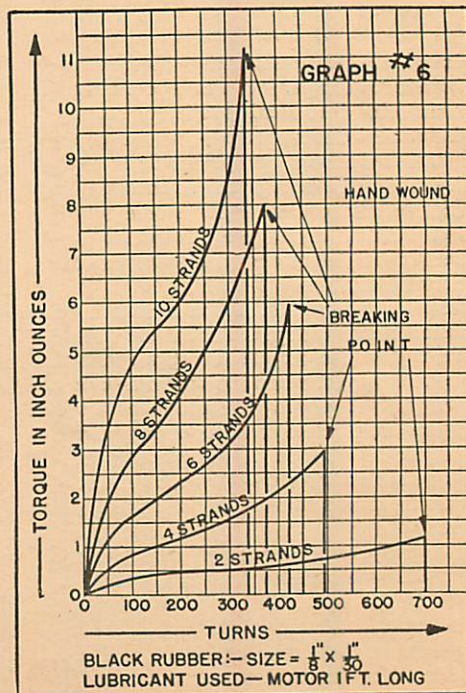
This is illustrated further by comparison of tables and graphs No. 4 and No. 8. In these tables $\frac{1}{32}'' \times \frac{1}{32}''$ rubber is used; about half the size of the rubber used in the tests, results of which are shown in tables and graphs No. 3 and No. 7. Here it is shown that the application of a lubricant actually reduces the maximum number of turns when few strands are used. However, as the number of strands increase, the possible maximum number of turns increase with the application of lubricant, until an increase of about 22% is attained when twelve strands are used. Under the same conditions, when twelve strands of $\frac{1}{16}'' \times \frac{1}{32}''$ rubber was used the increase was 35%; and with $\frac{1}{8}'' \times \frac{1}{30}''$, 50%. No doubt these facts will explode a lot of theories heretofore propounded by model builders of repute. After all, whether you find you are right or wrong, it is better to know the truth than to guess at it.

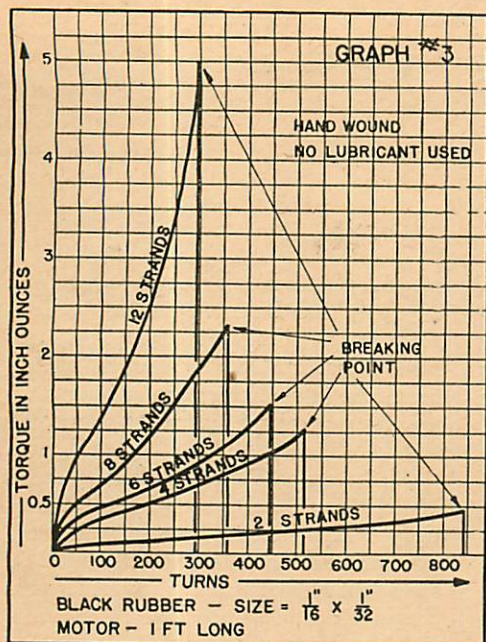


a story these figures tell us. First let us consider the effect upon the number of turns when a lubricant is used without stretching the motor to wind it, as compared to the number of turns possible to store in the motor when winding it dry.

If you examine table or graph No. 5 for brown rubber, you will see that there is a consistent increase of about 55% in the maximum number of turns when a lubricant is used, over the values for a corresponding number of strands given in table and graph No. 1. Table and graph No. 6 for black rubber of the same size, indicates a similar increase over values given in table and graph No. 2.

In tables and graphs No. 3 and No. 7 in which motors of finer strands are used ($\frac{1}{16}'' \times \frac{1}{32}''$), an increase in the number of turns is indicated when lubricant is used. This is so regardless of the number of strands in the motor. However, you will note in this case that when few strands are used, two for instance, that the increase in the number of turns using a lubricant is only about 18%, while when a large number of





The data given above refers to motors with lubricant but hand-wound without stretching. Now if the rubber is lubricated and stretched when wound, there is an increase in all cases of about 70% in the possible maximum number of turns. The maximum number of turns possible when the motor is stretched and wound may therefore be determined by multiplying the values for the maximum number of turns given in tables and graphs No. 5, No. 6, No. 7 and No. 8 by (1.7).

It is common knowledge among model plane builders that a motor may be wound to a larger number of turns after it has been wound and has unwound several times. The fatigue test table given on page No. 42 of the September issue shows the results of tests made with regard to this fact. Actually after four windings, the maximum number of turns it is possible to put into a motor is about 8% greater than upon the first winding of the motor. All the values given in the tables and graphs are values obtained when the motors were wound only once. Therefore, the number of turns it is possible to put into the motors after they have been

wound four or five times is about 8% greater in each case, than the values shown. It can be said, therefore, that the values given in the tables indicate the safe number of turns per foot of motor for the various motors indicated.

Now let us see how lubricant affects the turning effort (Torque) of motors with various sizes and numbers of strands. In table and graph No. 5 an increase in maximum torque is indicated in all cases except where four strands are used. The percentage increase varies from zero to 20%. In three out of the five cases recorded it is 20%.

In tables and graphs No. 2 and No. 6 where black rubber is used, the percentage increase in the maximum torque is very small. In fact when few strands are used and lubricant applied, the maximum torque actually is less. As the number of strands used in the motor increase, however, a slight increase in the torque is indicated, small as it may be.

In tables and graphs No. 3 and No. 7 the torque is less when a lubricant is used, as can be seen by comparing the two tables and graphs. The drop in the torque ranges from 7% to 15% in the five cases recorded. This is also true in the case of tables and graphs No. 4 and No. 8,

though the percentage decrease in the torque is not quite so pronounced; ranging from about 3% to 7%. In all cases in the tables, the decrease in torque is less when a large number of strands are used.

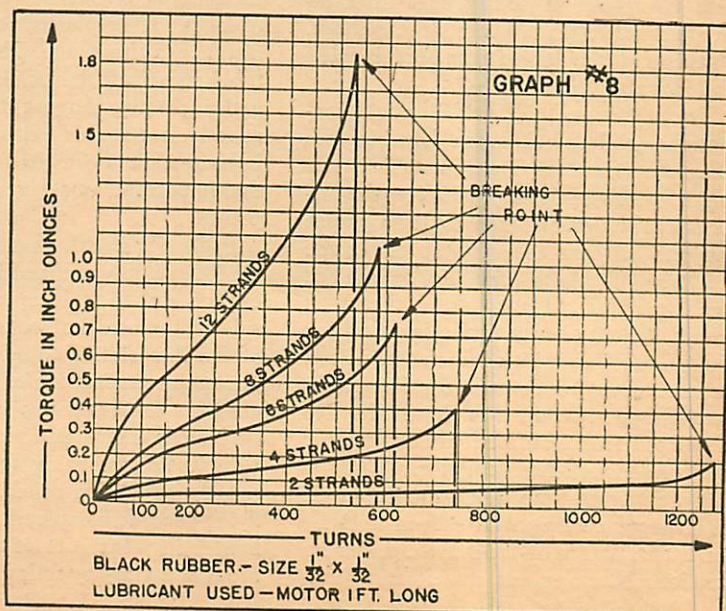
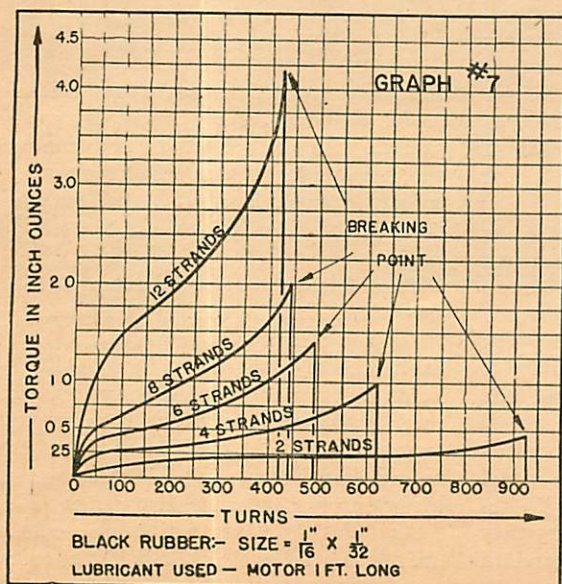
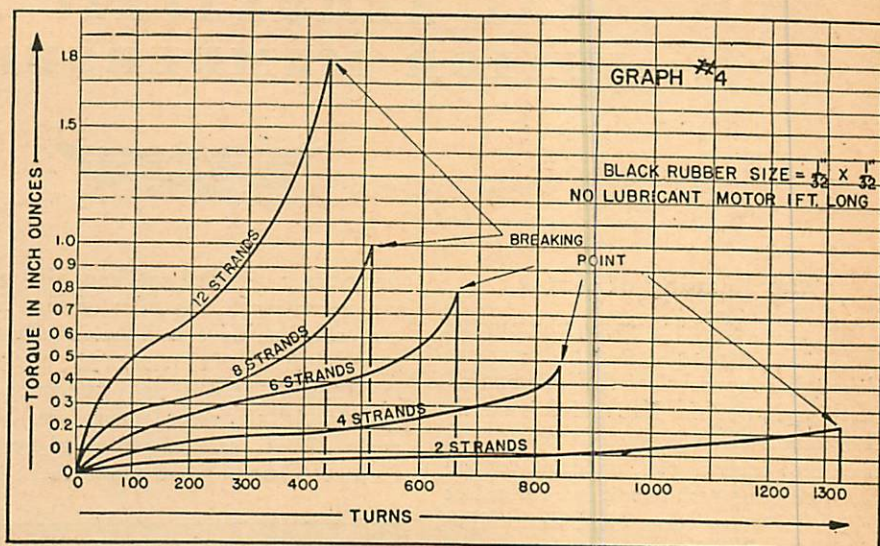
From the torque table on page No. 42 of the September issue, it can be seen that the torque increases considerably when the motor is stretched and wound with a lubricant. As a general rule for all cases, it may be said that the torque is 65% greater when the motor is lubricated and stretched when wound, than when it is wound by hand without being lubricated and stretched. Also, the torque is 38% greater when the motor is wound after being lubricated and stretched than when wound with a lubricant without being stretched.

Now that we know how a lubricant affects the torque values and the number of turns that can be stored in various types of motors, suppose we determine how the amount of work that can be stored up in any motor, is affected.

Last month an approximate formula was given for the amount of work that could be stored in a rubber band motor. It was given as follows:

$W = 2 \Pi QT$, where (W) equals the work in inch ounces; (Q) equals the

(Continued on page 42)



NATIONAL AERONAUTIC ASSOCIATION

JUNIOR MEMBERSHIP NEWS



The Meaning of N.A.A.

THE emphatic way in which model airplane builders and flyers have shown their approval of the junior membership plan of the National Aeronautic Association since its announcement less than nine months ago, indicates conclusively that the serious minded enthusiast realizes the importance and desirability of all that the N.A.A. stands for in the model field.

In the past, the Association took a keen interest in model aeronautics but felt that it could serve its purpose best by turning over to other organizations the actual management of competitive model plane flying, while the N.A.A. acted merely as the supervisory and regulatory body.

This plan did not work out entirely satisfactorily as there never was a permanent national organization to direct and foster model aeronautics. Many national clubs appeared on the horizon but without sufficient stamina to continue the good work that they began. This resulted in dissatisfaction and confusion because of the lack of permanency in one direction. Also many of these organizations were purely commercial in their intentions and some actually exploited the model builders.

Consequently, the N.A.A. came to the conclusion that the only satisfactory way in which a permanent national organization for model airplane builders could be maintained was for the Association itself to take into its membership as junior members, all builders and flyers who were interested in seeing that their efforts would be given serious recognition. To this end, the junior membership plan was inaugurated.

Since October, 1933, at the annual convention of the N.A.A. in Washington, when the Board of Governors made this junior membership a possibility, the Association has undertaken to form junior chapters all over the country under the guidance of adults who, by experience and inclination, demonstrated that they are qualified to conduct the local affairs of the Association in a fair and dignified manner. The junior membership ranks were also thrown open to those who live in isolated sections that could not muster members enough for a chapter.

In this brief time a large number of model airplane meets have been held by Contest Directors of the N.A.A. under its sanction. These meets have been con-

ducted in a dignified and impartial manner according to the rules of the Association which have resulted in officially recognized records for duration of flight by different classes and categories of models. All the records that have been made official, were passed upon by the Contest Committee of the N.A.A., the



Mr. Charles L. Lawrance, inventor of the Wright "Whirlwind" motor. An official of the N.A.A. and a model plane enthusiast

identical body that passes on the validity of large racing planes' records for speed, distance, altitude, etc. The accompanying table shows all the official records up to and including August 10, 1934. So far as is known at this writing, these records indicate that the United States holds all the important world records for model planes.

In its work with model builders so far the N.A.A. has confined its efforts almost exclusively to the sporting regulation side of junior aviation. It is the intention of the Association to continue this work on an increasing scale. The number of chapters is increasing steadily and this will mean more and more contests all being held according to one recognized set of competition rules that make model flying records completely comparable, no matter in what part of the country they are made. Only by following one standard

set of regulations can records really mean anything. The N.A.A. rules are so complete and sound in their concept that they have been accepted by several foreign countries. Model flyers in this country are in general unanimously in accord with these rules.

The recent National Championship Model Airplane Meet held in Akron, Ohio, was strictly an Association managed and sanctioned meet. It resulted in several new records but what is more important, it demonstrated to N.A.A. junior members from all over the country that the Association could and did conduct the best model airplane meet ever held anywhere. Many letters from the flyers themselves, and from the officials, declared the meet the best they had ever attended. It is only by impartial methods based on sound principles that a meet of that calibre can be conducted in the short space of two days with all contestants having an equal opportunity.

In addition to its supervision of the competitive phase of model flying, the N.A.A. plans to expand the interest in models by a number of means during the coming year. The Association is in a splendid position to accomplish this as it has in every State, a N.A.A. Governor and many adult chapters. The Association is purely a non-profit organization. It has nothing to commercialize and no "axe to grind." The N.A.A. is strictly your organization, belonging to you junior members as well as to the thousands of adult members. It is interested only in the good of aviation in all its aspects.

The New Records

THE accompanying table of official model airplane records shows, by comparison with the records of two months ago, how quickly the names of the record holders change. It also shows how the times of the record flights are constantly on the increase.

The age of the record holder, at the time the record is made, determines in which age class the record is listed. This explains how, for instance, Carl Goldberg holds a senior record and an open class record simultaneously. He was under twenty-one when he established his senior record but had passed his twenty-first birthday when he made his open record.

As a class, the open age group records are not as good as the records of the other

age groups. As time goes on, this disparity is sure to disappear. There will be more older contestants who will keep on flying as they graduate out of the younger groups.

Those who are interested in keeping a list of records can use a loose leaf book with one page for each category, making changes from time to time as new records are announced officially in these pages. This is being done by many at present and does not involve much effort once it has been started.

News From Junior Chapters

ON Saturday, August 11, the Bamberger Aero Club of Newark, N. J., and the "Aeronuts" of New York City held an indoor meet in the 165th Armory at Lexington Avenue and 25th Street. Two new autogiro records were established by New Jersey members. As soon as these have been accepted by the N.A.A. Contest Committee in Washington, they will be placed in the official record book.

The results of the meet are:

Class A Stick Model (Baby R.O.G.)

- 1st Herbert Greenberg, Newark, 8m 20s
- 2nd Lawrence Smithline, New York, 7m 43s

Class B Stick Model

- 1st Herbert Greenberg, Newark, 10m 03s
- 2nd Raymond Steinbacher, Ridgefield, N. J., 7m 10s

Autogiro

- 1st Alton H. DuFlon, Ridgefield, N. J., 2 m 01.2s (new senior record)
- 2nd Raymond Steinbacher, Ridgefield, 54s (new junior record)

The attendance at the meet was limited in numbers but those who were there had an interesting afternoon and some valuable practice under contest conditions.

THE Los Angeles and Santa Barbara clubs held an outdoor meet on July 14 at Carpentaria Airport, Santa Barbara, California. There was a good turnout and several novelty events were held. In the fuselage model contest, there was close competition. First place was won by Don Miller, Los Angeles, 4 minutes 47 seconds; second and third were tied at three minutes, these two being Richard Ealy and Ira Hassad, both of Los Angeles.

This meet was held in conjunction with the California Industrial Education Association Convention.

ALBERT LEWIS, President of the Jordan-Marsh Boston Traveler Junior Aviation League, Boston's N.A.A. junior chapter, in sending twenty-three new members' names into N.A.A. headquarters, writes: "Model building activity has diminished in this section during the sum-

mer, but in the fall we feel confident that we will be able to enlist every active model builder of the League in the ranks of the Junior N.A.A."

