# UNIVERSAL MODEL AIRPLANE NEWS

FEBRUARY

20¢

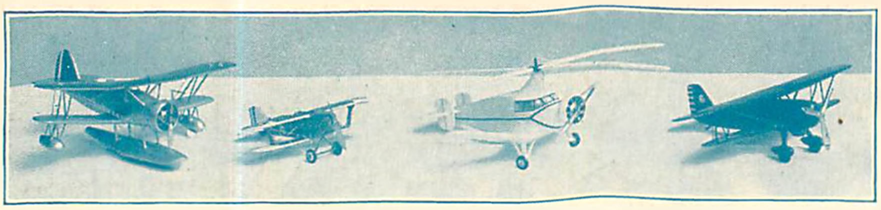
"THE ONLY MAGAZINE DEVOTED EXCLUSIVELY TO EXPERIMENTAL AVIATION"

THE CONSOLIDATED "ADMIRAL"—U. S. NAVY

# BUILD 4

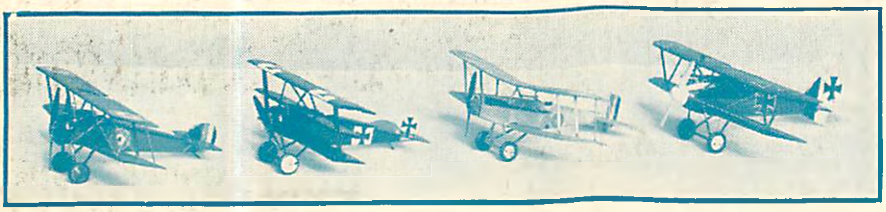
## Exact 1/4-Inch to the Foot SCALE MODELS

## for $1.25

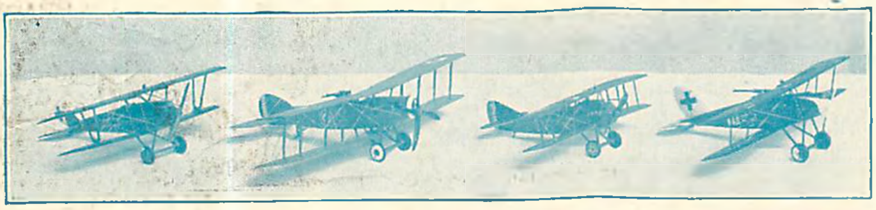


B/J·SEAPLANE NAVY RACER AUTOGIRO CURTIS HAWK P.6 E

CURTISS SWIFT BOEING XP 936 BOEING P-12-F B/J. PURSUIT



CAMEL FOKKER S. E. 5A ALBATROSS



Pfalz D111 BRISTOL FIGHTER SPAD 13 HALBERSTADT

HAWK P-5 CURTISS RACER HAWKER FURY SUPERMARINE

NOW, you can build four exact scale replica models of the world's most famous aeroplanes for $1.25. Each kit set contains all the wood parts **CUT TO OUTLINE SHAPE** as, fuselage, wings, elevator, rudder, and pontoons. These parts are cut from Balsa for all planes except the B-J Seaplane, Boeing P-12-F, Autogiro, and Boeing XP936 which come with pine parts only. Scale die cast propellers, wheels, and radial motors are also included in the kits; together with a full size scale plan, paint, cement, insignia, and other materials needed to complete each plane. These construction sets build up into solid wood exact scale models, and when completed represent the last word in solid scale model building.

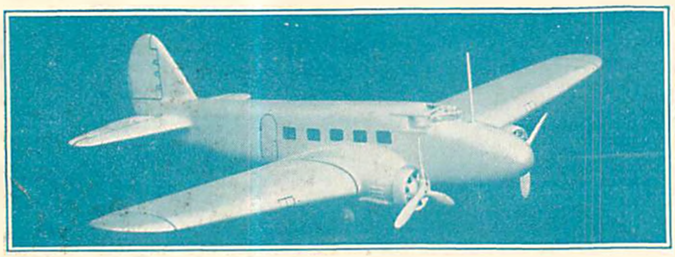
These kit sets are not to be confused with the 6 inch replica model kits supplying only blocks of wood and selling at a much cheaper rate. When you consider that all the wood parts for OUR KITS come cut to shape, the propellers ready to mount, wheels cast, and each ship is exactly 1/4 inch scale to the "proto type" it represents, you will agree that we are producing kit sets far superior to others on the market. The wing spans for these planes vary from about 6 inches for the Curtiss Racer to over eleven inches for the Bristol, according to the size of the real aeroplane.

Choose any four of these planes pictured here and send us $1.25, and we will send the kit sets to you postpaid.

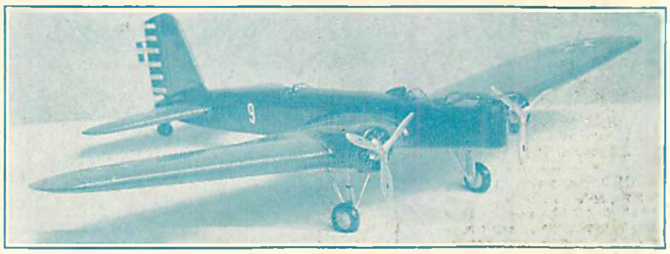
**Note:** This does not apply to the Boeing Bomber or Transport.

*These models were exhibited at the World's Fair in Chicago, 1933*

## BOEING TRANSPORT



## BOEING BOMBER Y1B-9A



**Now you can build the Boeing Transport or the Boeing Bomber pictured here and have an exact 1/4 inch scale replica model for $1.65**

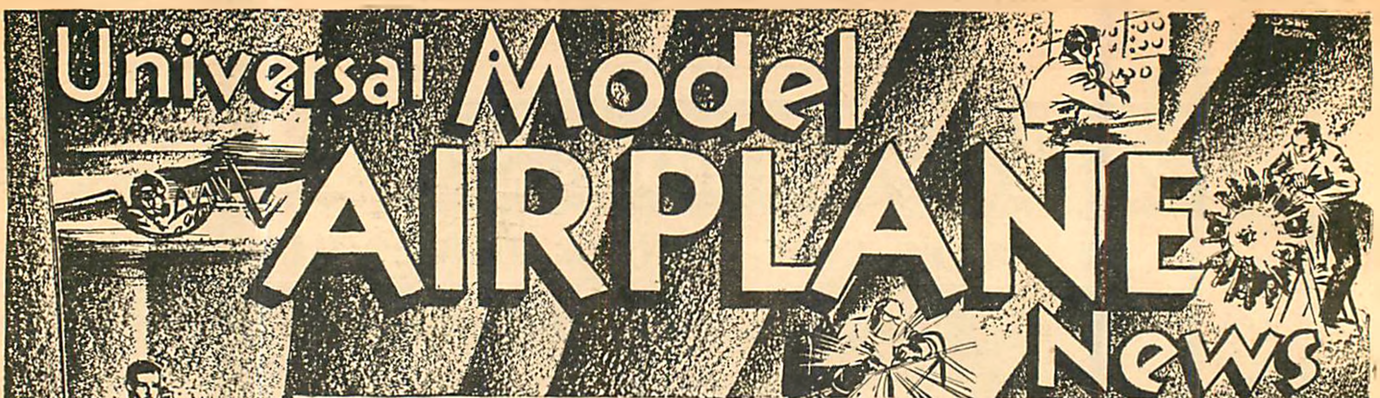
The kit sets contain all the wood parts cut to outline shape, two scale die cast Wasp Motors, two scale die cast three bladed propellers, all ready to mount, and cast wheels. These castings are made of Brittania metal and do not have to be hand finished. A full size 18½ inch wing span plan, glue, paint, etc., comprise the kits. When you consider that the fuselage, wings, rudder, and elevator are cut to shape and NOT blocks of wood, motors and propellers are ready to mount, and the size of the plane, 18½ inch wing span, you will realize we have produced a construction set that is in a class by itself. We Guarantee these kits to be as stated, and know you will be satisfied.