The Boston boys have had a long history of successful model plane achieve-

ment and their members have consistently made excellent records. The League has an active club program throughout the year and has had nearly all the famous aviation leaders as guest speakers at their regular meetings.

OFFICIAL MODEL AIRPLANE RECORDS

Approved by Contest Committee of the N.A.A.
Through August 10, 1934

INDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS B

Junior: Raymond Steinbacher.....Ridgefield, New Jersey.....9m 07s
Senior: Ralph Kummer.....St. Louis, Missouri.....17m 49.8s
Open: Frank Zaic.....New York City.....6m 57.2s

CLASS C

Junior: John Stokes.....Huntingdon Valley, Pa.18m 53.4s
Senior: Herbert Greenberg.....Newark, New Jersey.....19m 04.6s
Open: Carl Goldberg.....Madison, Wisconsin.....22m 59.4s

STICK MODEL AIRPLANES, R.O.G.

CLASS A

Junior: Joseph Pruss.....Philadelphia, Pa.10m 25s
Senior: Carl Goldberg.....Madison, Wisconsin.....9m 34.8s

CLASS B

Junior: Louis Shumsky.....Atlantic City, New Jersey.....9m 15.2s
Senior: William Latour.....Philadelphia, Pa.12m 46s

STICK MODEL AIRPLANES, R.O.W.

CLASS A

Junior: James Shivler.....Philadelphia, Pa.3m 41.8s
Senior: Paul Karnow.....Philadelphia, Pa.5m 01.4s

CLASS B

Junior: James Mooney.....Philadelphia, Pa.8m 37.6s
Senior: Mayhew Webster.....Philadelphia, Pa.11m 55s

GLIDERS, Hand-launched

CLASS A

Junior: Hewitt Phillips.....Belmont, Mass.21.6s
Senior: David B. Hecht.....New York City.....34.4s

CLASS B

Junior: Stanley Congdon.....Glen Ridge, New Jersey.....15s
Senior: David B. Hecht.....New York City.....31.6s

CLASS C

Junior: Stanley Congdon.....Glen Ridge, New Jersey.....17s

AUTOGIROS

Junior: Alton H. DuFlon, Jr.....Ridgefield, New Jersey.....44s
Senior: Herbert Greenberg.....Newark, New Jersey.....1m 38s

FUSELAGE MODELS, R.O.G.

CLASS B

Junior: Theodore Golomb.....Philadelphia, Pa.6m 26s
Senior: Herbert Greenberg.....Newark, New Jersey.....12m 23.5s

CLASS C

Junior: Hyman Oslick.....Philadelphia, Pa.12m 59.4s
Senior: Emmanuel Enderlein.....Philadelphia, Pa.13m 24s
Open: Jesse Bieberman.....Philadelphia, Pa.6m 31.2s

FUSELAGE MODELS, R.O.W.

CLASS B

Junior: John Stokes.....Philadelphia, Pa.3m 23s
Senior: William Latour.....Philadelphia, Pa.2m 43.6s

OUTDOORS

STICK MODEL AIRPLANES, Hand-launched

CLASS C

Junior: Bruno D'Angelo.....Philadelphia, Pa.8m 29.4s
Senior: Vernon Boehle.....Indianapolis, Ind.15m 00s
Open: Bernard Collins.....Providence, R. I.3m 23s

CLASS D

Junior: Fred Skafec.....Akron, Ohio.....8m 21.6s
Senior: Ralph Kummer.....St. Louis, Missouri.....20m 54s
Open: Frank Zaic.....New York City.....1m 27s

GLIDERS, Tow-launched

CLASS C

Senior: Bob File.....Columbus, Ohio.....23m 13s

CLASS D

Junior: Stanley Congdon.....Glen Ridge, New Jersey.....45.2s
Senior: Fred Korn.....New York City.....1m 16.2s

AUTOGIROS

Senior: Ralph Kummer.....St. Louis, Missouri.....2m 06s

FUSELAGE MODELS, R.O.G.

CLASS C

Junior: Donald Mertens.....Erie, Pennsylvania.....1m 44s
Senior: Russell Yungbluth.....St. Louis, Missouri.....11m 35s
Open: Bernard Collins.....Providence, R. I.2m 56s

CLASS D

Senior: Vernon Boehle.....Indianapolis, Ind.8m 43s
Open: Michael Lichstein.....Philadelphia, Pa.1m 28s

CLASS E (Gasoline Engine)


Senior: Maxwell Bassett.....Philadelphia, Pa.21m 57s
Open: Carl V. Carlson.....Chicago, Illinois.....6m 48.5s

The Stix, Baer and Fuller Company, St. Louis Junior Chapter is holding their annual Missouri Valley Meet August 23 and 24. It is one of the important events of the year and record flights as well as record crowds of spectators are anticipated.

This chapter has as members, some of the leading American builders and flyers. Ralph Kummer, Marvin Schmidt, Dick Courtial and Russell Yungbluth all have national reputations that place them among the best. With these and others as examples, the St. Louis boys are certain to continue in the front ranks.

Mr. Claude E. Carmichael, the energetic director of the club, has some very good events scheduled for the next year and there is every reason to believe that St. Louis will be decidedly on the model aviation map during 1935.

New Chapters

 THE District of Columbia Model Aircraft League of Washington has been granted a junior charter by the National Aeronautic Association. This club dates back to 1927 and has had an active existence ever since. Several graduates of the DCMAL are now in college or training as aeronautical engineers.

The League is sponsored by the Department of Playgrounds of the District of Columbia and by the Community Center and Elementary Science Departments of the Public Schools. The Advisory Board includes the heads of these departments and a number of persons interested in youth and in aeronautics: Miss Sibyl Baker, Lieutenant Roland Birnn, E. C. Burghduff, William R. Enyart, Joshua Evans, Jr., E. Clayton Fish, E. C. Graham, Paul Edward Garber, Walter Hinton, Fred Neely, Mrs. Elizabeth K. Peeples, Miss Esther Scott, Lawrence E. Williams, Chester H. Warrington, Chairman, and John H. Williams, Supervisor of Model Aircraft.

Mr. Warrington's address is 2035 17th Street, N.W., Washington, D. C. Any model airplane builder or enthusiast in the District is urged to communicate with him regarding membership in the DCMAL. It will be noted that the members of the Advisory Board are already rather well known as national figures in model aviation affairs as well as aeronautics generally. This organization appears destined to be one of the most active and prominent of N.A.A. junior chapters.

LOS ANGELES model builders and flyers have formed a newly chartered club under the direction of Mr. Sanford Kellogg, Grand Central Air Terminal, Glendale, California. All those in the vicinity of Los Angeles who are interested in joining this fine club may obtain particulars from Mr. Kellogg.

The Pacific Coast model builders are thoroughly up to date in their model work and much is expected from them in the competition field. Every year, some of them travel to the National Championship Meet and always make excellent names for themselves.



"Bert" Pond who flew Kenworthy's British model in the Moffett International Contest. This model placed highest of all foreign models

SANTA BARBARA, California, has a new charter from the N.A.A. and the club already numbers several expert model flyers. The Santa Barbara group is being sponsored by Mr. Ross Wood, 45 Mihran Building. He will be glad to hear from all those in and near Santa Barbara who are interested in becoming members of his group.

Behind both the Los Angeles and the Santa Barbara junior clubs, there is the interest and guiding spirit of Mr. Joseph Nikrent, a member of the N.A.A. Contest Committee. It is Mr. Nikrent who has timed the transcontinental flights of Frank Hawks, Colonel and Mrs. Lindbergh, Roscoe Turner, Jimmy Doolittle and others without number. His life has

been packed full of thrills and the story of air racing and automobile racing at Indianapolis would not be complete without including the story of "Joe" Nikrent.

All model airplane builders who live near Los Angeles will find that Mr. Nikrent is one of the men to see to stir up interest in model plane meets. He is one of the Association's most active boosters.

THE City of Philadelphia through its Bureau of Recreation has formed a chapter of junior members in the N.A.A. Mr. Clinton Rogers Woodruff is Director of the Bureau of Recreation and has as his model airplane advisor, Mr. Walter L. Bendon. This Philadelphia chapter has nine separate groups which are parts of the following Recreation Centers: Athletic, Cohocksink, Funfield, Kendrick, Kensington, Sherwood, Starr Garden, Waternview and Water Tower.

Mr. Bendon may be addressed at Funfield Recreation Center, Twenty-second and Huntingdon Streets, Philadelphia. His extensive experience in model airplane work will prove of great value to the junior members of his various groups.

PHILADELPHIA Model Aeroplane Association, one of the most active and best known clubs in the country, has formed a junior chapter under the leadership of Mr. Victor R. Fritz. Mr. C. H. English is the Association's Director and Mr. Fritz is Field Director. They make an active team. It is no exaggeration to say that Philadelphia is the most active city in the world in model airplane matters. This is reflected in the large number of model plane records held by Philadelphia flyers. During the school year, one or more large flying meets is held monthly under the direction of Mr. Fritz and his large staff of assistants.

The PMAA is sponsored by the Aero Club of Pennsylvania (N.A.A.), Philadelphia Evening Bulletin and Playgrounds Association. Its address is 1427 Spruce Street, Philadelphia, where there will always be found someone to explain the requirements for membership.

NATIONAL AERONAUTIC ASSOCIATION OF U. S. A.
DUPONT CIRCLE
WASHINGTON, D. C.



I hereby make application for membership in the National Aeronautic Association as a Junior Member. I am under twenty-one years of age.
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)

New Easy Way

To Learn Aviation

HARRY
14 YRS.

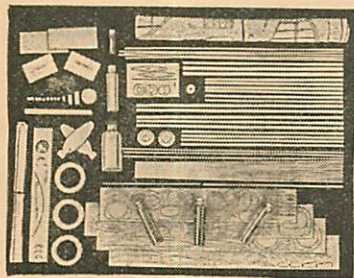
I'M GOING TO
SELL MINE

SHE'S A BEAUTY
I'M GOING TO
FLY MINE

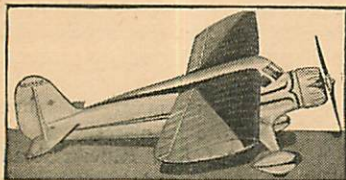
JACK
18 YRS.

I DON'T KNOW
WHETHER TO
SELL MINE
OR KEEP IT

DAD



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This beautiful flying plane, an absolutely accurate reproduction, in exact $\frac{3}{4}$ " scale, is in great demand today. With many new features, modern streamlining at all points, it is thoroughly advanced, and has a wing span $32 \frac{5}{16}$ ", a length of $21 \frac{1}{2}$ " and weighs $3 \frac{1}{2}$ oz. \$2.50



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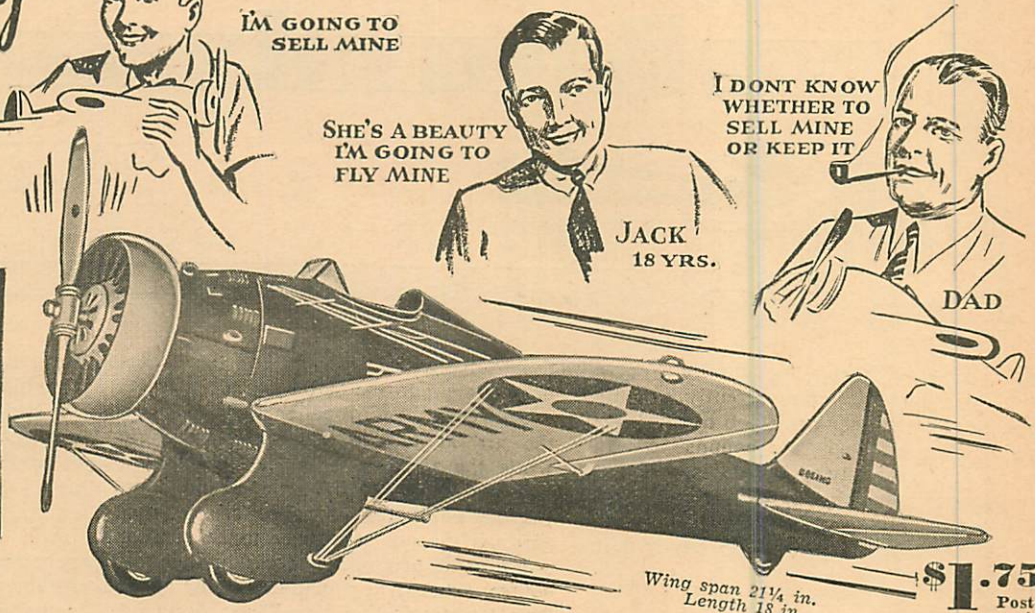
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Wing span $21 \frac{1}{4}$ in.
Length 18 in.

\$1.75
Post-paid

By Building Super Detail Model of BOEING P-26A

Boys, how would you like to have an experienced flying man sit down with you at your bench and help you lay out a real working model Boeing P-26A? One of the newest, most advanced of all fighting planes. Fast, speedy, with full armament capable of over 240 miles per hour. This flying model is an exact replica of this famous fighter and flyer—one that is identical in all but size with its noteworthy big brother. That's exactly what the IDEAL AIRPLANE AND SUPPLY COMPANY is doing for you. We have had experienced flying men who have spent their lives in designing and flying real planes lay out this Boeing P-26A for you! And they did it in a way that is so simple that any boy can build it.

As you build this plane you will learn the principles of flying. With your own hands you can work the controls right from the pilot's seat in the cockpit. Ailerons, rudder and elevator can be set in any position desired for flying, and so controlled that with

very little practice you can duplicate the adjustments necessary to make the plane take off like a bird, find its ceiling, circle, loop and finally make a perfect three point landing at the end of its flight.

Built in exact $\frac{3}{4}$ inch scale, this kit contains everything necessary to build a big, workman-like model with a wing span of $21 \frac{1}{4}$ inches, and a length of 18 inches. Finest materials only are used in its construction: sheets of selected plainly printed balsa of a quality not ordinarily found in a kit at this price; balsa strips of various sizes for its skeleton ribs, etc.; sheets of silk tissues, cement, both colored and plain dope, propeller shafts, 2 propellers, motor plate, rubber motor, wheels, cable cord and all other hooks, pulleys, control hinges, eyelets, washers, sand paper, celluloid, reed, wire and other small but necessary things to make the complete model exactly in accordance with the plans and instructions.

BOYS! MAKE BIG MONEY BUILDING PLANES

There is a big demand for IDEAL Model Planes. They are extremely popular for decorative purposes in the home. Sporting goods stores, stores dealing in aviation supplies, drug stores, jewelry stores, and toy stores all want them for display purposes and to place in stock. They are beautiful in windows or on counters, they help to advertise the store and attract attention to the windows.

You can sell finished IDEAL Planes to gas stations dealing in aviation oils; rent or sell them to department stores for special sales or sales in the sporting goods departments. You can also rent or sell them for decorative purposes to aviation associations, lodges, and club rooms. The possibilities for selling the finished planes are almost endless.

IMPORTANT If you are interested in learning aviation, if you want to build a better looking and better flying plane, if you want to have, when completed, an ornamental piece you will be proud to show your friends, or a plane that will sell readily at a good profit, then use only IDEAL kits.

Simply fill in the coupon with your name and address, enclose \$1.75 and the Boeing P-26A kit will be forwarded to you immediately.

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Please send immediately the items I have checked below. I am enclosing \$..... (West of Denver 25c extra. All planes postpaid.)

Boeing P-26A ☐ \$1.75
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Please print name.....

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Aviation Advisory Board

Conducted by
CHARLES HAMPSON GRANT
Chairman of the Board

Formerly of
The Technical Section, Air Service, U. S. Army

SOME very interesting questions have come into our office recently and we are actually enjoying our job of straightening some of you "air hounds" out in regard to aeronautical difficulties.

Here is a question or two from Ceibert Walter of Mooreland, Indiana, R.R. 1. Walter, we fear, believes he has at last been able to put one over on us; as his question infers that we have made conflicting statements. However, here it is with the answer following:

Question: In the article entitled "The Aerodynamic Design of the Model Plane" the statement was made that the propeller operates most efficiently when the blades are working at a four degree angle of attack. Also, I have frequently read in this magazine that for the average model, the propeller should have a pitch of one and one-half times the diameter; this would make the blades act at an angle of attack of approximately forty degrees. These two statements evidently contradict each other. Which is correct?