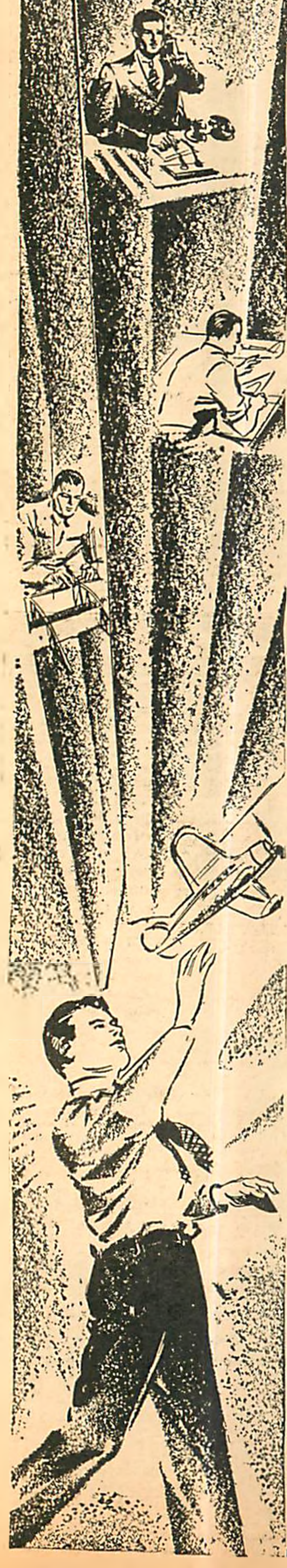
These kits can be had in either balsa or pine at $1.65 EACH, Postpaid.

# HAWK MODEL AEROPLANES

4944 Irving Park Blvd., *Dept. H 3* CHICAGO, ILL.

CHICAGO'S OLDEST MODEL AEROPLANE ESTABLISHMENT



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*Edited by Charles Hampson Grant*

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## IN OUR NEXT ISSUE

An absorbing story of the purpose of and the problems embodied in Lindbergh's recent tour of the continents, by Fletcher Pratt.

**How You Can Build the Waco Cabin Plane,** by Joseph Kovel, gives you complete data to build one of the finest performing scale models that we have ever seen.

Robert Morrison gives intimate details of the latest airplanes, with three view drawings, in **On the Frontiers of Aviation,** Part 2. (We were unable to print this in our February issue).

**The Development of the Fokker Fighters,** by Robert C. Hare, continues to tell you new and undisclosed features of Fokker Planes that lead up to the successful D.7. type.

**Build the Martin Bomber,** by Barnett Feinberg, gives you complete data from which you can create a striking solid scale miniature of the world's fastest bombing plane.

There will be also much useful information and many other fascinating articles, such as, **How You Can Make Hydrogen,** the **Aerodynamic Design of the Model Plane,** and news of recent contests, and model builder's activities throughout the world.

Order your copy of Universal Model Airplane News from your newsdealer now, or send $2.00 for your year's subscription to 125 West 45th St., New York City. Canadian subscriptions $2.00. Other countries $2.50.

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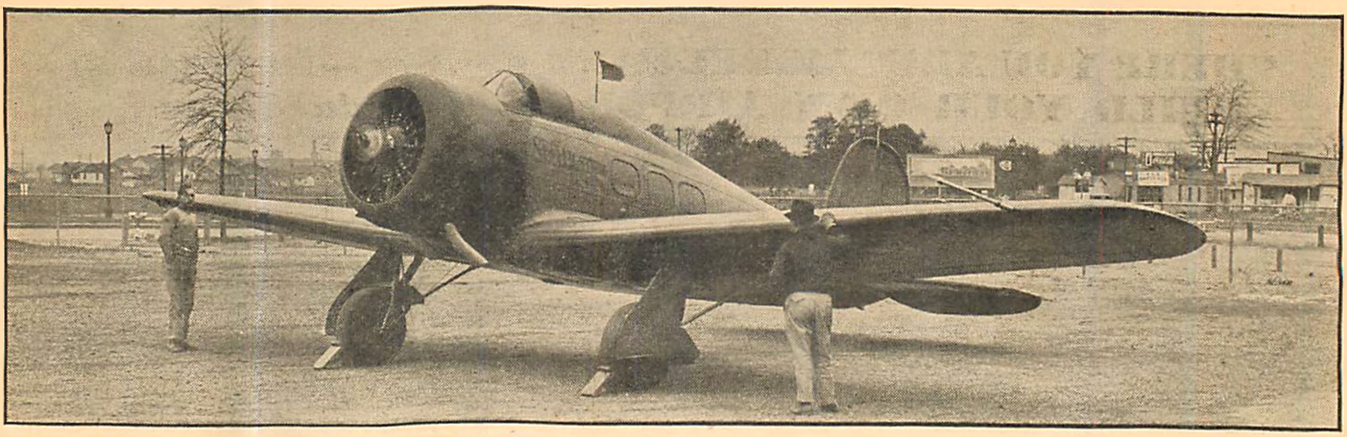


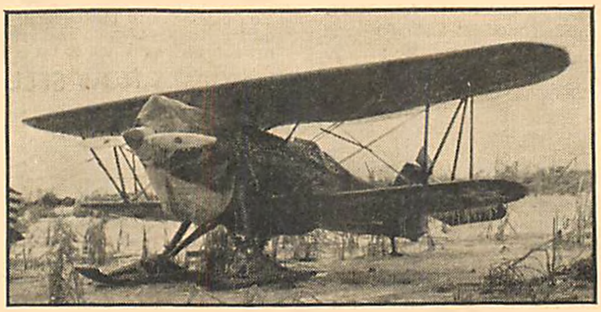
Jimmy Doolittle's Lockheed equipped with leading edge de-icing strips.

# Making the Air Safe

## Developments of Genius Which Are Taming the Hazards of Flight.

By H. LATANE LEWIS II

TOSSED and buffeted by a winter gale, the night mail plane winged its solitary way a mile above a storm-torn earth. Sleet, with the velocity of buckshot, mercilessly pounded the fabric surface of the big ship. Hunched forward in the cockpit to protect his face sat the bronzed young pilot, the tiny light on the instrument panel casting a weird glow over his tense features. In the compartment up front rode 600 pounds of valuable mail and express that had to go through.

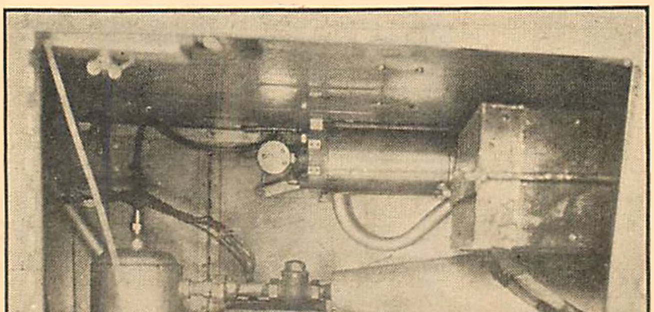


How an army plane with no de-icers looks after an ice storm.

The plane had begun to feel sluggish now and did not respond to the controls. Although the engine was running at full throttle, the altimeter showed that the plane was settling rapidly. The pilot cast a hurried glance about him. Suddenly an icy hand gripped his heart. Sleet, with menacing swiftness, was building up on the wings.

Then the engine, until now faithfully droning out its sonorous song, began to pound itself to pieces. Ice had formed on the propeller and the unequal loading had caused it to go off balance.

The pilot began a frantic dive for the earth. It was too late now. The big ship had lost all of its lift and had become just so much dead weight in the air. Turning over and over like a wounded bird, it fell.



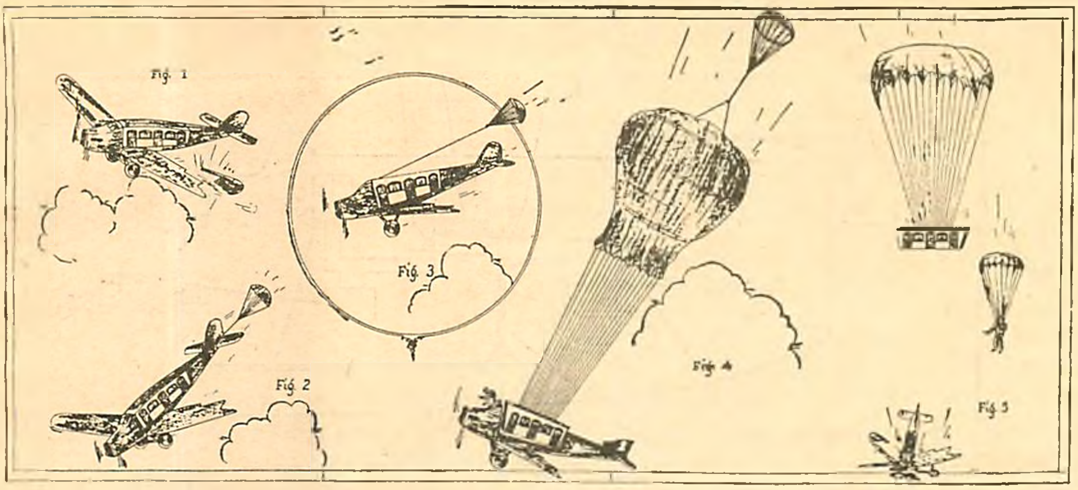
A sonic altimeter installed in a Douglas.

In the past, the only safeguard against such tragic occurrences has been to avoid, whenever possible, weather that will produce the deadly menace of an ice coating on wings and propeller. It is not so much the weight of the ice that matters. The real danger lies in the building up of the ice on the leading edge of the wing, which changes its contour and causes it to lose its lifting power.

Among the new safety devices for aircraft that are now being tested is the "rubber overshoe," or "De-Icer," which is designed to rid aviation of one of its worst enemies.

"De-Icers" consist of thin sheets of rubber cemented to the leading edges of wings and tail surfaces. Each of these sheets contains three long inner tubes. These tubes are automatically inflated and deflated when a plane is operated under ice-forming conditions by means of a pump driven by the engine. A valve, operated by the pilot, releases compressed air into them, causing an automatic expansion and contraction.

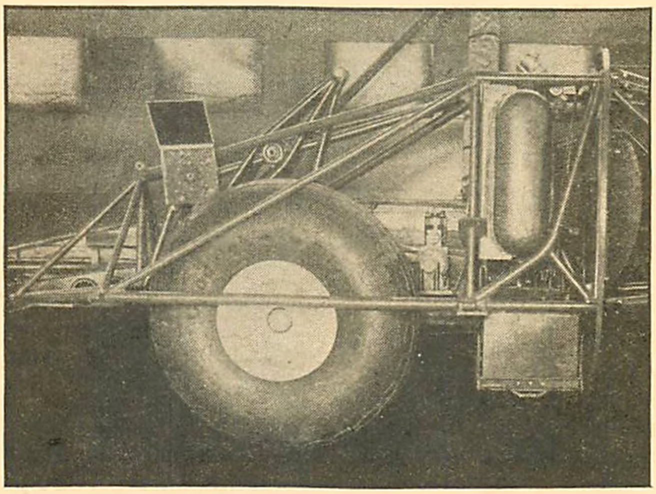
At first the two outside tubes inflate; then, as they deflate, the large center tube inflates. The pulsation rate is one per minute. The ice is cracked loose by this "breathing" action and is ripped off by the air




The diagram shows the various stages of operation of the plane parachute. The whole cabin with passengers are landed safely.

stream as soon as it forms. A similar arrangement eliminates the ice from the propeller.

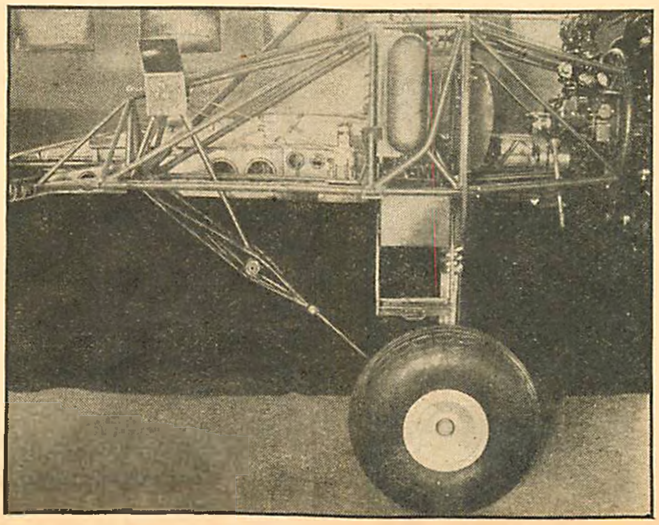
These simple little devices are proving to be a real lifesaver. They have already been installed on a number of mail and passenger planes, permitting them to get through even in blinding hailstorms.



Retractable landing gear of a Curtiss Condor.

The problem of making the air safe has been vigorously attacked by aeronautical engineers, both government and civilian, during the past year and many new devices have been produced that have a far-reaching effect. For while flying is the fastest means of transportation, it must also be made the safest. This is the objective towards which the industry has now turned its attention. "Speed with safety" is to become the watchword of aviation.

One of the greatest dangers has always been the possibility of collision between airplanes flying in opposite directions along an airway. Then too, there is the risk of some plane that is not following the airway, but just barging along, crossing the path of ships operating along the regular route.



Retractable landing gear with wheels down.

This danger is particularly great at night and in stormy weather when visibility is restricted. Almost any pilot who has done much bad weather flying can tell a hair-raising story or two of missing a collision by "the skin of his teeth." But now the Aeronautics Branch of the Department of Commerce, ever ready to solve aviation's deepest problems, has come forth with an answer.

The equipment, which would be carried on all airplanes, consists of a compact radio transmitting and receiving set, both operating on the same frequency. The transmitter continuously sends out signals which radiate in all directions from the plane. The receiving set, however, will receive signals only when they are coming from directly in front of the plane, or within a path thirty degrees wide from the front. Thus, no signal is received from another airplane unless the line of flight is directly toward that airplane. When the pilot receives this warning, he maneuvers his ship so as to decrease the intensity of the received signal, which automatically takes him out of the path of danger.

The signals may be heard up to a distance of 3 miles when the planes are on approximately the same altitude. If, however, they are flying on a sufficiently different altitude when warning is not necessary, no signal is heard.

Another interesting device for use in stormy weather when the ground is obscured is the sonic altimeter. This insignificant looking instrument gives the pilot his exact altitude above ground, accurate to within two or three feet. Present type altimeters are barometric; that is, they measure air density and translate it into altitude above sea level. Pilots flying over high, mountainous country have sometimes flown into the ground while their altimeter registered several thousand feet above sea level.