Answer: In the first place, Walter has made a mis-statement when he says that the blades would have an angle of attack of forty degrees when the pitch is one and one-half times the diameter. This is not so. There would be a forty degree *blade angle*; the blade angle being an entirely different quantity from the angle of attack. The blade angle is the angle between the blade of the propeller at any specific section of the blade, and the plane of rotation of the propeller. When the machine is at rest on the ground and not

flying, the angle of attack of the blades is equivalent to the blade angle.

However, the propeller blades act on the air at an entirely different angle while the airplane is in the air *moving forward in flight*. Under these conditions, the blades of the propeller are passing through the air at a very much smaller angle as it progresses along in a spiral course, actually at a blade angle of about four degrees if the propeller is designed correctly.

In connection with this question may I offer a little constructive criticism? If young men would not be too ready to *assume* that they are correct and others are wrong; they would progress more quickly in various fields of endeavor.

In order to protect yourself from criticism it is wise to assume yourself wrong until you have proven the other fellow wrong. No one is infallible. UNIVERSAL MODEL AIRPLANE NEWS undoubtedly has made, and will make, mistakes occasionally; but the proper approach of one who wishes to criticize, will make everyone feel happier. We welcome constructive criticism at all times. If we have made a mistake we will readily admit and correct it.

Question: Why is a propeller with a helical pitch more efficient than one with a straight pitch?

Answer: Because every section of the blades of a helical pitched propeller passes through the air at approximately the same angle of attack; thus allowing all the sections to give thrust without in-

terference between different sections of the blade. In the blades of a straight pitched propeller the various sections do not work in this way. At the tip, the blade is passing through the air at an angle of attack greater than the most efficient angle, causing inefficiency; and at the hub the blade is passing through the air at a negative angle of attack. This latter condition not only causes inefficiency, but actually causes back pressure rather than a thrust forward.

Question: Where may I purchase back issues of UNIVERSAL MODEL AIRPLANE NEWS?

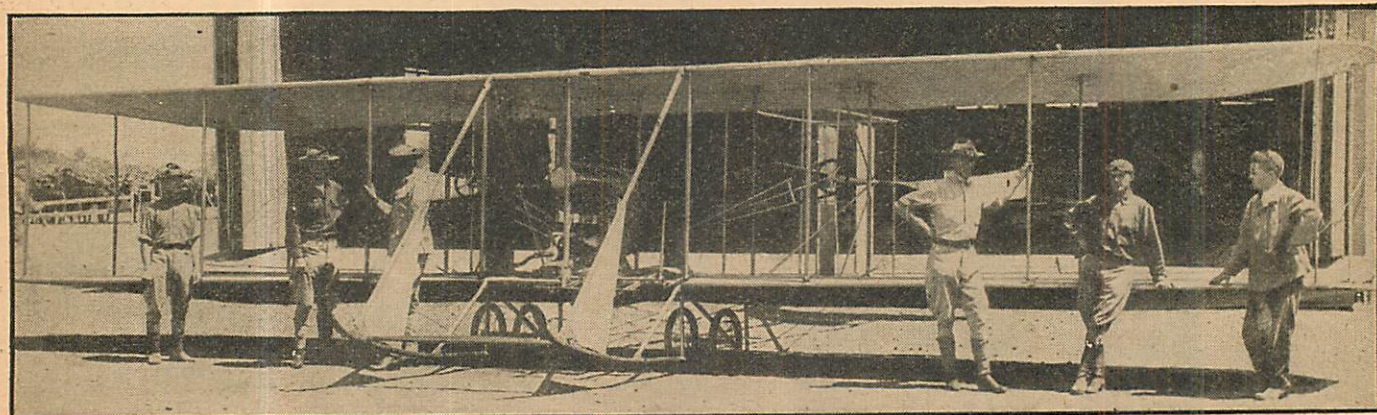
Answer: Back issues may be obtained by writing to the editorial offices.

Kenneth Watts of 838 Rideau Road, Calgary, Alberta, Canada, wishes to know:

Question: What is the best method to use for warping wing and tail surfaces?

Answer: The method to be used depends upon the type of construction used in the model. If the covering is of paper, we suggest that it be sprayed a little with water and held in a definite position until it dries again. Sometimes heat will warp the surface to a sufficient extent, especially when the surface is doped. This last method is the best method to use when the surfaces are made of balsa.

We have a very interesting question from Jimmy Throckmorton of 121 North Congress Avenue, Atlantic City, New Jersey. It is particularly so, because it illustrates very well the philosophy of thought of many participating in com-

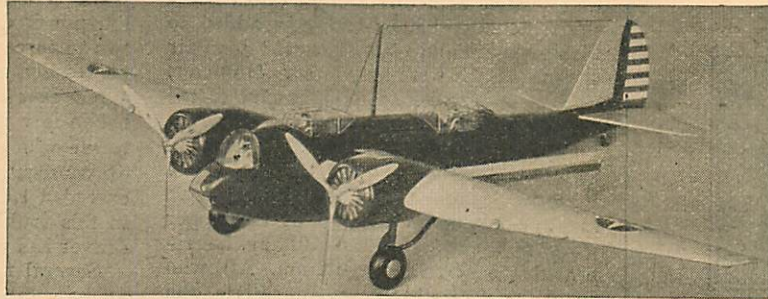


Here is the Old Wright Twin Pusher plane that started the U. S. Army off on its history making aviation career, the first U. S. Army plane, 1910 model. It was piloted by Second Lt. B. D. Foulis (second from right). This ship weighed approximately 1100 lbs. and was driven by a 35 h.p. engine operating two oppositely turning propellers through a chain reduction gear system. The propellers turned about 350 r.p.m., giving high efficiency because of their slow speed

Start your Fall model building with this eagerly awaited $\frac{3}{4}$ " C-D

MARTIN BOMBER

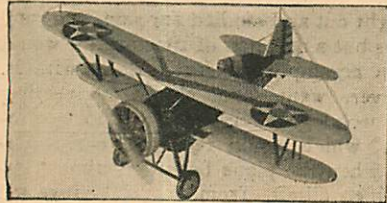
Another C-D realistic masterpiece! An authentic high speed flying model of the famous mid-wing bomber—the plane that's still on the secret list—claimed fastest service Bomber in world—Army again ordered 46—10 used in U. S. to Alaska cross-country trials, called one of the most difficult and hazardous flying trips ever undertaken—only a Martin could be entrusted to the job—the only really efficient substitute mail plane. Span 53", length 33 $\frac{1}{4}$ ", weight 17 oz. Colored standard U. S. Army yellow, olive drab, details black. Novel and strong method of duplicating an



almost impossible landing gear (but not retractable). Complicated fillets beautifully (and easily) duplicated. Nothing ever before like it—even our

Boeing 247. Has printed out wood—an enormous quantity—all strips necessary. Turned balsa invisible hub wheels. By simply removing motor

spars (the time-proven efficient method of multi-motor powering) model is ready for exhibition. All other necessary material, such as strong tissue, celluloid hinge wire, M. W., large quantities of dopes, wood and paper cement, insignia, rubber, turned cowl fronts, stout axle material, striping tape, etc., hundreds of pieces, considering all wood printed out. If sold 5 or more years ago, would easily command at least \$20.00. Shipped express collect, 10 lbs. (not C.O.D.)—ready for shipment approximately Sept. 25th—order yours now! Complete (giant) Kit SF-45, \$6.50 only



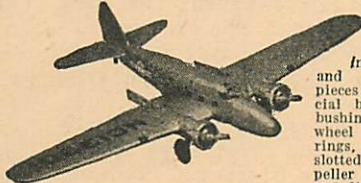
BOEING P12-E

Span 22 $\frac{1}{2}$ ", length 15 $\frac{1}{2}$ ", weight 3.2 oz. Printed out wood. Colored yellow and olive drab, with beautiful red and yellow trimmings. Complete Kit SF-8C, only \$1.75

KING OF LARGE DISTANCE MODELS—BOEING 247. Span 55 $\frac{1}{2}$ ",

length 38 $\frac{1}{2}$ ", wt. 16 oz. Colored all silver.

A Super-complete Kit—119 pieces, including many 36" balsa sheets and strips, tapered "nose" pieces for wings, large special balsa wheels with bronze bushings, drilled aluminum tail wheel pieces, turned balsa end rings, C-D standard steel type slotted and drilled flying propeller hubs, all necessary dopes and liquids, over 20 sq. ft. of full size superdetailed C-D drawings and photos, and all other special material needed. Complete Giant Kit SF-35 (shipped "express collect" only—recipient to pay 7 lb. shipping charges when delivered)—originally sold at \$6.50—now only \$4.95



'32 Gee-Bee

Span 18 $\frac{1}{2}$ ", length 13 $\frac{1}{2}$ ", weight 2.7 oz. White with red scalloping, black details. NOW CONTAINS PRINTED OUT WOOD. Complete Kit SF-27, only \$1.75

All kits shown on this page contain printed out wood except SF-19, 31, 32 and 35

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Speed flights, Span 19 $\frac{1}{2}$ ", length 13 $\frac{1}{2}$ ", wt. 2.8 oz. Red and black. Complete Kit SF-31, only \$1.50



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Span 21 $\frac{1}{2}$ ", length 17 $\frac{1}{2}$ ", wt. 2.5 oz. Yellow and olive drab. Complete Kit SF-23, only \$1.75



'30 Howard "Pete"
Span 15", length 13 $\frac{1}{2}$ ", wt. 1.5 oz. All white. Complete Kit SF-18B, only 98c



'32 Howard "Ike"
Span 15 $\frac{1}{2}$ ", length 12 $\frac{1}{2}$ ", wt. 1.5 oz. All-White (2 or 4 wheels). Complete Kit SF-42, only 98c



'32 Supermarine S6-B
Span 22", length over all 21 $\frac{1}{2}$ ", wt. 2.9 oz. Will R.O.W. Silver and blue. Complete Kit SF-19, only \$1.75



'33 Boeing F4B-3
Span 22 $\frac{1}{2}$ ", length 15 $\frac{1}{2}$ ", weight 3.2 oz. Silver, yellow, red. NOW HAS PRINTED OUT WOOD. Super complete. Complete Kit SF-29, only \$1.75

The pride of many C-D fans.

18" Sheet Balsa	1/4" ... 8c	20c
Thick-ness	5/16" ... 10c	22c
width	3/8" ... 12c	24c
2" 3"	1/2" ... 14c	26c

We also have a fine assortment of Strip White Pine, 1/16x 1/16", 2 for 1c, 5 different wheel shoe blocks for any $\frac{3}{4}$ " model, other dopes, etc., etc. Send 3c stamp for list.

C-D Model Enamel Dopes

In Clear, Silver, Cream, Military Yellow, Green, Orange, Fire Chief Red, Olive Drab, Blue, Brown, Glistening White, Glossy Black, 1 oz. 10c, 2 oz. 17c

C-D Paper Cement
1 oz 10c, 2 oz. 17c

C-D Waterproof Cement
1 oz 10c, 2 oz. 17c

C-D Prop. Hubs
Right hand, slotted, drilled for No. 14 MW, 5/16 x 15/16", 3c

READ WHAT OTHERS SAY
NEW YORK, N. Y.—"I sent away for your \$2.95 Vought Corsair kit on Tuesday and received it Friday. I call this very fast service. The plane are very clear and the kit the most complete I have ever seen."

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GREENSBORO, N. C.—"Your Howard Kit is the most complete Howard I've ever seen."

TWIN FALLS, ID.—"Your printed out wood simplifies and makes building more interesting."

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Fibre Prop. Blades for 2", and 1 $\frac{1}{2}$ "
Tabbed blades have tabs which are folded and cemented into hub. Pairs for props.

5 $\frac{1}{2}$ x15/16"4c
6 $\frac{1}{2}$ x1 $\frac{1}{8}$ "4c
7x1 $\frac{1}{4}$ "5c
8x1 $\frac{1}{2}$ "5c

C-D Bronze Washers
3/16" dia. for No. 14 MW, per doz. 4c

Fine Jap. Tissue
No. 1—24x36". 12c
No. 2—21x31". 4c
No. 3—20x24". 3c

3/32" C-D Rubber
25' 9c; 50' 12c; 210' 60c

1/8" C-D Rubber
25' 12c; 50' 22c; 210' 85c

Cleveland Stripping Tape
Per Card.....5c

Celluloid 2 x 6
Thin, 2c; Thick, 3c

Alum. Motor Plates
7/8" for 1 $\frac{1}{2}$ " Celluloid Motor, 1-3/16"

All C-D Kits are super complete with pilot blocks, etc.—EVERYTHING YOU NEED!



'33 Aerona C-3
Span 27", length 15 $\frac{1}{2}$ ", wt. 1.9 oz. Red and silver. Complete Kit SF-40, only \$1.75



'33 Curtiss F9C-2
Span 19 $\frac{1}{2}$ ", length 15 $\frac{1}{2}$ ", wt. 2.2 oz. Silver, blue, red and black. Complete Kit SF-22B, only \$1.75



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Span 17 $\frac{1}{2}$ ", length 12", wt. 2.1 oz. Yellow and black. Comp. Kit SF-17B, only \$1.50



1933 WACO C
Span 24 $\frac{1}{2}$ ", length 19 $\frac{1}{2}$ ", wt. 3.7 oz. Silver and red. Complete Kit SF-37, only \$2.75



'30 Boeing 95 Mail
Span 33 $\frac{1}{2}$ ", length 24 $\frac{1}{2}$ ", wt. 3.5 oz. Blue and natural. Complete Kit SF-32, only \$1.50

GET THE C-D CATALOG showing world's largest line of AUTHENTIC scale flying models—also complete line of best quality parts and supplies. Send 3c stamp for your copy now!

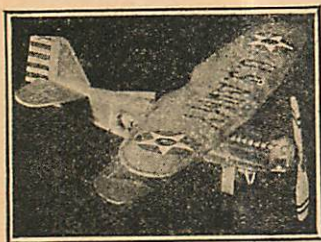
IN ORDERING—send check, M. O. (if cash, register). Remember—every parts order, regardless of how small, MUST be accompanied by 15c packing charge, insurance 5c per order. No C.O.D.'s on any order. (Canada and Engl.: Add 10% all orders, except SF-35 and 45; other countries 20%.)

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'32 Douglas O-38
Span 30", length 23 $\frac{1}{2}$ ", wt. 4.8 oz. Yellow, olive drab, black details. Printed out wood, 2 pilots, only. Complete Kit SF-43, \$2.75
A very beautiful and unusually detailed model.

Boys!



Curtiss Hawk P-6-E

IT'S A GIFT FREE With a Year's Subscription

Yes sir, fellows, we will give you absolutely free a dandy construction set to make a 12" model of the popular U. S. Army Curtiss Hawk P-6-E plane.

All you have to do to get this liberal offer is to mail to us your check or money order for \$2.00. We'll send you twelve consecutive issues of UNIVERSAL MODEL AIRPLANE NEWS and will ship the kit to you right away.

This fifty cent kit contains genuine blue print, full size three views with all important details illustrated and complete instructions. It is all ready for you to sit right down and build one of the most beautiful models you ever constructed.

Hurry up, boys, and send in your subscription. Be among the lucky ones to receive as our gift the Curtiss Hawk P-6-E.

This offer expires October 5th, 1934

SUBSCRIBE NOW!



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551 Fifth Avenue, Desk 325
New York City

Enclosed find \$2.00 for which please send me UNIVERSAL MODEL AIRPLANE NEWS for one year. It is understood that I am to receive the Curtiss Hawk P-6-E kit by return mail.

Name

Age

Street

City State

Acrobats of the Sky

(Continued from page 5)

Gliding down to a landing, Beachy was quite elated with the thought of an additional thrill which he had now added to his repertoire and which he could do at air circuses which were so popular. However, upon climbing from his plane some of the observers denied that the craft had actually done a loop. Though somewhat angered, Beachy was not dismayed. He set to work immediately to paint his name in huge letters on the top of the upper wing and on the following day he repeated the startling evolution. All who could read could now appreciate the reality of the loop.

Let us first analyze the various forms of loops. All of us know the ordinary or inside loop in which the pilot is sitting on the inside of the evolution. The speed necessary to perform this maneuver depends entirely upon the type and weight of the airplane involved. For the powerful pursuit planes, little excess speed is required for the engines will practically pull the aircraft through the loop. On the other hand, heavy tri-motored Fords and twin-engined Navy flying boats have been looped. Naturally, they required considerable initial speed to permit them to complete the stunt.