The sonic altimeter blows a high-pitched whistle at regular intervals as the air-

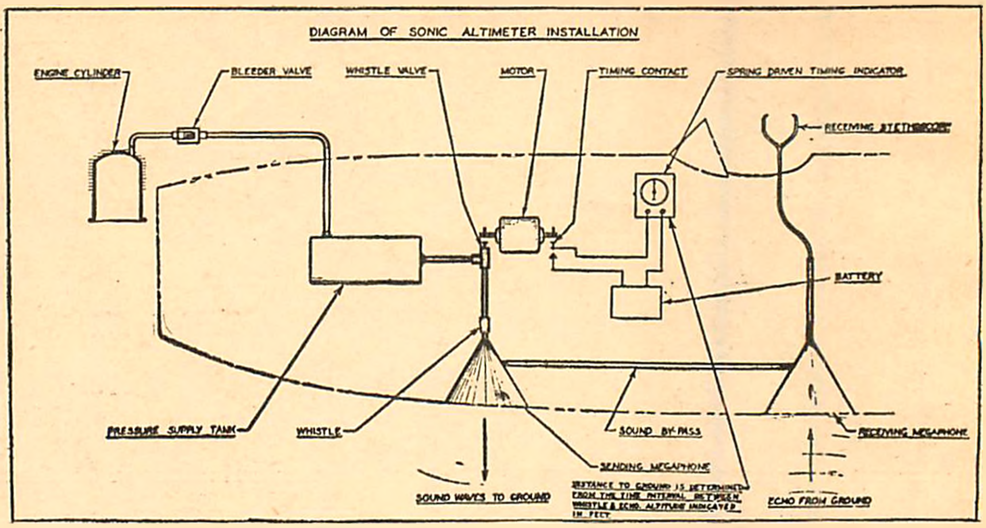


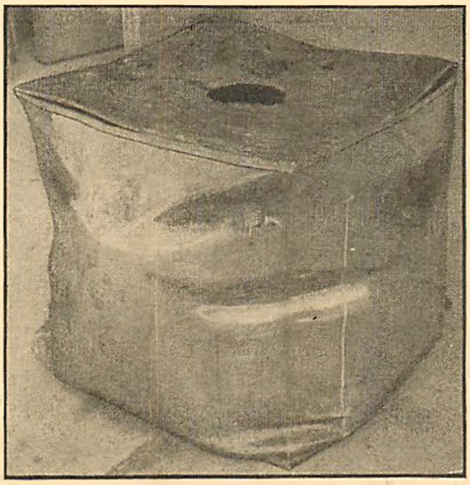

**Diagram showing layout of sonic altimeter. (Official Photo U. S. Army Air Corps.)**

plane flies along. The sound travels down, hits the earth, and is reflected back to the airplane, where it is caught by a megaphone attached to sound filters. The elapsed time between whistle and echo is measured and is indicated in feet on a dial in front of the pilot. As sound travels at the rate of 1,100 feet per second, a two-second interval would indicate that the airplane was at 1,100 feet, it taking one second for the signal to reach the ground and another second for it to travel back to the plane.

So sensitive is the device that it is possible to tell when houses and trees and other such objects are being passed over.

The mention of safety equipment for airplanes always brings up the much discussed question of equipping passengers with parachutes. It is argued by some authorities that chutes should be standard equipment on airplanes just as life-boats are on ocean liners.

In California, recently, a large transport plane, heavily loaded with passengers, became pinched in by fog. The gas was running low and the pilot still could not find a hole in the mist. He cruised around, coming lower and lower, feeling for the ground in an effort to set the big plane down. He flew into the side of a house at high speed. A terrific explosion followed, killing everyone in the plane and also all the occupants of the house.



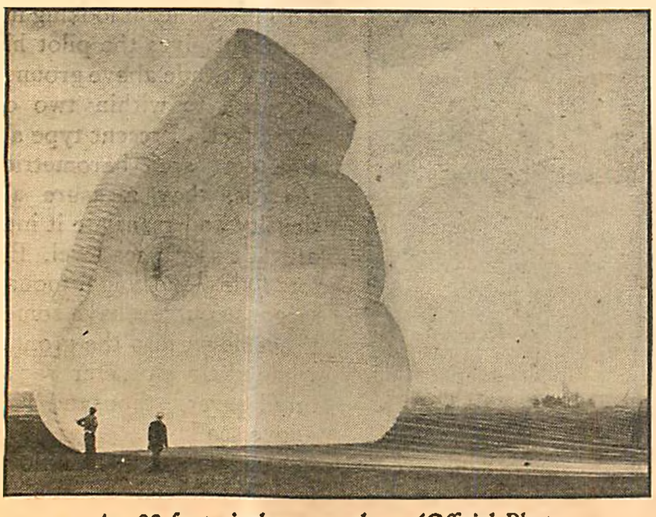
**Crash-proof tank unharmed by drop on concrete floor.**

If the passengers had been equipped with chutes, the pilot could have done as Army pilots have frequently done—climbed up to a safe altitude and then have given the order to bail out.

However, it must be admitted that under most circumstances there would hardly be sufficient time for 15 or 18 passengers to file through the single exit with which most transports are equipped. Moreover, many of them would doubtless become panic-stricken and refuse to jump.

Out at Wright Field, Dayton, Ohio, Major E. L. Hoffman, the Army's parachute genius, has invented a device that may overcome the disadvantages of equipping each passenger with an individual chute.

The proposition is to construct transport planes with detachable cabins which a giant parachute could lift off into space in the event of an emergency, while the rest of the plane falls to earth. The pilot would wear an individual chute and when, like a true ship captain, he sees his passengers well on the road to safety, he will leave his ship, yank the rip cord, and join the Caterpillar Club.



**An 80 foot airplane parachute (Official Photo U. S. Army Air Corps.)**

The parachute that Major Hoffman has developed for this work is a big 80-foot Triangle chute designed to carry a load of 2,500 pounds, or the equivalent of a 12-passenger cabin. It is housed in the top of the cabin with the pilot chute tucked away in the tail. A pull of the lever by the pilot of the plane is all that is necessary to release it. In three seconds the cabin is clear and descending at a rate of 18 feet per second. The landing place may be picked by manipulating the shroud lines on the way down.

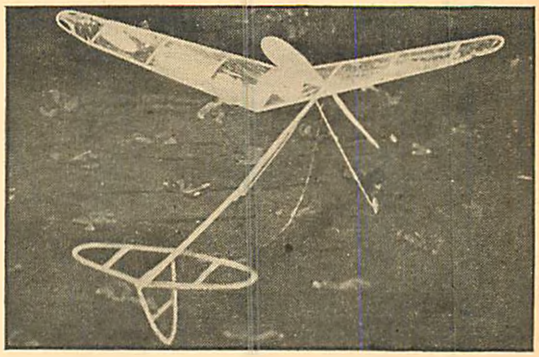
Inventors are determined to make passengers bail out in case of an accident whether they want to or not. Last month a blind engineer from California demonstrated to government officials at Washington a device that dumps passengers out and sends them floating down to earth, chair and all.

The pilot simply pulls a lever like an automobile brake. With lightning rapidity, accordion-like exits beside each seat fold back and long mechanical arms swing the seats

*(Continued on page 45)*

# Keeping Pace with Model Science

## How You Can Build the Baby R.O.G. That Holds the World's Record of 9 Min. 35 Sec.



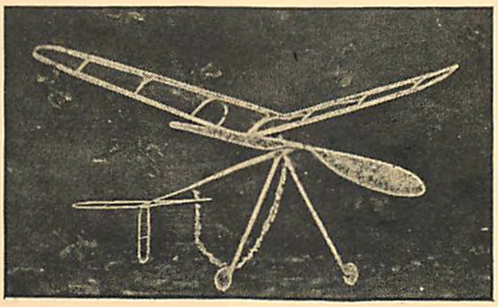
The microfilm covered Baby R.O.G. that set a world's record of 9 min. 35 sec.

ARTICLE No. 3

By CARL GOLDBERG

THE original Baby R. O. G. was probably the greatest fun-giving airplane ever invented. Compact, high-powered, with flights full of breath-taking zooms and collisions, it really was a shame that this fine little ship had to be developed into a slow, steady-moving record type model. However, civilization demands progress and so it is also with model aviation. "And one more Injun (our little R.O.G.) bit the dust of progress."

When first introduced to the brand new model building public of 1927, the year in which Colonel Lindbergh's famous flight brought out so much interest in aviation, the Baby R.O.G. had an average performance of 20 to 40 seconds. The best generally known performance was 50 seconds. This was gradually raised, quite unsensationally, until Herbert Owen of New Britain, Connecticut, stunned the Eastern group of model builders by winning first place in the Baby R.O.G. event of the December 1932 Eastern States championships, conducted by Universal Model Airplane News, with a record flight of 7 minutes, 30 seconds. Since Owen's astonishing ship was covered with microfilm, the lightest wing covering yet known, it was but natural that the East should become "microfilm-conscious"; and with that, average durations moved up accordingly. Several months later, John Tyskewicz of Hartford, Connecticut, turned in a flight of 7:43 officially, and in June several Philadelphia model builders sent the record past the 8 minute mark, to about 8:20.



The high wing gives stability and the large propeller long duration.

At about this time, a group of New York enthusiasts, including John Young, Laurence Smithline, John Zaic, Allan Penn, David Hecht, Edward Katzenberger, Jerome Kittel and myself, began to seriously study the problems of obtaining great duration. It was found, among many other things, that by more carefully engineering the construction, by weighing each tiny part in thousandths of an ounce, a model could be made of sufficient strength and yet much lighter.

Out of the work of this group, then, was evolved the Baby R.O.G. described herein, and with which I was fortunate enough to set a new official record of 9 minutes, 35 seconds on September 9th of this year.

This little crate on its first test did over 6 minutes; on the second 9 minutes, 2 seconds; on the third 8 minutes, 58 seconds. The two latter flights had the same number of winds, 2000. The next trial had 2100 turns in the motor, and lasted 9 minutes, 35 seconds. On the third official trial, with 2300 in the motor, the wing collapsed in the center during the take off, probably because of a poor butt joint of the spars.

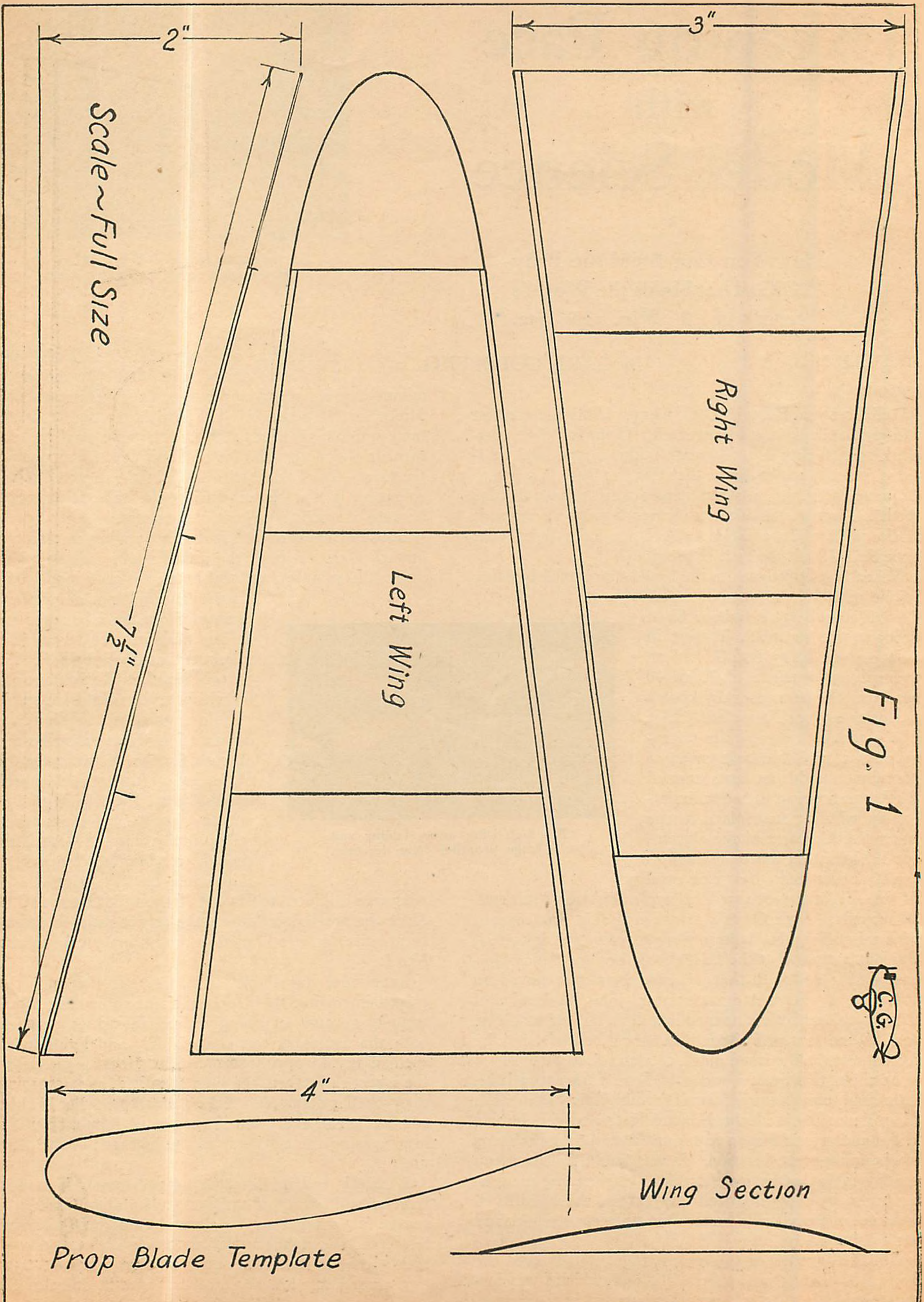
It would appear, that had this accident not occurred at such a critical time, the model might well have flown some 10½ minutes, and this being the case, model builders probably will not allow the 9½ minute official mark to stand long. In fact, it is not too unreasonable to expect that the Baby R.O.G. record will stand at 12 minutes or better within a year of this writing.

Before going on to discuss the construction of this particular model, consider the necessary features of the type. It must have wheeled landing gear, the wheels to be of not less than ½ inch diameter and rolling freely, and the struts strong enough to adequately support the ship while on the ground. The wing area is limited to Class A 30 sq. in. for Baby R.O.G.s. Since the area is so limited, the aspect ratio, in order to be practical, is also limited in the ordinary case to about 8 to 1.