When the proper speed is reached the pilot eases his control stick back. This is not a quick evolution and the airplane must not be handled roughly. If the elevators are pulled upward too quickly, the plane will squash and lose the forward speed which is so necessary. As the plane climbs upward and over, the stick is pulled even further back and by tilting his head upward, the pilot is in a position to see the earth directly overhead. He then brings the controls clear back, throttles down his engine and the plane glides first into a dive and then into normal flying position where the pilot again resumes level flight. If done well, centrifugal force will hold the pilot in his seat and so will remove the necessity of a safety belt. However, it is not wise to always count on a perfectly performed maneuver.

The finesse required in aerobatic flying is to keep the alignment of the direction of flight. That is to say, at the completion of the loop, the plane should be traveling in the same line of flight as when it first began the maneuver. This is not always as easy as it might first seem. For instance, it is well known that the engine torque tends to pull an airplane towards the left. To overcome this the pilot is required to carry right rudder, if he is to fly a straight course. This, of course, applies only as long as the torque is effective or as long as the engine is running. As the engine slows down and power is finally cut off at the top of the loop, the pilot should no longer carry right rudder. Instead, he must neutralize the rudder if he is to keep his craft on the same line of flight. Of course, as soon as he can see the ground over his head he can pick up some landmark by which he can steer. When first learning to perform aerobatics, students are advised to loop directly over a road or a fence, for in this manner they can maintain the proper direction.

If a powerful engine is mounted in the craft, altitude may be gained during the maneuver by simply prolonging the climbing portion of the loop. The average airplane will maintain its altitude while a low-powered craft will likely lose from two to three hundred feet. Like any other profession, aviation is subject to fads and a few years ago an informal competition began in which the participants undertook to see who could do the greatest number of consecutive loops. When the number exceeded 1,000, interest was suddenly lost in this fruitless rivalry. This type of endeavor has proved of no value to aviation.

Several famous aerobatic pilots arrived at the solution of a more difficult type of loop at about the same time, but it is generally thought that Major Jimmie Doolittle was the first to actually perform an outside loop. This maneuver had been thought out and studied for some time and it was but a question of time until it would be an accomplished fact. Along with it, however, went some clever engineering for special gasoline tanks had to be produced which would feed the roaring engine when the plane began its almost impossible climb from normal inverted flight.

In the outside loop, the pilot rolls his craft over on its back and then forces his mount to climb upward to the top of the arc. He then goes on down in his dive, pushing further and further over until he once more has attained the inverted position, after which he rolls his plane over and is then in normal flight. Obviously, the pilot is on the outside of the loop with centrifugal force tugging at him and trying to throw him from his plane. It thus becomes essential that more than ordinary measures be taken to insure that the pilot is kept in his cockpit. Two strong safety belts will suffice for this.

Moreover, the strength of the plane is to be considered. The normal airplane is built to withstand several times the greatest possible stresses which can be imposed upon its structure. The maneuver which ordinarily is most severe is the pull out from terminal velocity dives, and it is for these forces that the airplane is strengthened. An outside loop places just the opposite strains upon the plane which is not especially designed for these loads. Experiments, however, have proved that the modern fighting plane is capable of withstanding an outside or inverted loop.

Imagine the thoughts that must have filled Doolittle's head the morning he climbed into his tiny single-seater for the express purpose of doing an outside loop. To an observer, Jimmie's face would have told little. So far as the casual on-looker could tell, the compact army pilot was merely off to practice landings as he taxied down the field and swung into the wind for the take off.

While his face may have shown no emotion, his mind was probably filled with conclusions reached after many hours' study of small models. Holding them upside down he had worked and re-worked the controls in order that he might make no mistakes when at last he was actually in the air in a similar position. No rules for inverted flight had ever been

written but Jimmie was out to write a few rules for himself.

Quickly climbing to 5,000 feet, he lost no time in applying the lessons he had learned after so many patient hours over his model airplanes. Half-rolling his pursuit plane, he dropped the nose slightly when in the inverted position in order that he could build up his speed for the steepest hill yet known to man. When the needle of his air speed meter reached out and touched 175 m.p.h., he slowly began to push the control stick forward. Up went the nose and old man Centrifugal Force pulled and yanked on Jimmie, who refused to let go, thanks to his system of double belts.

At last the plane was standing in a vertical position with the speed greatly reduced. Jimmie's head was about to burst because of the flow of blood from the lower part of his body. His eyes became heavy and there was the slightest crimson tinge on his nose. But still he refused to ease the pressure on the elevators which would have given him relief from his strangling sensation. Rather, as the speed of the craft diminished, he pushed even further forward. Slowly the craft made its way up towards the top of the arc with the engine laboring not from high speed but from the strenuous demands for power now being made upon it by the wide open throttle.

At last with but a few feet to go and with victory in sight, the fighting plane shook, the ailerons flapped uselessly, and the craft stalled to fall off into a spin! The pilot was about fagged out and his head ached from the tremendous pressure placed upon it. But, as he pulled out his handkerchief and wiped the blood from his nose, and after inspecting his safety belt, he again nosed his craft down and rolled it over on its back. Again, the long arduous struggle up the never-ending hill with the engine pounding out its response as though to admit it had failed the gallant pilot, but would try harder this time.

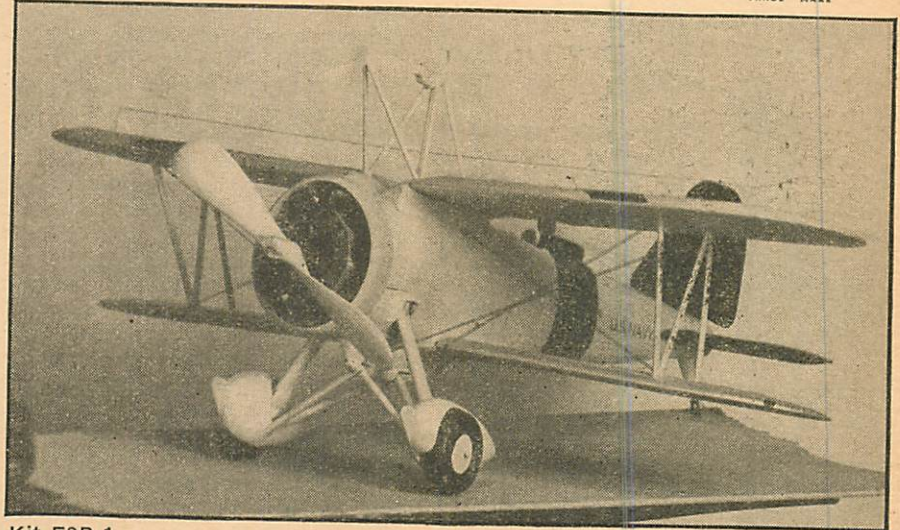
In spite of his physical discomfort, Major Doolittle was more gentle with the controls this time. He did not force his mount around the arc except when he found it necessary. Consequently, he retained and conserved his air speed with the result that he climbed right on up the hill until he gained the top. No Alpine mountain climber was any more thrilled and eager to plan a flag of achievement on a hitherto inaccessible peak than was Jimmie. But, the peak surmounted, he could not stop and survey the world from his lofty height, for he had accomplished but half of his task, although it must be admitted by far the more difficult half.

Forward even further went the elevator controls as the swift pursuit plant answered the controls for a glide. Down and down it went but its master failed to ease the controls and the craft continued on beyond the vertical with its wires screaming like tormented demons. The engine was beating a tattoo which, combined with the cries of the wires, caused much worry to the watchers far below. But the sturdy craft never faltered and carried Doolittle

(Continued on next page)

VISUALIZE

a 1" to the foot flying scale model of the Curtiss Sparrow Hawk. Span 25 1/2", length 19 1/4", weight 5 1/2 oz. Colored Navy gray, aluminum, yellow and black. An exact reproduction of one of the fighters carried in the U. S. S. Macon.



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Price
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3. Turned scale air wheels
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5. Special shock absorbers
6. Movable controls

7. Unique, true running stub axes
8. All fuselage and tail markings printed to scale
9. Printed instrument panel
10. Helical pitch propeller design
11. Improved method of mounting tail surfaces
12. Turned balsa drag ring

CONTENTS

A kit complete with large full size plans and minute instructions, finished drag ring, cylinders, air wheels; free wheeling attachment for flying propeller, center drilled propeller block, scale propeller block, 2 oz. each of cement, clear dope and gray dope, 1 oz. each of black, yellow and aluminum dope, 4 sheets of printed balsa, aluminum tubing bushings in landing gear, printed insignias and fuselage markings, formed wire fittings, washers, eyelets, aluminum tubing, balsa strips, wax paper and sandpaper.

This model is recommended for experienced builders.

Tropical Supplies

Balsa Sheet

18" Lengths	
1/64x2	.03
1/32x2	.03
1/32x3	.05
1/16x2	.03
1/16x3	.05
3/32x2	.04
3/32x3	.06
1/8x2	.04
1/8x3	.06
3/16x2	.05
3/16x3	.08
1/4x2	.06
1/4x3	.10
3/8x2	.08
3/8x3	.10
1/2x2	.12
1/2x3	.15

Balsa Strips

1/32x1/16	20 for .05
1/32x1/8	3 for .01
1/16x1/16	20 for .05
1/16x1/8	3 for .01
1/16x3/16	3 for .01
1/16x1/2	1 for .01
3/32x3/32	2 for .01
1/8x1/8	2 for .01
3/8x3/8	1 for .01
1/2x1/2	1 for .01
1/2x3/4	1 for .01

1/4x1/2	1 for .02
3/16x3/16	1 for .02
1/4x1/4	1 for .02
1/4x1/2	1 for .04
5/16x5/16	1 for .03
3/8x3/8	1 for .03
1/2x1/2	1 for .04

Prop Blocks

3/8x1/2x5	.01
3/8x3/8x6	.02
3/8x1x7	.03
3/8x1 1/2x8	.04
3/8x1x8	.04
3/8x1 1/2x9	.06
3/8x1 1/2x10	.06
3/8x1 1/2x10	.07
3/8x1 1/2x10	.08
3/8x1 1/2x11	.08
1/4x1 1/2x12	.10
1/4x1 1/2x12	.08
1/4x1 1/2x13	.09
7/8x1 1/2x14	.09
1x1 1/2x15	.10

Microfilm Solution

1 Oz.	.12
-------	-----

Rubber Lubricant

1 Oz.	.12
-------	-----

Cement

1 oz.	.12
2 oz.	.20

Dope

Clear, red, yellow, blue, green, black, white, olive drab, silver, orange.	
1 oz.	.12
2 oz.	.20

Japanese Tissue

Black, blue, green, olive drab, yellow, red.	
Orange	.05 per sheet
White	.03 per sheet
Superfine	.08 per sheet

Cowlings

Lathe turned and base coated.	
1/2 dia. 2 dia. 2 1/2 dia. 3 dia.	
Open	.20 .25 .30 .35
Closed	.20 .25 .30 .35
Drag	.20 .25 .30 .35

Celluloid Motors

1 1/2" dia.	.20
2" dia.	.27
3" dia.	.35
Brushes	2 for .05

Sheet Celluloid

2"x5" sheet	.03
-------------	-----

Celluloid Wheels

3/4" dia.	per pair .06
1" dia.	per pair .08
1 1/4" dia.	per pair .11
1 3/4" dia.	per pair .17

Balsa Wheels

1/2" dia.	per pair .04
3/4" dia.	per pair .06
1" dia.	per pair .08
1 1/4" dia.	per pair .09
1 1/2" dia.	per pair .10
2 1/2" dia.	per pair .13
1"x1/2" Air wheels	per pair .10

Hardwood Wheels

1/2" dia.	per pair .03
3/4" dia.	per pair .05
1" dia.	per pair .07

Washers

1/8 O. D. brass per doz.	.06
3/16 O. D. copper	per doz. .05

Rubber

.045 square	2 ft. .01
1/8 flat	2 ft. .01
3/16 flat	1 ft. .01

Banana Oil

Clear and refined 1 oz.	.12
-------------------------	-----

Bamboo

1/32" sq. x 11" .3 for	.01
1/16" sq. x 12" .3 for	.01
1/16"x1/4"x15"	1 for .01

Music Wire

Gauges 6-8-10-12-14	.01 per ft.
---------------------	-------------

Eyelets

Small brass, per doz.	.05
-----------------------	-----

Instructions for Ordering

We will not accept cash, stamps or foreign coin. Please send money order. All KITS are post paid. No orders less than 50c for supplies are accepted. Add 15c for postage and packing charges on orders amounting to \$1.50; over \$1.50

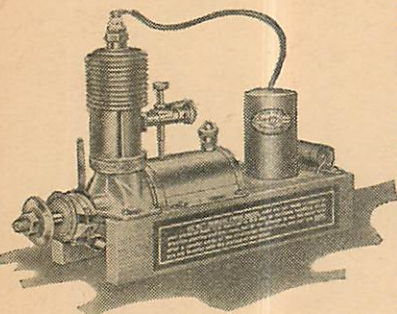
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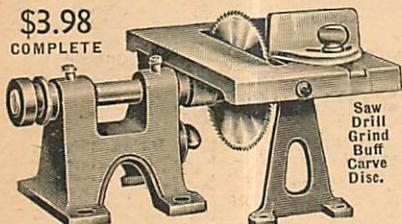
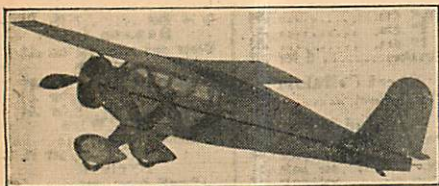
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ALL RECORDSIN THE
GAS POWERED CLASSES
NOW HELD BY THE**BROWN MOTOR**EASTERN MEET, NEWARK, N. J., MAY 19, 1934.
FIRST & SECOND (ONLY TWO PLANES TO FLY)
6 Min. 7 2-5 Sec. on 1/2 Oz. of Gas (NEW RULES).NATIONAL MEET, AKRON, O., JUNE 27-29, 1934.
ALL FIVE PLACE WINNERS POWERED WITH
THIS STURDY AND RELIABLE LITTLE MOTOR.
WINNER'S TIME, 21 Min. 57 Sec., on 1/2 Oz. GAS.ENDURANCE RECORD: 2 Hrs., 35 Min., 39 Sec.
MAY 28, 1934; CAMDEN, N. J., AIRPORT TO ARM-
STRONG'S CORNERS, DEL.—54 MI. AS THE
PLANE FLIES—ACTUALLY OVER 150 MILES.PRICE \$15.00 COMPLETE. ADD: 50c East of, 75c
West of MISSISSIPPI, for POSTAGE, CASE & INS.

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**JUNIOR MOTORS
CORPORATION**

Broad Street Station Bldg., Philadelphia, Pa.

\$3.98
COMPLETEShaw Quick Change Super Shop. Table, 7" x 10".
Mandrel, Miter Gauge, Buff, Key, 4" Saw, A Real
Tool. Send \$1.00. bal. C.O.D. Weight 12 lbs. Dept. "E"
SHAW TOOL CO., 433 N. 10th St., Milwaukee, Wis.**FLYING MODELS THAT FLY!****BELLANCA**Kit N Y 34Postpaid **75c**
Here's a summer bargain for you! A 20" span cabin
plane weighing only 6/10 of an ounce. If properly built
it will fly 45-50 seconds, at heights of over 50 feet. It
is one of our most easily built models. Remember
Pioneer Kits are all built up to a performance standard,
not down to a cheap price. Every kit is complete with
full sized blue-prints, ready carved propeller, and all
parts needed to build like the cuts.
Our new catalog and price list will be sent to you upon
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on to inverted level flight. When there, he slow-rolled back to normal flight and the first outside loop had been done.

During this same period, Lieut. Al Williams of the Navy was giving much serious thought to outside loops and all forms of inverted flight. Al Williams became the Navy's exponent of this type of flying and he carried on his studies in a thorough manner. His plane became a flying laboratory which carried him through these strenuous maneuvers in order that he could observe the reactions of both the aircraft and the pilot. On his knee was strapped a notebook while his cockpit was a nest of instruments to record the stresses placed upon the plane structure. His was an important job for he was endeavoring to find out where safety ended and where danger began. It should be recorded that as a result of these investigations, Williams was enabled to find out much valuable information which, when studied carefully by other pilots, may prevent them from getting into trouble from unfamiliar maneuvers.

It soon developed that the outside loop could be made in two ways. The pilot could first roll his craft over on its back and then fly upwards, or he could simply nose his craft over from normal flight and enter the outside loop by diving the plane onto its back. No distinction in name is made between these two methods. Both are outside or inverted loops.

Since this early period of investigation of the outside loop, this maneuver has become quite common. Many commercial planes of today are fully capable of performing this feat though it is not to be recommended except in particularly favorable circumstances.