Experience has shown thus far that the only thing gained in raising the aspect ratio of so small a wing is trouble, because of the practical difficulties in getting both the necessary torsional rigidity and lightness into such an awkward, tiny framework. Because of limits on the aspect ratio, then, the span is limited, and accordingly the propeller diameter. Since a small propeller is at best still inefficient, every bit of knowledge should be utilized in increasing the efficiency to the highest possible measure.

With this end in view, the prop diameter is made as large as will permit of satisfactory stability (that is, the torque factor must not be allowed to become uncontrollable) and the "blade angle" or "block thickness-to-width ratio" is made low. The latter may be compared to setting a wing at a low angle of incidence in order to get a

*(Continued on page 12)*


2"
3"
Scale~Full Size
7 1/2"
Left Wing
Right Wing
Fig. 1
C.G.
4"
Wing Section
Prop Blade Template

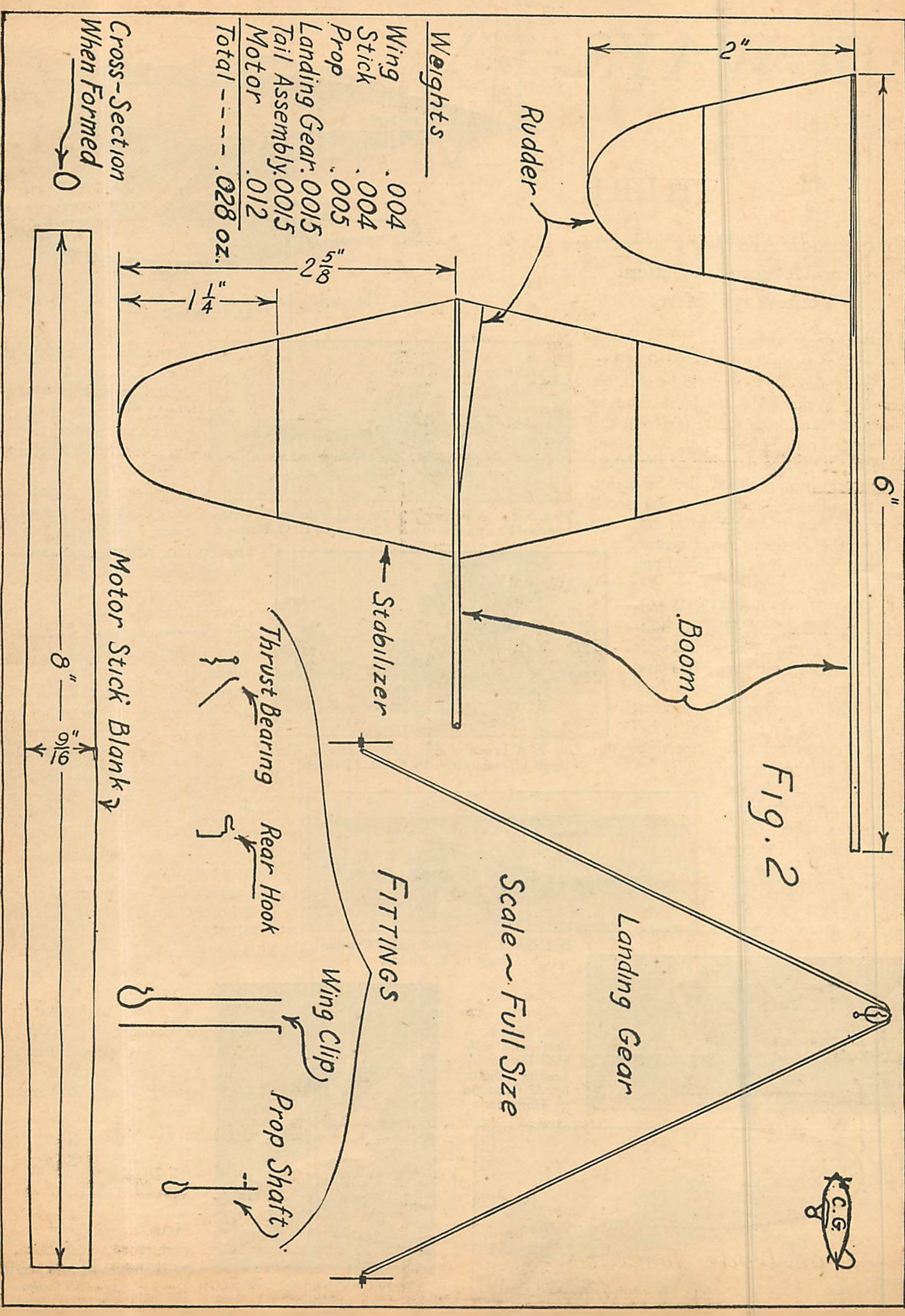
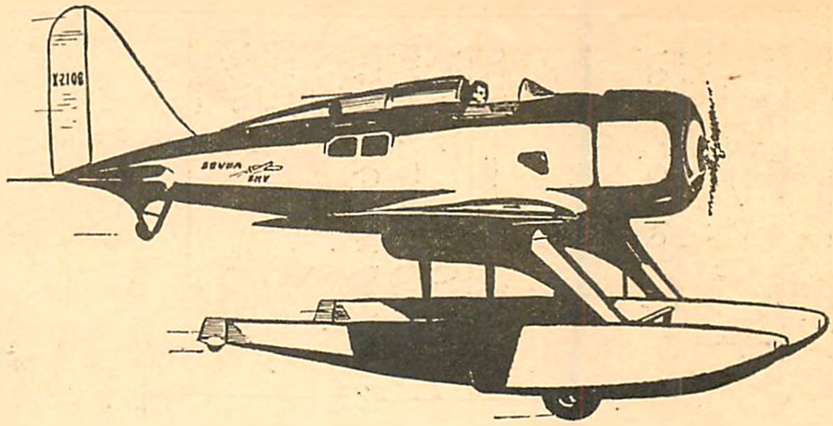


Fig. 2
Weights
Wing .004
Stick .004
Prop .005
Landing Gear .0015
Tail Assembly .0015
Motor .012
Total - - - - .028 oz.
Cross-Section When Formed
Rudder
2"
6"
$2\frac{5}{8}$"
$1\frac{1}{4}$"
Boom
Stabilizer
Landing Gear
Scale ~ Full Size
FITTINGS
Thrust Bearing
Rear Hook
Wing Clip
Prop Shaft
Motor Stick Blank
8"
$\frac{9}{16}$"
C.G

# AIR-WAYS HERE AND THERE

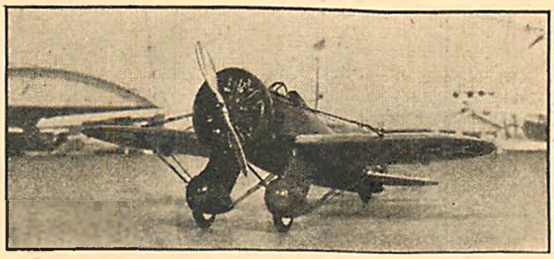


The world's fastest amphibian, the Seversky, by H. C. Wood.

**What Readers Are Doing to Increase Their Knowledge of Aviation. "Air Your Ways" Here.**

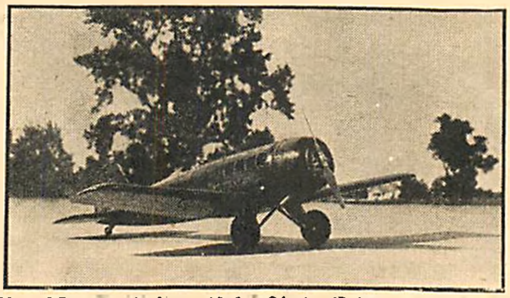
HARLAND C. WOOD may live in the backwoods, so to speak, at Lyndonville, Vt., but he is certainly up to the minute with his airplanes. Perhaps he has more time to think calmly and accurately, far from the maddening throng of the cities, for he has produced a very fine drawing of the latest world's record amphibian, the Seversky, for our heading. Model fans will recall that it set a new speed record of 180 m.p.h. at the National Air Pageant, held recently at Roosevelt Field, Long Island.

Mr. C. O. Harrison of 1423 Woodward Ave., Springfield, Ohio, is master of the art of trick photography, as you will see from pictures No. 1 and No. 2. Picture No. 1 shows a new Boeing YIP26 resting at the airport, ready for tuning up. It is hard to believe that this is not a full size ship. The part of the picture which shows the hanger and the planes in the background was taken at an actual airport. However, the plane in the foreground is only a model. This realistic effect was attained by super-imposing a picture of a model and the photograph of an actual airport in a very clever manner.



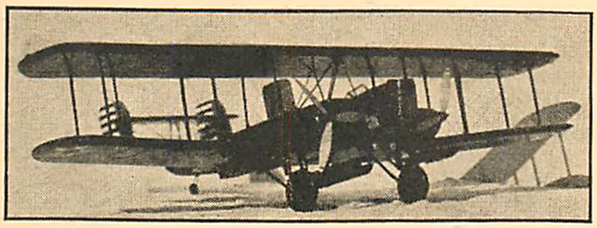
Pict. No. 1. A Boeing Y1P-26 solid scale model superimposed on a picture of a real airport, by C. O. Harrison

The same applies to picture No. 2 of the Northrop Alpha. The model of the Northrop Alpha has been superimposed upon a photograph of an appropriate landscape. These are the two finest photographs that we have received this month. Not only is the photography clever, but the models have been built with exceptional detail. On the whole, this is a very fine job. The span of the Boeing YIP26 is 6¾" and is made of mahogany including the cowl and pants. The motor is made of brass screws and steel wires. The whole model has been carefully constructed by hand. The Northrop Alpha is also made of mahogany and finished with filler and lacquer. The span of this ship is slightly less than 10½".



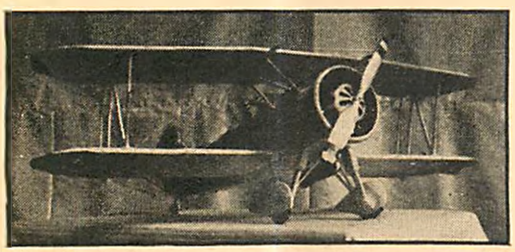
Pict. No. 2. A beautiful 6¾ inch Northrop Alpha built of mahogany, by C. O. Harrison

Picture No. 3 shows a solid scale model of a Curtiss Condor XB2, built by R. Rinkel, of 39 Golden Hill St., Milford, Conn. Though Rinkel has put himself into the construction of this model, we would say that it is a pretty smooth job. All the details have been carried out ,even to bomb racks, bombs and landing lights.



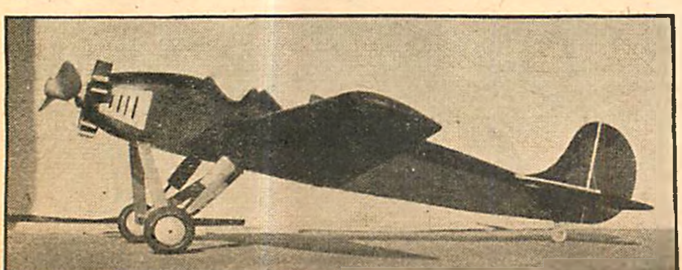
Pict. No. 3. A detailed scale "Condor" built by R. Rinkel.

Now we have another solid scale model by Mr. de Bremond Hoffman of 251 Churchill Ave., Palo Alto, Calif. It is a Curtiss Hell Diver, shown in picture No. 4. Here, also, details have been carefully worked out and include landing lights which work

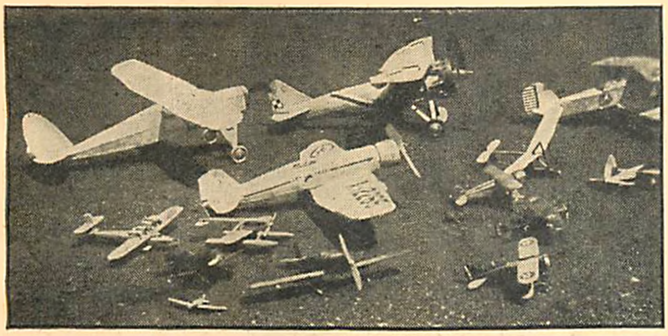


Pict. No. 4. A neat solid scale Hell Diver with landing lights, by de Bremond Hoffman.

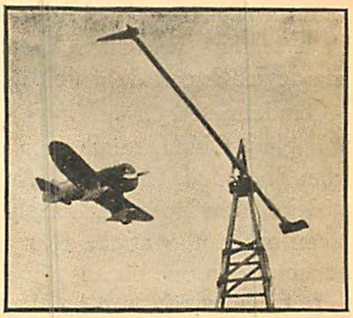
Pict. No. 5. Lloyd Wellner and his detail model of a Bowlus sailplane.



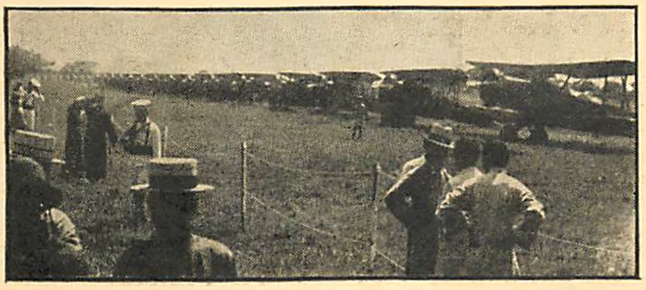
Pict. No. 6. Winfred Winters built this five foot Mohawk Pinto.



Pict. No. 7. A group of models of all sizes built by George Barrett. The Puss Moth on the left in the picture is the best flier.

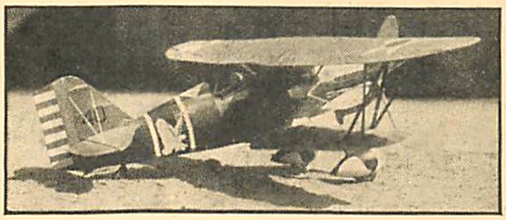


Pict. No. 8. A novel device rigged up by Jarden McCorkle by means of which he makes his solid models fly.



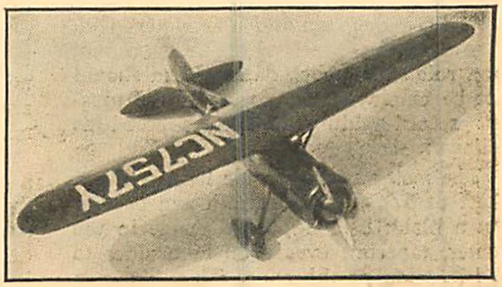
Pict. No. 9. A line of new Curtiss Hawks lined up at the Hunjao airport Shanghai, China, (Courtesy Gaudencio Orden).


Pict. No. 10. A very complete model airport built by Raymond Le Kashman. Lots of action here.

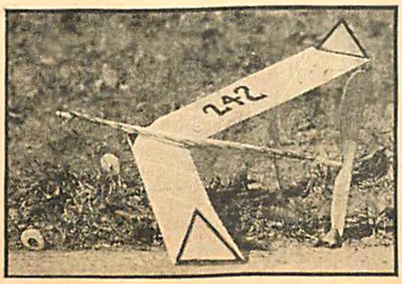


Pict. 11. One of the best flying scale Hawk P6Es that we have seen, by Jack Seidenwand.