* * *

The succeeding article will deal with the various types of tail spins and their combination with loops to make an exciting array of aerobatics. It will discuss the value of aerobatics from both the pilot's and the observer's point of view.

Build This Prize-Winning Stinson*(Continued from page 15)***Motor Stick Detail (Plate 4)**

First make the square which is to fit into the nose of the ship (1/20" x 1/8" medium balsa). Select a light piece of balsa for the nose block (3/16" x 1 3/8" x 1 3/8"), and cement it firmly to the square. When this is dry, fit the square into the nose of the fuselage, carve and sand the block to the correct shape. We are now ready to make the hollow motor stick.

Select a piece of medium balsa, 1/32" x 1 1/4" x 17" and sand it lightly. Cut out the motor stick cap, then cut the rest of it to shape as indicated by the hollow motor stick pattern. Select a straight piece of either pine or spruce, 1/8" x 1/2" x 20", and round one side of it so that the cross-section will form a "U" shape. Soak the balsa motor stick blank in water and bend it around the hardwood stick. Wrap gauze around it so that the balsa blank will take the shape of the hardwood stick, then bake it in an oven until dry (about 4 min.). When it is dry, unwrap the

gauze from the stick and sandpaper the balsa "U" while it is still on the hardwood stick. When this has been done, insert the bulkheads (soft balsa) into the balsa "U," as shown on plan and cement the cap firmly into place.

The stiffeners, or motor stick reinforcers, are made of a medium grade of balsa 3/32" sq., which have been planed to a triangular shape, as shown in enlarged view of cross-section. Give the whole motor stick a coat of dope and sand lightly. Cement the thrust bearing to the motor stick, cut a hole in the nose block, insert the motor stick into this opening so that the thrust bearing sets snugly on the nose block, and cement the motor stick firmly into place. Cement the rear hook and can to the motor stick and set aside to dry.

Wing Frames (Plate 2)

The ribs are made of a medium light grade of balsa, a scant 1/32" thick and cut out for lightness, as shown on plan. The notches at the bottom of the rib are cut to receive a 1/20" x 1/16" spar. The notches at the top of the rib and leading edge are cut to receive a 1/16" sq. spar. The trailing edge is 1/20" x 3/32". All the spars are made of a medium grade of balsa. Cut and sand the different spars to size and the wing frames are ready for assembly.

Those who have not had much model building experience may find it necessary to draw the wing plan on a sheet of paper and assemble the wing frame right on the drawing, as the wing plan is made to one half scale on the drawing. The front assembly view of the machine is also one half scale.

When assembling the wing frames, set the inner end ribs at an angle so that the wing will have a dihedral angle when cemented to the fuselage. The tips are made of 1/32" x 1/20" medium balsa and are slightly moistened before being bent into shape and cemented into place.

Tail Frames

Draw the stabilizer plan on a sheet of paper, lay a sheet of waxed paper over the plan and stick a number of pins into the stabilizer outline. Select a light grade of balsa for the stabilizer outline, plane it down to 1/32" sq., then sand it round. Moisten this strip and bend it around the pin jig that you have just made. The spar is a medium grade of balsa, 1/16" x 3/32" at the center, tapering down to 1/20" round at the tips. After the spar has been cemented into place, you may cement the ribs into position. (The ribs are 1/32" sq., sanded to a slightly round shape).

The rudder is made in the same manner. The parts are now ready to be covered.

Covering

Cover the window frames of the fuselage with a light grade of cellophane, then cover the rest of the fuselage with superfine tissue or any other light grade of tissue.

The wing and tail frames are also covered with this tissue. The wings and fuselage may be sprayed with water in order to tighten the covering. While the wings are drying, give the right wing some

(Continued on page 46)

The Albatros Fighters on Parade

(Continued from page 13)

edge, while the rear spar was located about halfway along the chord. A third false spar, considered thus, inasmuch as it was not connected with the body and was not supported by any interplane struts. The trailing edge was in the form of a slightly scalloped wire. Ailerons employed only in the upper wing were generously compensated and were balanced within the wing proper. 32 highly cambered ribs made up the construction of the 42 foot upper wing. The two piece lower wing of similar construction was curved at the tips and consisted of fourteen ribs in each wing half, which when attached to the body, comprised a total span of 40 feet, 6 inches. The chord of both planes was 6 feet.

The conventional Teves & Braun radiator was again employed in the upper plane atop the cabane which was itself arranged in four legged form of triangular erection. Four interplane struts (wood-encased steel tube) made up the wing supports on each side which were braced with crossed wires. Two sets of circular section stranded guy-cables served additionally on each side, spreading out and downward from the upper interplane struts nearest the body, and were fastened to the lower body longitudinals. Nose cables on each side of the body were attached at end points to the first lower interplane strut, bracing the entire wing structure. The

compass, so as to be visible from both cockpits, was mounted in a circular opening in the right lower wing. A "plough" type attachment on the axle of the conventional design landing gear served to slow the rolling speed of the ship when convenient. The track was 6 feet, 5½ inches.

The Albatros C-10 as shown in the photograph, came out in the spring of 1917, succeeding four previous C types of the same name, which are insufficiently important to mention here. The C-10 moreover, presents no great difference or improvements over the earlier C-5 other than a slight change in the form of the lower wing and the displacement of the cooling system to the sides of the body. The 260 h.p. Mercedes engine however, was one of the few features that pronounced this machine by a slight advantage in speed over its closest rival, the Halberstadt C-7. The body and tail construction likewise, was the same as that employed in the C-5.

The most important of the Albatros C type fighters was the C-12. This machine shows a marked advancement in the C types produced before the "dreidecker periode." In this most advanced two-seater fighter of the late war, we note the smooth body lines of the D-5a and the similarity that existed throughout, with few exceptions such as in length, height and span. Owing to the additional increase in the wing spread of this machine, the conventional method of wing bracing and inter-

plane strut arrangement was still employed. The C-12 was powered by the 260 h.p. Mercedes with which it could fly at the notable rate of 130 to 135 m.p.h. and attain its ceiling of approximately 18,500 feet in 19 minutes. The C-12 was equipped to carry four bombs located under the pilot's cockpit in front, but were released by the observer in back by means of a quadrant and small lever. The armament consisted of two stationary Spandau machine-guns mounted in front, and two flexible Spandaus manned by the observer in back.

In taking up the description of the Albatros Dr-1, it is interesting to note that this radical departure in German fighting aircraft was the last Albatros D type of its class. Succeeding D types of the same name presented changes in body design made necessary by experiments being conducted with different types of power plants. This was where power and streamline aspects began to clash.

Outstanding characteristics shown in the Albatros triplane were those by which this machine superseded the famous Fokker Dr-1 of Richthofen renown. Not only in view of the fact that the Albatros triplane power plant embraced double, nearly triple (modified) horse-power than the Fokker Dr-1 engine, but in addition, the Albatros Dr-1 excelled the former in general performance. Moreover, the Fokker was equipped with only two ailerons in the upper wing, while the Albatros em-

(Continued on page 44)

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BALSA WOOD

Best quality obtainable

24" lengths		
1/32 x 1/16	18 for	5c
1/16 x 1/16	15 for	5c
1/16 x 3/32	15 for	5c
1/16 x 1/8	12 for	5c
1/16 x 1/4	9 for	5c
3/32 x 3/32	9 for	5c
1/8 x 1/8	8 for	5c
1/8 x 1/4	6 for	5c
3/16 x 3/16	6 for	10c
3/16 x 5/16	6 for	12c
1/4 x 1/4	6 for	12c
1/4 x 1/2	5 for	12c
1/2 x 1/2	2 for	10c
1/2 x 1	1 for	6c
1 x 1	1 for	8c

24" SHEETS

1/100 x 2	1 for	7c
1/64 x 2	1 for	6c
1/32 x 2	1 for	5c
1/16 x 2	1 for	3c
3/32 x 2	1 for	4c
1/8 x 2	1 for	4c
3/16 x 2	1 for	6c
1/4 x 2	1 for	8c
1/2 x 2	1 for	10c
1 x 2	1 for	15c
2 x 2	1 for	20c

TURNED BALLOON

1/2 x 4c Pr.	1 1/2 10c Pr.
3/4 x 6c Pr.	2 12c Pr.
1 x 8c Pr.	3 15c Pr.

PROPELLERS

Hand Carved	
5" diam.	8c
6" diam.	10c
7" diam.	12c
8" diam.	15c
10" diam.	20c

PROPELLER SHAFTS

Large or small, 2c	5c
--------------------	----

Dear Sir:

I received my wood yesterday and was very pleased with it. Not a piece was broken (thanks to your good packing) and not a piece was missing. I have already built a Heath-Parasol with your wood and can say that it is the best wood I have ever used and I have built a lot of planes.

The last company I ordered wood from didn't send me as many pieces as I had ordered and I thought they would never send it. Thanking you for your service.

Very truly yours, SIDNEY LOTZ,
2018 Tuam Ave., Houston, Texas.

PROP BLOCKS

4"	5 for	4c
5"	5 for	5c
6"	4 for	5c
7"	3 for	6c
8"	3 for	7c
9"	2 for	8c
10"	2 for	9c
11"	2 for	11c
12"	2 for	13c
14"	2 for	15c
16"	2 for	17c
18"	2 for	20c

STRAIGHT MUSIC

No. 5-6-8-10-12-14-16-18
2 ft. 1c

THRUST BEARINGS

Large or small 2c each

WASHERS

3/32 diam.	4c dozen
5/32 diam.	2c dozen
1/4 diam.	2c dozen

PROPELLER CARVING

KNIVES

50c each

CELLULOID PANTS

Small for 1" wheel or

3/4 diam. 20c pr.

Large for 1 1/2 or 1 3/4"

30c pr.

DRAG RINGS

1 inch diam. 15c

1 1/2 inch diam. 20c

2 inch diam. 25c

2 1/2 inch diam. 28c

3 inch diam. 30c

Reed 1/16 or 1/32 dia. 2ft.

Alum Leaf 100 sq. in. 3c ea.

Celluloid Sheets 2x6, 3c ea.

Insig. Sheets, 1c ea.

SILK for LARGER

MODELS

Pure, light, strong.

Sq. yd. 40c

BRASS TUBING

1/16 I. d. 10c ft.

COLORED DOPE

Large bottle 5c

1 oz. bottle 10c

4 oz. bottle 30c

CLEAR DOPE AND

ACETONE

Large bottle 5c

1 oz. bottle 10c

4 oz. bottle 26c

COLORLESS CEMENT

Large bottle 5c

6 inch tube 16c

4 oz. bottle 30c

ALUM. TUBING

1/16 O. D. per ft. 5c

3/32 O. D. per ft. 6c

1/8 O. D. per ft. 7c

3/16 O. D. per ft. 11c

ALUM. SHEET

.002 sq. ft. 3c

.008 sq. ft. 12c

.010 sq. ft. 14c

.013 sq. ft. 20c

MOTOR PLATES

for

1 1/2" motor 8c

2" motor 10c

3" motor 12c

Sandpaper 4c sheet

CELLULOID WHEELS

3/4" diam. 6c Pr.

1" diam. 8c Pr.

1 1/2" diam. 12c Pr.

1 3/4" diam. 11c Pr.

1 7/8" diam. 17c Pr.

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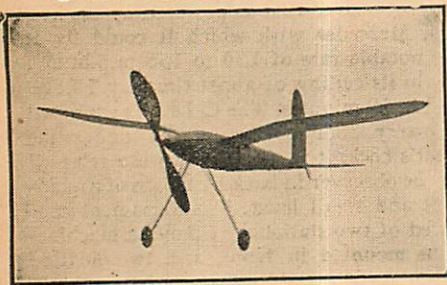
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How the Aeroplane Was Created

(Continued from page 19)

Equipped with 400 h.p. Liberty motors and machine-guns, they made a formidable weapon. This machine possessed an unusual feature in a new type of inter-plane strut into which the angle of incidence was built. This of course made for simpler assembly and if anything, made the ship's structure much stronger. The undercarriage was very strong and heavy. Another feature was the Scarff Ring mounting for the machine-gun in the observer's cockpit. Unusual among Allied machines was the placement of the radiator in the upper wing center section. All things considered, this was one of the best fighting planes to be placed in the ranks of the Allied air forces.

This group would not be complete without some mention of the Thomas Morse group of fighters. These ships were of excellent design and especially good at acrobatics, which of course was a tremendous advantage. A feature of one of these models was the side by side arrangement of the seats as against the tandem one used universally heretofore.

There were some other types of training ships worthy of mention, which were usually overshadowed by overwhelming use of the JNs. The Continental designed by Burnelli was a fine job and was conventionally similar to the Curtiss model. The Vought is also another of which little was known, but so well did these perform that they received a government contract by virtue of competitive tests. Since that time, Vought has become a regular constructor to the U. S. government for machines for national defense.

The only large type of bombing ship designed in this country for war use was the Glen L. Martin bomber. This ship made a name for itself by its high performance. A special feature was the heavy armament it was capable of carrying. Of course, as previously mentioned, there was constructed in this country quite a few Handley-Pages and Capronis but mainly for the purpose of propaganda.

During this period of the manufacture of war materials, Boeing was furnishing a very fine biplane to the government for the purpose of flying the mails, which service had been in operation for some time. This job was of fine appearance and of rugged construction, to say nothing of its ability as a flyer. Rugged it had to be since there was not the fine spread of airports and emergency flying fields available today. Especially was this ship characterized by the heavy pay load it could carry.

Post war aviation brought to the attention of the public many ships left over from the war, which with slight alterations, could be adapted to peace time pursuits, so there was a grand scramble for these machines which the United States government was willing to sell below cost. The excess number of DHs were at once drafted into the government service and used for mail-carrying purposes. Many others such as the Curtiss "Jennies" were bought by ex-service men who used them for barnstorming or exhibition flying at circuses and fairs. These men certainly

played a great part in making the country at large air-conscious. Liberty motors were bought at ridiculously low prices in original crates and were even adapted to the new sport of speed-boat racing.

Many others such as the Thomas-Morse and Loening were purchased for private use as sport planes and of course American manufacturers were quick to envision a promising field for a new type of flying machine for the use of the sportsman, the owner-flyer type.

Less than a year after the war was over, the U. S. Navy, which had ideas of its own as to distance endurance flying, had made ready four new types of flying boats with the idea of being the first to cross the Atlantic Ocean. These were designed and built with the collaboration of Glen Curtiss and after thorough tests, these were narrowed down to the NCs 1, 3 and 4.

These flying boats were huge in size, with a wing spread of one hundred and twenty-six feet and driven by three Liberty motors in tractor fashion. The hulls of these boats were rather short to give as little surface resistance to a boat of this size as possible, it being found practical to eliminate the long hull of the former Curtiss boats and to place the rear control surfaces on outriggers or booms.

As stated before, the NC2 was eliminated due to a difference in design. At any rate, after severe tests the three ships left Rockaway, L. I., on May 8th, 1919, and next day arrived at Trepassey Bay, Newfoundland. After a short delay due to motor trouble the flight was resumed. Adverse weather was encountered and numbers three and four, badly crippled, limped into port at Ponta Del Gada, Canary Islands, just west of Portugal. The NC1 was swamped by high waves and abandoned. More delays were encountered but on May 31st, the NC4 finally landed in the Thames at London, being the first flying machine to successfully negotiate the Atlantic.

The future will tell to what greater heights of service the airplane will rise.

—THE END—

Fundamentals of Model Airplane
Building

(Continued from page 11)

3/16" x 3" long. Sandpaper them smooth and then cement them on each side of the rudder along its straight bottom edge.

This assembly is then cemented to the center of the elevator, as shown in the plans. The trailing edge of the rudder must be flush with that of the elevator, the rudder must bisect the elevator, and the trailing edge of the elevator must form right angles with the rudder.

Wing

Study the plan of the wing. Note that it is cut from two pieces of 1/32" sheet balsa measuring 4" wide and 13 5/16" long. Cut these two pieces to exact size. Note that one of them is shown on the left side of the wing in the plans by dotted lines. Measure 2" in from one edge and then draw a line along the center of the wing board bisecting it. All measurements are laid out on each side of this line. At the tip of the piece, measure 1" on each

side of the line. Lay out the trailing edge of the wing by drawing a line from the trailing end of the inner end of the board to this 1" point.

Draw a second line across the width of the board at right angles to the trailing edge line so that its forward end meets the inner front corner of the board. This line forms the inner edge of one wing half.

From the leading end of this inner edge, measure $\frac{1}{2}$ " along the leading edge of the board. Now draw a line from this point to the 1" point at the wing tip. This forms the leading edge of the wing. Make a graph of the wing tip, trace it on the board and cut out the wing half. The second wing half is cut out in the same manner. Finish smooth with sandpaper.

Both halves should now be tested to see that when placed together they form a perfectly straight trailing edge. If not, their inner edges must be sanded until a perfect fit is obtained. At the same time, the entire wing span must measure exactly 26".

Each wing half requires four wing ribs, which are shown full-size in the accompanying drawing. Trace these on thin paper, transfer two of each rib on $\frac{1}{16}$ " sheet balsa and cut out. Finish carefully with sandpaper.

Assemble the ribs on each wing half before joining the halves together. Note their positions as shown in the plan under "Wing." Rib No. 1 which is the largest, is placed $\frac{1}{2}$ " in from the inner edge and parallel to it. Rib No. 2, the second largest, is placed $3\frac{1}{4}$ " in from the inner edge or

$2\frac{3}{4}$ " in from rib No. 1. The third rib is placed $2\frac{7}{8}$ " from rib No. 2, while the smallest and last rib, (No. 4), is cemented $3\frac{7}{8}$ " from the wing tip or 3" from rib No. 3.

Apply cement to both the ribs and the underside of the wing half and carefully bend the wing around the ribs. Hold with pins until dry. The second half is assembled in the same manner.

Balsa sheeting, measuring $\frac{1}{32}$ " thick and $5\frac{1}{16}$ " wide, is cemented between ribs No. 1 and No. 2 on the leading and trailing undersides of each wing half for added strength. The inner edges of each wing are now beveled to match each other perfectly when the wing is given a $2\frac{1}{8}$ " dihedral at each tip.

Obtain this dihedral in the usual manner and then cement the halves together. Two additional balsa sheetings are now added along the underside of the wing at the leading and trailing edges between the No. 1 ribs of each half. Like the others, these must measure $\frac{1}{32}$ " thick and $5\frac{1}{16}$ " wide. They must be cut 1" long, bent to fit the dihedral angle and cemented.

Mr. Grant has developed a new type of wing clip for this model. It consists of four pieces of wire, two of them forming the leading edge clip and two the trailing edge clip. Note their full-size form at the top of the plan. They are bent from No. 6 piano wire. Bend two front clips and two rear clips. Instead of going directly into the wing structure, these clips have a bent lip on them which extends inward on the

underside of the wing before they are bent up to enter its wood surface. These bends are shown at "A" and "B". The former is for the leading clips, while "B" is for the trailing ones.

These clips come up to the edge of the wing, extend along the edge, turn in at right angles, extend toward the center of the wing and are then bent up, and inserted into it. Note this in the illustration showing the clip on the wing, marked Fig. 3. Test your bends to see that the trailing clips are exactly $\frac{1}{8}$ " shorter than the leading clips.

The wing is attached to the motor stick by spreading the hooks of each clip apart, passing them over the stick and bringing them together under it, where they are held together with short $\frac{1}{2}$ -inch long rubber bands. The attaching of these bands is shown in Fig. 1.

Propeller

The propeller is carved from a medium hard balsa block measuring $\frac{7}{8}$ " thick, $1\frac{3}{4}$ " wide and 10" long. Lay out the pattern as shown full size in the drawing, and then carve in the usual manner. Its hub is cut away on the inner side or on the side from which the propeller shaft protrudes.

Bend a propeller shaft from No. 13 piano wire to the exact size shown in the plans. Insert it through the hub from the inner side, bend it around as shown, pull it back so that the end enters the hub wood and add cement for strength.

(Continued on page 42)

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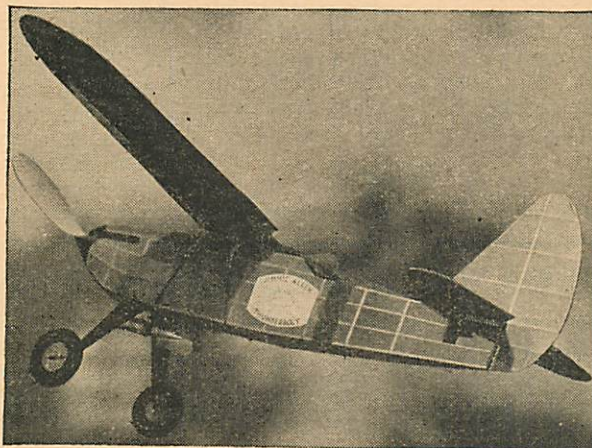
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Landing Gear

The landing gear is bent from a single piece of No. 13 piano wire, as shown in the plans. Note that this piece extends up to the stick, goes forward along its bottom edges and then forms a bend around the motor stick. In this way, it must be placed over the motor stick from the stick's upper side, as shown in the small drawing of it. However, before it is attached to the stick, wheels must be cut and the propeller bearing must be bent.

The wheels may be of hard wood and if this is used, they may be $1\frac{1}{4}$ " in diameter and $\frac{3}{16}$ " thick. If balsa wood is used, they should be $1\frac{1}{2}$ " in diameter and $\frac{1}{4}$ " thick. Cut these out, sand to perfect circles and attach to the landing gear.

A regulation propeller bearing is cemented to the underside of the motor stick. Slip the landing gear over the stick, apply cement and then bind both the gear and the bearing with thread. Apply a coat of cement over the finished binding for added strength. Note that the landing gear wire at the lower end extends back a distance of $1\frac{3}{4}$ ".

Motor Power

The motor consists of six strands of black or brown rubber and is attached to the combination rear hook and tail skid by a second hook, known as an "S" hook because of its shape. Note this at the top of the plan. It is also bent from No. 13 piano wire. Such a hook permits the motor to be wound with a hand winder, such as is shown in Fig. 2.

Tie the length of rubber together into one loop and then pass it between the "S" hook at one end and the propeller shaft at the other. For proper sag in the motor, a length of 100" should be used.

If you wish more power, another strand may be added making seven in all. In this case, one end is tied to the propeller shaft hook, wound back and forth between this hook and the "S" hook, and then the free end tied to the "S" hook.

Flying

For all strong motors a winder should

be used. These may be purchased at any model airplane supply store and are used as shown in Fig. 2. While one holds the propeller shaft away from the bearing, the other attaches the hook of the winder over the "S" hook, stretches the rubber motor about four or five times the length of one strand and begins to wind. While the winding proceeds, the one doing the winding should slowly walk toward the model.

With such a winder, this motor can be given about 550 to 600 turns when a lubricant is used. Such lubricants can be purchased, applied before winding and then carefully washed off before the model is stored away between flights.

If the winder is not used, a hand-winding can be given the motor of about 300 turns. Through the balance method, locate the center of gravity, as shown on the plan by "C. G." in the side view. The location of the wing is determined from this point of gravity. Note that the leading edge of the wing is set exactly $1\frac{3}{4}$ " in front of this point.

Set the wing at this position, wind the motor and launch the plane on its maiden voyage!

The Aerodynamic Design of the Model Plane

(Continued from page 29)

torque in inch ounces and (T) equals the maximum number of turns that the motor will take. The torque (Q) in the formula in this case should be the *average* torque developed over the whole winding of the motor. In the example worked out as an illustration, the *maximum* torque was used. This was an oversight. *The average torque is approximately one-half the maximum torque given in the tables.* This fact can be checked by calculating the average torque of any motor from its graph given with this article. It may be calculated by taking the torque value on the graph at every fifty turns, (this is the vertical distance from the base line to the curve), adding them up and dividing the sum by the number of torque readings used from zero to maximum torque.

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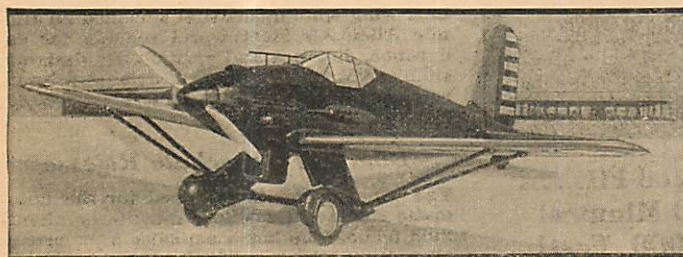
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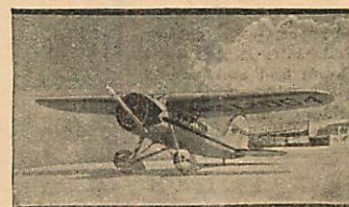
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The example given should be worked out as follows for a motor of eight strands of $1/8" \times 1/30"$ brown rubber, one foot long. (Shown in torque table on page No. 42 of September issue). $W = 2\pi \left(\frac{12.0}{2} \right)$

545 or $W = 20,650$ inch ounces of work.

The work that can be stored in any motor per foot of motor is proportional to the area of the graph lying directly under the torque curve and above the graph base line. Therefore, the work may be calculated directly from the graph as follows: $W = 2\pi H \left(\frac{N}{V} \right)$. Where (W) equals the stored work in inch ounces; (H) equals the number of turns represented by one square of the graph measured horizontally; (N) equals the total number of squares within the area bounded by the torque curve, the base line and the vertical line extending downward from the breaking point shown on the graph; (V) equals the number of squares, measured vertically, required to make one inch ounce of torque. For instance in graph No. 1, $V = 2$. In graph No. 7, $V = 4$.

By using either one of these methods of calculating work, the effect of a lubricant or different sizes and numbers of strands can easily be determined.

Let us examine the graphs and see what effect lubricating the rubber has upon the amount of work that can be stored in it. In the various cases there is a decided increase in the amount of work that can be stored. The increase varies from about 45% to 98%. The low value of 45% is probably too low, due to a slight error in the torque, caused by improper registering of the scale. In most of the five cases in the varying number of strands, the increase is from about 75% to 98%. It is safe to say that the amount of work that can be stored in any motor composed of this size strands of brown rubber, increases 80% when a lubricant is used and the motor is not stretched when wound.

The increase in the stored work increases about 50% when lubricant is used on black rubber motors of $1/8" \times 1/30"$ strands, wound without stretch. The value is indicated by comparison of tables No. 2 and No. 6.

Comparing tables No. 3 and No. 7 for $1/16" \times 1/32"$ black rubber, the average increase is about 10%. However, when a large number of strands are used with lubricant the percentage of increase in the stored work is greater.

This fact is quite glaring in the case of $1/32" \times 1/32"$ black rubber. With a small number of strands the stored work actually decreases about 8%, while the use of a lubricant when a large number of strands are used increases the amount of work that can be stored in the motor by about 20%.

Next month we will discuss other characteristics of the tables, showing how the maximum turns, the torque and the stored work are affected by the quality and size of the rubber used. Useful formulas will be given also in issues to follow.

It is suggested that you study the graphs carefully as much useful information can be derived from them.

Happy Landings until next month!

Air Ways

(Continued from page 21)

did very well, for he says that this is his first contest model.

The airplane bug does not confine itself to males, for picture No. 7 shows Miss Doris Carolan, twelve-year-old model enthusiast, of 184-24 90th Avenue, Hollis, New York, with two of her model ships which she has built. On the right is a Nieuport 27 C.1, and on the left Udet's Albatros D-5.

No doubt many readers have heard of the Comet National Airplane Contest which was held recently.

Hundreds of young men from all over the country competed and thirty winners were picked by the five judges from the total number of entries. The winning model was a Boeing F4B-4, built by Edward Poremba of 1301 South 51st Avenue, Cicero, Illinois, who is shown in picture No. 8. His model faithfully reproduced the features of the large ship even to fire extinguisher, throttle, joy stick, rudder pedals, instrument panels, etc. The motor even had push rods, spark plug wires, shutter cowl and hollow exhaust pipes to scale.

Second place was won by Alex Horbach of 1539 S. Komensky Avenue, Chicago, Illinois, who is shown in picture No. 9 with some of the trophies he has won. Alex also built a scale model Boeing F4B-4. It was very difficult to choose between the models of these two young men. Alex won a movie camera and projector which he says he intends to make good use of at model meets.

Third prize was captured by Robert Bosser of 330 E. Atlantic Street, Appleton, Wisconsin, who entered a model of a wartime Spad. This model was unusual because of its finish, which made it stand out from all the others.

MODEL NEWS FROM OTHER COUNTRIES

England

We are indebted to James Ford of 272 High Street North, Manor Park E.12, London, England, for picture No. 10, which shows the British Wakefield Contest team. The winner, J. B. Allman, is shown at the left in the front row. R. T. Howse who won second place, is shown in the back row, third from the left.

Australia

Picture No. 11 shows the Essendon Model Aero Club of Melbourne, Australia. We are indebted to R. Dearie, Honorable Secretary of the Club, of 33 Scotia Street, Noonee Ponds W.4., Victoria, Australia. This club was formed two years ago and is a unit of the Associated Model Aero Clubs of Victoria. Its purpose is to teach the members of the Club the fundamentals of aviation. Young men who wish to join have to pass "a satisfactory probationary period before being accepted. This system insures a very low percentage of idle members. Instruction classes are held for the probationary members and it goes a long way toward making their models successful. The best official outdoor flight of a member was

(Continued on page 47)

Selley SUPPLIES AND ACCESSORIES

When you need model airplane accessories, think of SELLEY. Your requirements taken care of on 24 hours' notice. Try us.

New Guns Die Cast

WITH RING MOUNT

1 1/4" long B 25c
1 1/4" long A 30c

SWIVEL TYPE GUNS C

2" Double Action ... 15c

PURSUIT TYPE GUNS D

3/4" long ... 5c
1" long ... 5c
1 1/4" long ... 5c

TYPE F

1 1/4" long ... 10c

TYPE E

1 1/4" long ... 15c

DUMMY RATCHET GUN

7/8" long ... 10c

Bombs and TORPEDOES

13/16" ... 5c
1 1/4" ... 10c
3" Torpedo ... 15c

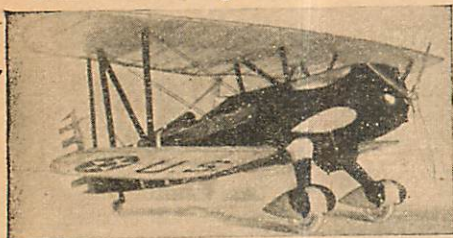
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PROPELLERS

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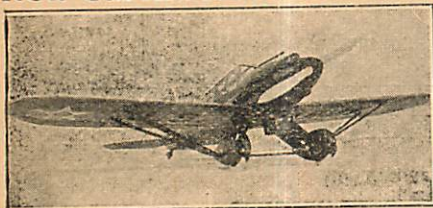
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Curtiss Army Hawk P6E

24" Span, Weight 2 1/4 oz., Flies 800 Feet

The strongest and most perfect model of the P6E on the market. Has squadron insignia on pants and fuselage, metal exhaust pipes, aluminum wheels, 2 color dopes, all parts printed on balsa, printed instrument board, semi scale. Fibre prop. Const. Set. \$2.50 Complete, Postpaid

New Curtiss XP934 Pursuit

24" Span, Weight 1 oz., Flies 675 Feet

Set includes semi-finished wheel pants, glistening hollow metal exhaust pipes, strong aluminum wheels, two color dopes, glue, wing and rudder insignia, U. S. Army lettering, detail drawing, ribs, formers, etc., \$1.75 only on balsa. Const. Set. Postpaid

Illustrated Catalogue 3c Stamp

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The last time we advertised this solid balsa R.O.G., we sold out every one we had!

And why not? This plane has no equal for consistent flights. Yet any builder can make it in 15 to 30 minutes. And we guarantee flight even if it is his first model. Dealer, this kit builds a model that will build a trade; for it encourages the new builder and delights the expert.

Improved kit contains: Fully carved prop, wings and tail assembly cut, ready for use, turned wheels, plenty of cement, etc., all in a neat 2 colored box. Cost you \$1.05 per dozen (plus 20c postage on 1st doz., 10c for every add. doz.) Single kits, 20c P.P.

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5307 NEW UTRICHT AVE. BROOKLYN, N. Y.

The Albatros Fighters on Parade*(Continued from page 39)*

ployed that number on all three wings, so as to result in quicker maneuvering in tight places.

Equipped with the 200 h.p. Benz 3a engine, the speed of the Albatros Dr-1 (or D-VI) was extremely greater, and additional to this advantage, the climbing ability left little to be desired in fighting triplanes of that period.

Sturdy wing construction afforded utmost safety in view of the well known fact that power dives and tight loops were choice stunts frequently dependent in the success of the German fighting pilot.

The Albatros Dr-1 was produced under the serial or firm name L-36. This machine was accepted by the German Imperial Air Service in July 1917, only a month after the heralding of the preceding Albatros type.

The fuselage of the Dr-1 presented the same construction and dimensions throughout as the preceding D-a. The tail section and landing gear was also the same. The most outstanding feature presented in the Dr-1 was the unique and most practical triplane arrangement. The upper wing was constructed in one piece. The front spar was placed almost snug with the thin leading edge, while the rear main spar was practically in the center of the short chord distance. The trailing edge in the form of a wire, was scalloped characteristic in planes of that period. 26 cambered speed type ribs were employed to form the upper and lowest planes, while the middle plane was formed with only 12 ribs in each of its two halves.

As previously mentioned, ailerons were used on all three planes which worked together by vertical steel rods to which they were connected, then to the control rod which ran through the middle wing to the pilot's cockpit.

The regulation Teves & Braun radiator was set in the left middle wing half. The lower wing was made up of two parts joined in the center at a point by which it was attached to the belly of the body by three steel bolts. At this section, a gap between the wing and body served to allow sufficient air currents to pass, whereas in preceding types, this space was filled by a keel.

Two sets of guy wires were employed to brace the wing structure; two to carry and two to brace. The carrying cables ran from the lower body end points to the upper wings, through and attached to the middle wing halves. The bracing wires were attached between the middle and lower wings. The cabane N type struts in this instance were spread further out in parasol fashion to assure perfect visibility for the pilot at this section, and to add to the structural strength of the upper plane.

Two sets of wood encased steel interplane struts one above the other, served to support the planes on each side which as may be noted, displayed a slight degree of negative stagger. The usual D-5a Spandau armament, automatic radiation and electric starting device existed likewise in this machine.

The Albatros Dr-1 saw somewhat little

service at the Western Front. Production of this remarkable German warplane was short-lived and diverted to lighter and faster machines of the biplane class.

Modeling America's Greatest Seaplane*(Continued from page 23)*

with knife or small plane to approximate shape and sand well.

The most important part of solid scale model building is the careful and thorough use of sandpaper in all steps of the construction.

The nacelles should be turned out on a wood lathe if possible. If a lathe isn't available, they should be marked and carved by hand—possibly one of the different size spun aluminum cowls on the market will be the proper size. If so, carve the nacelle and fit the cowl. You can probably find a three blade die cast prop of the proper size advertised in one of the larger supply house ads. If not, carve one from hard wood, finish with fine sandpaper and paint aluminum. Fit nacelles carefully to wing and cement in place.

The tail structure is easy. Make templates in proper scale, mark wood, cut out outline, shape to proper airfoil section and sandpaper. Make tail bracing from split bamboo of streamline shape and assemble after carefully marking rudder and strut locations with templates.

The floats should be blocked out the same as the hull, carved to shape by hand and sandpapered well.

Make the thinner struts from bamboo and the larger ones from bamboo or hardwood.

Assemble wing and empennage (tail-grove) on hull, floats on wing with the two main struts, leaving all other bracing out until the model has been painted.

As it is really the finish which makes a model, great pains and care should be taken with same.

Start by filling in all the pores of the wood with any one of several paste wood fillers your local hardware store or paint shop has in stock. While at this same store it would be advisable to get some "Wetordry" sandpaper grades 6/0 and 8/0. Use this dry on wood and dip in water for use on lacquered surfaces. After rubbing filler well into the grain of the balsa wood, let it dry overnight and sand with number 6/0 sandpaper, dry.

You will need two different colored lacquers for this model, chrome yellow and aluminum. Both of these colors may be obtained from the large plane supply houses and should be good grade aircraft lacquers rather than pigmented dopes.

Mask the windows with scotch cellulose tape, cut to proper size and shape. This cellulose tape may be obtained in practically any stationery store. Now spray or brush three coats of aluminum lacquer onto the plane and rub the first coat with number 6/0 "Wetordry" sandpaper dipped in water to keep surface being sanded wet. Sand second coat absolutely smooth with 8/0 wet paper and leave third with gloss surface untouched. If the surface isn't glossy enough, sand with number 8/0 sandpaper wet and add coat of

clear lacquer. This will lengthen life of finish and help preserve smooth surface.

There is a section of the upper wing painted chrome yellow for visibility in case the plane is forced down. This is shown on the plans by a dashed line. The edges of this may be kept straight by masking same with cellulose tape. After the paint job is finished the rest of the struts may be put in. Use thread for all wire bracing and dope with aluminum lacquer to tighten. Paint rest of struts with aluminum lacquer.

Mask the windows with scotch cellulose with a draftsman's ruling pen and India ink. If the ink won't stick, add a little thinner or acetone to it but do not make any mistakes in the marking, as the ink will not come off.

With a little care and patience, a beautiful model may be turned out. This model will stand a good chance in the best of contests if it is well built for these plans are drawn from factory drawings of the S-42.

On the Frontiers of Aviation

(Continued from page 7)

the pilot, giving him excellent visibility. The top airfoil is a gull-wing while the bottom one is the usual straight wing.

The Hawker Day and Night Bomber with Napier Dagger engine is a two-place biplane similar in general design to our observation biplanes. Its in-line power plant is air-cooled.

The Hawker Hart is a two-place biplane with a sweepback in the upper wing. A radial Pegasus is its power plant, developing about 690 h.p. at 3,500 ft. It is a development from former Harts.

The Naval Air Station at Lakehurst, New Jersey, has a new arrival there. It is the K-1 Navy twin-engined "blimp." Its gondola is faired into the "belly" of the balloon.

Wiley Post has revamped his "Winnie Mae" considerably for his stratosphere exploits.

From all parts of the aeronautical industry there are encouraging signs of progress. There is now a steady demand for American airplanes at home and abroad.

Col. Charles A. Lindbergh has been one of the recent buyers of the new Monocoupe. Lately he has been using TWA's new Northrop record-breaking Gamma and also Tony Little's fleet Monocoupe.

The first of the twenty-two Vultee low-wings to be built for American Air Lines has been completed. It is said to be the fastest air transport in the world.

The giant four-engined Fokker XXXVI has been built and it has a performance in the vicinity of that of our Curtiss Condors. The huge craft, whose total weight is 35,000 pounds, will be a serious competitor in the MacRobertson Race.

Short Brothers of England have out a new twin-engined gull-winged flying boat. Airspeed, also of England, has completed a wonderful little twin-engined low-wing sport plane known as the Airspeed Envoy.

Ben Howard is said to be building a new racer for the National Air Races this year.

Build a Solid Wood Scale Model of the Seversky-3L Land Plane

(Plans page No. 8)

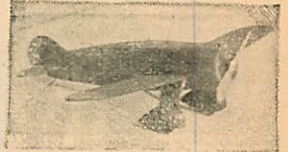
Get dimensions of material needed from full size plans accompanying this article. The model will be made up of the individual parts as listed; fuselage, wing, rudder and fin, stabilizer and elevators, landing gear, prop and wheels.

Make the fuselage first. After tracing the outline of side view of fuselage (the cowl should be made as part of the fuselage) from plans on tracing paper, lay the paper on block to be made into fuselage. Pressing heavily so as to make groove in wood, follow around the outline on the paper once more. Darken grooves in wood with pencil, making them more distinct. Using a chisel or jig saw, cut away all the excess wood of the top and bottom of fuselage. Go over the two flat surfaces with coarse sandpaper.

Then draw the top view of the fuselage on block as you did side elevation and cut around the sides of the fuselage. Sandpaper the two sides, smoothing out all roughnesses.

With a sharp chisel begin rounding out the fuselage as shown by cross sections, cutting off all sharp corners. Take special care in shaping out the long thin turtle deck on top of fuselage. The windows will be painted on later. Go over the entire fuselage with coarse sandpaper and then fine sandpaper, giving it a smooth finish.

(Continued on page 46)



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NC 6 Fairchild 24	NC 18 Pittsman Auto Giro
NC 7 Boeing Pursuit	NC 19 Vought Corsair
NC 8 French Breguet	NC 20 British Gloucester Fighter
NC 9 Pittsman Super-Mallwing	NC 21 Bristol Fighter
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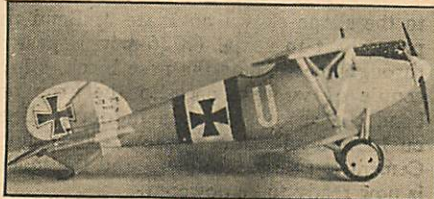
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(Continued from page 38)

washout and the left wing some washin. It is not advisable to spray the tail surfaces with water, as they are comparatively weak and might warp out of shape.

Assembly

Cement the stabilizer to the fuselage and do likewise to the rudder. Cement the wings to the fuselage, giving them 1 1/2" dihedral for each tip. Set the wings at a 3 degree angle of incidence in relation to the line of thrust, (which passes through the center of the rubber motor when it is tightly wound).

Cut the wing struts to the correct size (front struts are 1/16" x 1/8" x length, and rear struts are 1/20" x 1/8" x length), and cement them firmly into place, taking care that the wing has 1 1/2" dihedral for each tip.

Landing Gear

Cut and sand the landing gear struts to size and cement them firmly into place. Bend the shock absorbing axle into shape (use .020 wire), and cement them to struts "C." The wheels are made of 3 discs which are cemented together cross-grained. They are secured to the axle by putting a drop of cement on the end of the axle after the wheel has been slipped on.

Bend the tail wheel fitting (.020 wire) into shape, slip on the tail wheel and cement the fitting to the fuselage.

Cylinder Detail

The cylinders are made of a light grade of balsa, 1/4" sq., which has been planed and sanded to a round cross-section. Coat this balsa dowel with cement, then wind black thread around it, as shown on Plate 4. Cut seven pieces of this strip and cement them to the balsa motor base at the nose of the fuselage. The anti-drag ring may be made of either a light grade of cardboard, of 1/32" sheet balsa, (balsa preferred). After it has been cut to size (pattern on Plate 4), moisten the balsa slightly on the outside, if balsa is used, and bend it around the cylinders, cementing it firmly to each cylinder.

Propeller

The prop is carved out of a soft balsa block 1" x 1 5/8" x 10". First mark out the diagonals, cut out the prop blank, then carve the prop. The blades taper from 1/8" at the hub to 1/32" at the tips. When the prop is carved, cut and sand the blades to the shape shown on Plate 3. Bend the prop shaft to shape (.026 wire), pass it through the rear of the nose block, slip a couple of washers on, slip the prop on, bend the shaft as shown in dotted lines on Plate 3 and sink it into the prop hub. Cement it firmly into place and the model is now ready to be powered.

The ship may be powered with either 4 strands of black rubber (1/8" x 1/32") with 2" of slack, or 2 strands of brown rubber (7/32" x 1/30") with 2" of slack.

Flying the Model

Remember that this is primarily an indoor ship and should be tested as such.

Balance the ship by holding the wing with your index fingers about 1/3 back of the leading edge. The model should balance on an even keel. If it is tail heavy, add

a bit of weight to the nose. If it is nose heavy, add weight to the tail.

When this has been done, wind the prop about 150 turns by hand, raise the nose slightly and launch the ship. If the model has been built properly, it will climb to about 20 feet, circle a few times and come in for a graceful landing. If the ship stalls, raise the leading edge of the stabilizer slightly. If the ship dives, raise the trailing edge of the stabilizer slightly.

When the ship has been adjusted properly, remove the motor stick, lubricate the motor, attach the "S" hook to a mechanical winder, stretch the motor to about 4 times its normal length and give it the maximum number of winds. Put the motor stick into the fuselage, pin it into place, then glance at a calendar before launching the ship.

Build a Solid Scale Model of the Seversky 3L Land Plane

(Continued from page 45)

Make the wing next. It will be made in two sections, one for each side of fuselage. Be sure to make one left and one right wing section and not two lefts or two rights. This may be done by reversing the tracing paper for one of the wing sections. The wing fillets may be made after the assembly of the wing and fuselage. After the outline of the wing sections have been cut out with jig saw, taper them down with chisel as shown on front view of plane. Then shape out the airfoil of wing with chisel, referring to the two wing sections J-J and K-K. Smooth out the surface with coarse and fine sandpaper. Draw in the outline of the ailerons.

The tail surfaces, including the fin, rudder, stabilizer and elevators, are made with a razor blade and chisel, using the same procedure as you did the wing. In tracing the outlines of the parts, you need not trace the fillets, that is the bulging where the tail units join fuselage, if it is too difficult to carve out the fillets and tail units all in one piece, as the fillets may be made with putty in the assembly of the model. After shaping out the pieces, sandpaper them thoroughly and draw lines separating the controls. The small fairings at the tail of the fuselage between the two elevators may be made from scrap wood with a razor blade.

Draw outlines of "pants," landing gear fairing, on pieces of wood the required width. Have grain of wood running lengthwise. Cut around outline with jig saw and then streamline the fairings as you did other parts of the plane. Note cross-section F-F. Fillets of these may also be made of putty if you desire to do so. Sandpaper the two "pants" and then chisel out the bottom of each one in order to insert the streamlined wheels which may be made or purchased. Two straight pins may be used as axles, which are inserted through the side of the "pants" and through a small hole drilled in the center of the wheels.

The tail wheel is enclosed in a "pant" which may be carved with a razor blade. The "pant" is fully streamlined and is half an inch wide. It may be cut in half lengthwise from top to bottom with a razor blade and hollowed out for a wheel. The halves can then be ambroided together

once more. A tube of ambroid (glue) may be purchased at nearly any model shop. Insert pin as axle.

The prop is made in three parts, two blades and a hub. The blades may be cut from a thin strip of wood with a razor blade. True size of prop is given in front view of plane. The hub can also be cut out with a razor blade.

Sandpaper all parts with thin sandpaper, brush off all dust, and begin the assembly of the model.

Connect the wing sections to fuselage first. This is done by laying the two wing sections in correct position on a flat surface alongside the fuselage. Put small blocks under wing tips to give them the same dihedral angle as in front elevation of plane. Use plenty of ambroid in connecting the joints. Connect up the tail when wing joints have thoroughly dried in same manner. After the tail has dried, ambroid on the landing gear. This may easily be done by laying the model on its back. A small round piece of wood as shown in side elevation of plans may be used in connecting tail wheel to fuselage. Ambroid the two blades of prop to hub. The prop turns clockwise, looking forward from cockpit. Insert straight pin through center of hub and into nose of fuselage. Putty up all joints and give the model its finishing touches before painting. A wire may be wrapped around landing gear fairing as shown on plans, denoting joint of landing gear with wing on actual plane.

Brush off all dust and begin doping. Several coats will have to be applied before you have a smooth finish. It is advisable to sandpaper the model once more after the first coat has dried. The color of the Seversky is a bronze color. Paint windows white. A radial motor painted in black on the nose of the cowl would add to the realistic appearance of the model.

Touch up all parts and the model will be completed.

Air Ways

(Continued from page 43)

twenty-five minutes, eighteen seconds. It covered a distance of twenty-five miles." The members of this club evidently know how to build models; such flights are not made every day. Mr. H. Halmshaw, President of the Club, holds the indoor flight

record with a time of two minutes, twelve seconds.

Mr. Freshman of the Model Flying Club of Australia, has sent us picture No. 12 showing the entrants in the monthly outdoor contest for New South Wales. These young men competed for the Angus and Coote Cup, the Angus and Coote Flying Scale Trophy and for the privilege of entering the Wakefield Contest. The winner of the Wakefield heats was V. Kelaher who made an average of forty-seven seconds for three flights. Second was Bert Markin. Kelaher is shown in the second row, fourth from left end. Markin is second from the left in the top row.

CLUB NEWS

Connecticut Model Airplane Club

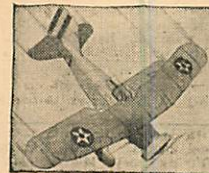
The state of Connecticut has a very active group of model builders in the Connecticut Model Airplane Club. Picture No. 13 shows a group of the winners of a contest which was held at Hartford on June 23rd and 24th. Herbert W. Owen of New Britain was the individual high point scorer of the meet. He is shown in the center of the first row with the collection of "hardware" which was awarded him as prizes. Owen has been a consistent winner in all the meets which he has entered and is one of the best model builders. At his left is George Gumbus of Hartford, second high point scorer. Directly behind Owen is Julius Sobanski, also of Hartford. He won third place. Irving Bailey of New Haven, shown at the extreme right of the rear row, was the winner of the Senior Scale Model Contest. As a reward for their outstanding achievements, Ex-Governor John H. Trumbull took Owen, Sobanski and Gumbus for a hop in his Stinson Cabin, flying from Hartford to New Britain and back.

Catherine Clark of Waterbury, who is thirteen years old, acquired the distinction of being the first young lady to enter the State Model Airplane Contest of Connecticut during the six years of its existence. She won sixth place in the Junior Scale Event with a model of the Hawker Super Fury.

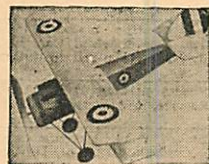
We are indebted for this information to Mr. C. Donald McKelvie of the Hartford (Continued on page 48)



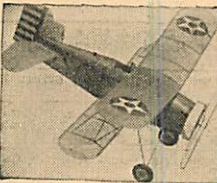
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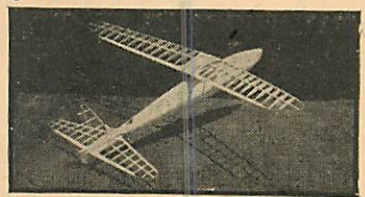
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Of UNIVERSAL MODEL AIRPLANE NEWS published monthly at Springfield, Mass., for October 1st, 1934, State of New York, County of New York.

Before me, a Notary Public in and for the State and County aforesaid, personally appeared George C. Johnson, who, having been duly sworn according to law, deposes and says that he is the Publisher of UNIVERSAL MODEL AIRPLANE NEWS and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in Section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, George C. Johnson, 551 Fifth Avenue, New York, N. Y. Editor, Charles H. Grant, 551 Fifth Avenue, New York, N. Y. Managing Editor, George C. Johnson, 551 Fifth Avenue, New York, N. Y. Business Manager, George C. Johnson, 551 Fifth Avenue, New York, N. Y.

2. That the owner is: Jay Publishing Corp., 551 Fifth Avenue, New York, N. Y. George C. Johnson, 551 Fifth Avenue, New York, N. Y.

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

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

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Y. M. C. A., who acted as assistant director of the meet and registrar.

Atlantic City Model Airplane Club

The 1932 National Model Airplane Contest evidently left its footprints in the sands of Atlantic City, for since that time, this seaside resort has been very air-minded as far as model planes are concerned. One of the model airplane fans who lives there is Jimmie Throckmorton of 121 North Congress Avenue. He has been kind enough to write and send us picture No. 14, which shows him holding a plane built by John Ginnetti, former Mulvihill champion and also a resident of Atlantic City. The ship has a wing spread of six feet, three inches and a fuselage of five feet, one inch. A Clark "Y" wing section is used. Power is supplied by a Brown Junior motor, which swings a fourteen inch propeller. We notice from the picture, however, that the motor appears to be bashful for it is either hiding back of the wing or its builder could not persuade it to assume its proper position on the plane. However, this should be a good sign for the motor if human instincts are any criterion. If this is true, John's motor should DO plenty.

Both of these young men are members of the Atlantic City Model Airplane Club, which is doing a great deal of indoor work. They fly in a convention hall with a one hundred and thirty-five foot ceiling. Jimmie tells us that several gas models are in the course of construction by members of this Club.

Glen Ellyn Model Airplane Club

Glen Ellyn, Illinois, has a very progressive model club which meets at the Y. M. C. A. clubrooms at 450 Turner Avenue. Bill Shaw, a member of this club, sends us picture No. 15, which shows a Boeing F4B-3 built by Harold Krueger, on the left. Krueger lives at 308 Glennwood Avenue. On the right is Bill Shaw's Curtiss Hawk P6-E. Both of these are extremely nice-looking ships and very realistic in appearance. This Club held a contest on July 10th and 11th. It was called the Centennial Model Airplane Contest and was sponsored by the Centennial Committee.

Minneapolis Model Aero Club

The Minneapolis Model Aero Club has been very active during the past summer. On July 15th a flying scale model contest was held. Two other contests of which we have received no news were held later in the summer. One was the Northwestern National Bank Contest and the other was for flying and Wakefield planes. Vernon Hanson is president.

Bamberger Aero Club

The Bamberger Aero Club has a new club director. Upon the resignation of Irwin Polk, the director of the Club for the past five years, Nathan Polk, his brother, has taken over his position. We wish Mr. Nathan Polk every success and hope that the Club continues to progress and demonstrate its unusual talent as it has in the past under Mr. Irwin Polk.

The Club will hold its Second Annual

Glider Meet at the Newark Airport on Saturday, September 29th. This meet will decide who will attain enough points to take the Jack O'Meara Trophy, now held by Stanley Congdon of Glen Ridge, New Jersey. The meet will be divided into two groups; Junior and Senior. There will be three events; hand-launched, tow-launched and catapult-launched. Gliders in all three events will be in Class "C" of the National Aeronautic Association rules.

Aviation Advisory Board

(Continued from page 34)

mercial aviation today. It is as follows:

Question: What are the aerodynamic reasons why most of the large air lines are using low-wing jobs? Most model builders can see no reason in this. In a model it tends for instability.

Answer: The model builders are absolutely correct, it does tend for instability. However, commercial air lines are primarily in business for another purpose; that is, to make money. Because of this, the airplane's efficiency seems to be the first consideration. The greater the efficiency, the more payload can be carried and the greater the revenue from the operations of the plane. Because of this, stability must be a secondary matter. It is wrong to say that they do not consider stability, but they do not seem to consider it as the primary factor. After the efficiency has been gained, it appears to be their policy to then consider how safe they can make the plane without losing the efficiency. Unquestionably, airplanes can be made in this manner with a certain degree of safety. However, in our opinion, the air lines do not put the consideration of the maximum degree of safety before everything else. Therefore, in their search for speed and high lift, regardless of safety and stability factors, the low-wing type of plane is chosen. In this type of plane head resistance is cut to a minimum and the type of construction can be used which makes for comparatively little weight. By doing this they are defying the fact that such a plane is more unstable than if the wing and thrust line were raised above the center of gravity.

Many arguments can be started on this question, and we will welcome any that our readers wish to introduce. However, we wish to warn them that they are beaten before they start on this question. Such arguments usually base the idea of stability upon the fact that they consider stability as inability to disturb the plane in flight. This is dependent upon the inertia of the ship. This quality, present day airplanes have to a great degree. However, they are forgetting the fact that once the plane is disturbed, its inertia tends to keep the plane in unstable motion. For instance, once the plane is forced into a spin it is extremely difficult, if not impossible, to bring it out of the spin because of its inertia and great weight.

Stability in the true sense, is that quality which an airplane possesses which has a tendency to bring the airplane quickly back into normal flight position when once it has been disturbed.

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9 Beautiful "designed-to-scale" FLYERS

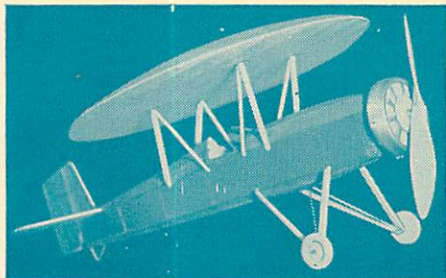
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Plans alone for these models, 10c each.

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each
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Madison Umbrella Type

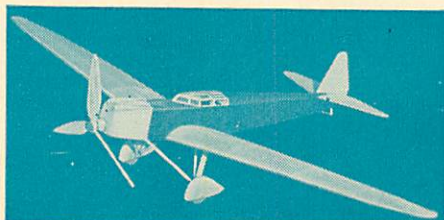
One of the new successful umbrella type planes. Circumference of wing, 28 inches. 50c postpaid.

Wedell Williams

15" model of the racing plane that made new records at the air races. 50c postpaid.

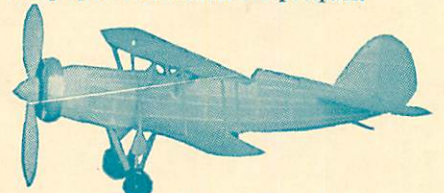
Junkers D-1

15" model, an outstanding type of German commercial all metal plane. 50c postpaid.



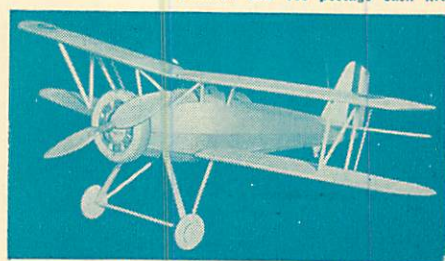
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A perfect model of a famous French bomber. Wing spread 20 inches. 50c postpaid.



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15" model of the ship board type Navy planes used on Aircraft carriers. 50c postpaid.

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15" model of one of the fastest army pursuit planes. Complete kit 50c postpaid.

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15" flying model of a famous plane. Easy to build. Sturdy and shockproof. 50c postpaid.

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15" flying scale model of a famous fighting ship. 50c postpaid.

Each of These New Madison Kits Contains

1—Finished Hand Carved Hard Wood Propeller

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- 2—Sheets of colored Japanese tissue
- 1—Bottle of Aleo Cement Ribs and Bulkheads printed on Balsa Wood

1—2" Drag Ring with each kit where required (Aluminum)

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- 1—1 Foot length .028 wire
- All necessary wood for Stringers and Landing Gear

MADISON SUPPLIES are HIGHEST QUALITY! BIGGEST VALUES!

COLORED DOPE
Pigmented aircraft dope.
Red, Blue, Black, Yellow,
Orange, Olive Drab, Silver,
Star color.
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4 oz. can28
Pint90

ALUMINUM DRAG RINGS
Used on real ships for cutting down wind resistance. A beautiful addition to any radial motored model.
1 1/2" diam.19
2" diam.21
2 1/2" diam.25
3" diam.29

12" SHEET ALUMINUM
.005, per ft.12
.010, per ft.19
.003, per ft.12

THRUST BEARINGS
Strong and light, large size, .035 hole,02
Per doz.20
Small .025 hole02
Per doz.20

COLORLESS CEMENT
Strongest, lightest and fastest drying.
1 oz. tube15
2 oz. can17

4 oz. can32
Pint1.00
WOOD WHEELS
1" diam. hardwood unbreakable, pair5c

INSIGNIAS
U. S. Army and Navy, 4 Stars and 3 Stripes (red, white and blue). 1" sheet, 3c; 1 1/2", 4c; 2", 5c; 2 1/2", 6c.

CELLULOID WHEELS
3/4" diam. — pair... .06
1" diam. — pair... .08
1 1/2" diam. — pair... .11
1 3/4" diam. — pair... .17
3" diam. — pair... .30

DUMMY RADIAL ENGINES
Celluloid, 9 cylinders, 3" diam.
Each20
1 1/2" diam.35
2" diam.30

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Pure sheet aluminum .0003 inch thick, only 1/10 thickness of writing paper. Light, strong; 3 1/2" wide, 5 for05

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Strong, light tissue. Sheet 20x24.....3 for .08
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Our Balsa Wood is the lightest and best balsa to be had. It is clear, straight-grained stock, cut to convenient sizes.

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1/16x1/1620 for .05
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1/16x1/412 for .05
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3/8x3/46 for .05
3/8x16 for .05
3/8x1 1/46 for .10
3/8x1 1/26 for .11
3/8x1 3/46 for .12
3/8x26 for .13
3/8x2 1/46 for .14
3/8x2 1/26 for .15
3/8x2 3/46 for .16
3/8x36 for .17
3/8x3 1/46 for .20
1x12 for .12

40" Lengths
1/4x3/405
3/8x3/406
3/8x1/207
3/8x108

PLANK BALSA
1x3x3630
1x6x3645
1x6x3645
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PROP BLOCKS
1/2x3/4x55 for .05
1/2x3/4x64 for .05
3/4x1x73 for .06
3/4x1x83 for .07
3/4x1 1/4x83 for .08
3/4x1 1/2x102 for .09
3/4x1 3/4x112 for .11
3/4x1 1/2x112 for .12
3/4x1 1/4x122 for .13
3/4x1 1/2x122 for .15
3/4x1 1/4x142 for .17

18" SHEET BALSA
1/32x22 for .03 1/2
1/16x22 for .04 1/2
3/16x22 for .06
3/8x22 for .08
1/2x22 for .10
3/4x22 for .18
36" lengths may be had if desired at above prices but for half quantity.

ALUM. 3-BLADE PROP
Each blade 1 1/4" long .15
N.A.C.A. COWLINGS
No dummy motor needed with this cowlings.
1 1/2" diam.19
2 1/2" diam.21
3" diam.30

CELLULOID COMB DRAG RING AND DUMMY MOTOR
1 1/2" dia. 25c; 3" 45c.

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Nitrate dope thinned down for model airplane use.
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Lightest covering material known. For covering endurance models.
Sheet 20x1505
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COLORED JAP TISSUE
Red, Blue, Green, Orange, Brown, Yellow and Black.
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Straight-grained genuine birch dowels:
3/4x18"6 for .05

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Tonkin straight-grained, no-knot bamboo.
1/16x1/4x1101
Per doz.08
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.045 sq. 25 ft.08
3/32 flat 25 ft.10
1/8 flat 25 ft.12
3/16 flat 25 ft.15

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2 oz. can11
4 oz. can18
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Rotary Barrel
3/4", 8c; 1 1/2", 12c; 1 3/4", 15c

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4 ft. packages, 1 ft. lengths:02
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The CURTISS GOSHAWK

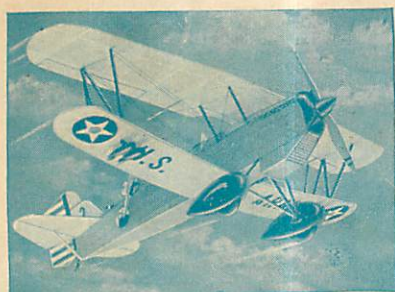
WOW! What a model! What a kit! What a value! Boy, you'll rave about Comet's great new Curtiss Goshawk—a faithful scale model of Uncle Sam's most talked-of ship! 360 miles per hour in a power dive—that's speed! Machine guns trained to spit their deadly hail from between the cylinders of the motor. Shock absorbing landing gear—dozens of other features. Kit contains many Balsa stringers, wing spars, formers and ribs clearly printed on high grade Balsa veneer, tissue, cement, banana liquid, rubber motor, semi-shaped wheel pants, wheels, metal fittings and washers, colorful naval insignia, semi-shaped cowling, printed scale propeller, auxiliary gas tank, carved Balsa propeller, tubed aluminum gunsight, strut Balsa, rubber cockpit coaming, plenty of sheet Balsa, thread, dope brush, printed rib sheet, sand paper, and everything else you need. New type fuselage saves 4 hours' work. What a seller this great kit will be at only \$1.00 postpaid.



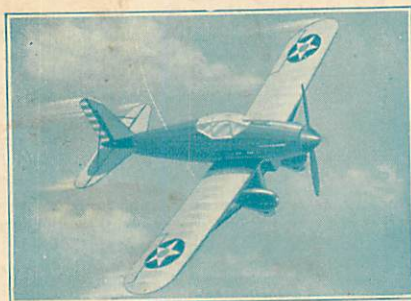
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WINGSPAN — 19½ Inches

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THE NEW CURTISS FALCON
24" wingspan Postpaid \$1.95



THE NEW CURTISS-SWIFT
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YES SIR, that's a real challenge—a challenge that defies any one anywhere to beat Comet's marvelous kits and sensational values! And it's a challenge that's backed by evidence—in the form of letters from Comet's users praising the completeness of Comet kits, the ease with which Comet plans can be followed—and the flyability of Comet models! And we don't just ask you to take our word for these things—we guarantee everything—you can't go wrong with any Comet kit—because your money will be cheerfully refunded if you are not 100% satisfied!

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Wingspan 17½"

The Troy, N. Y. Times carries the news that Edgar Hayes, won a model plane contest with a Comet Curtiss Robin that flew two minutes, and more than 2,500 feet! Edgar says: "I have built other Comet models—and every one was a great flyer."

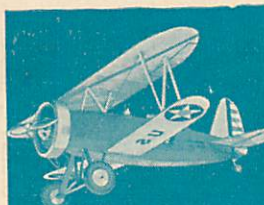
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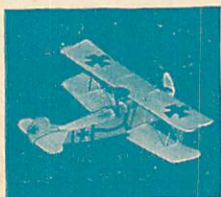
CURTISS HAWK
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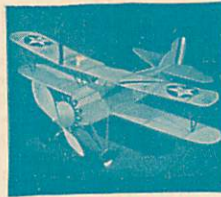
(3 for \$1.00 postpaid)
Dipper—12½" wingspan
Capt. Page—12½" wingspan
Zipp—15" wingspan



FOKKER D-7 FLYING SCALE
12" wingspan 25c

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Aeronca—16" wingspan
C-1 Pursuit—15" wingspan



CURTISS HELL-DIVER
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