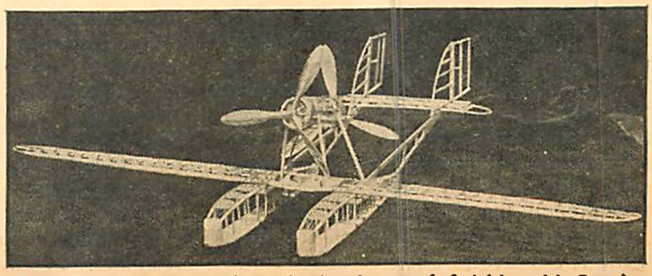
Pict. No. 12. John Andrews tunes up his five foot Stinson "R" for a flight.



Pict. No. 14. A Lockheed Air-Express built by Frank Distler, with a body made from newspaper.




Pict. No. 13. A tailless model built by Wm. Eymann, that flies for 100 seconds.



Pict. No. 15. Oscar Adamoff is hard at work finishing this Savoia Marchetti. He expects it to fly when finished.

by a small size flashlight battery in the fuselage, movable controls and an electric motor to turn the propeller.

Lloyd Wellner of 510 Leda Place, Akron, Ohio, has been kind enough to send us picture No. 5 of himself and his exact scale Bowlus "Dragon Fly." This model recently flew for 24 minutes and travelled a distance of 2½ miles. The scale is 1" to 1'. The span of the model is 60". It weighs 1.15 oz. and has an area of 183 sq. in. The glide is 20 to 1, which Wellner attributes to the wing section which is an Eiffel "400," tapering to a Munk No. 12 at the tip. While flying, at the time of the flight reported, it was at a 600' altitude and still going up when he lost it. A 150' tow line was used. The wind velocity was between 20 to 35 miles an hour.

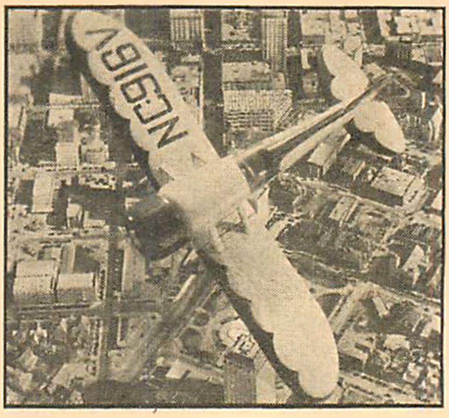
Winfred Winters of 813 Pipestone St., Benton Harbor, Mich., sends picture No. 6 of his non-scale model of the Mohawk Pinto. This ship is unusual inasmuch as it has a wing span of 60¼". All controls are adjustable and shock absorbers are spring action, single acting, the springs being contained in an aluminum housing. Tires are 3" Firestone Balloons. Wheels are home-made with aluminum bearings. This model actually flies and takes off after a run of about 10'. It placed among the winners at the National Model Show in Chicago last winter.

George C. Barrett of Schenck Ave., Matawan, N. J., has quite a collection of models, which is shown in picture No. 7. The Puss Moth which you see in the left hand corner of the picture is a very stable flier, making a very beautiful take-off and landing. He recommends this ship for model builders who wish to construct and fly a plane that will give flight satisfaction. We would say that Barrett was extremely versatile, considering the various types and sizes of airplanes which he has built.

Picture No. 8 shows a novel device designed and built by Jarden McCorkle of Gladwyne, Pa. The model Gee Bee of 25" span is suspended by wires from the end of a revolving arm. At the other end of the arm is a weight which counterbalances the weight of the model. This model is pivoted and supported at the top of a door. When the 12 volt motor built into the fuselage, spins the propeller, the model picks up rapidly and attains a surprisingly high speed. It gives a very realistic effect, travelling in about a 20′ circle. McCorkle says he would like to hear from readers who have done anything along this line. His device is certainly unique.

Gaudencio A. Orden of 69 Point Road Terrace No. 288 Shanghai, China, sends us a picture, No. 9, all the way from Shanghai, China, which shows the great activity in aviation now going on in this far-off country. It was taken on Sept. 9 at the Hunjao Airdrome. This day was a memorable one because five new Curtiss Hawks which were recently received by the Chinese forces, were christened. The picture shows the line-up of Curtiss Hawks except for the one at the extreme right, which is a Douglas. The ceremony was performed by the Boy Scouts and Girl Scouts. They even have these in China. We appreciate Orden's contribution extremely, which shows us how aviation is progressing rapidly in the remote parts of the world.

Raymond Le Kashman of 277 West End Ave., New York City, sends us a very unusual picture, No. 10. The scene which is shown is not one of a real airport but merely a miniature airport which he built. He tells us in his letter that this was a "rushed" photography job and it can be improved. "I will tell you the mistakes I made before you yell at me.



**Pict. No. 16. A faked photo of a Travelaire flying over Fort Worth, Texas, by Wm. Bennett.**

"(1) The lights are too low. (2) The sheet background is not stretched tight. (3) I forgot that there is always a

*(Continued on page 46)*

**Keeping Pace With Model Science**

*(Continued from page 7)*

good lift to drag ratio. Stability is still a prime problem because of the large prop; therefore, a tail boom and high wing clips are employed. With regard to dihedral, here's one way to consider the matter. Using much dihedral, it is true that the wing suffers a slight loss in lift. However, the plane becomes so stable that the wing may be set at several different locations.

Microfilm covering, unless the proper solution is used in the preparation, is likely to be a source of difficulty and loss of patience. Most films now on the market are either brittle and crack easily, besides warping the wing frame, or else they are very sticky and have big holes torn out whenever they accidentally touch something. It is advisable to get a film solution whose films are not subject to these faults. Also, do not use films that are so thin as to be risky—the added duration over slightly heavier films is no more than several seconds, yet the increased amount of repairs necessary makes them extremely short in life. The proper color film would be in the red, green and blue range. Gun blue and gold, especially the latter, cannot as a rule stand much damage and should not be employed. To construct the present record-holding R.O.G., proceed as follows:

The motor stick is made by sanding a sheet of 1/64″ balsa smooth and cutting out a blank 8″ long, 9/16″ wide in the center, tapering evenly on both sides to 7/16″ wide at the ends. This blank is sanded evenly throughout until it weighs .002 ounce. A solid wood former is now made of the proper cross section as shown in the drawing and tapered. In fact, the former appears exactly like the finished stick will appear, except that the former has smaller cross sections.

The motor stick blank is soaked in warm water (not boiling) and then carefully bent around the former, with the two edges coming together to form the seam at the top or point of the former. At the same time, one inch gauze is carefully wrapped around the affair, being sure not to throw the seam out of line. The whole is now baked in an oven at 300-350 degrees for about five minutes, taken out, and the gauze and former removed.

With great care and patience, glue the seam with the least amount of glue you can manage. Incidentally, this glue or model airplane cement as it is called, should be the very best you can get: colorless, fast-drying, great strength, and not thick. In fact, all materials must be of the highest class. Otherwise, you're handicapped before you start. The wood, rubber motor and microfilm have a great effect on the ship's endurance, even if one does not consider the workmanship. It pays to hunt around and get the best, even though in some cases you may be charged higher prices.

With regard to rubber, I can only repeat the words of Mr. Howard McEntee: Get the best and freshest obtainable, and use a good rubber lubricant. To get back to the motor stick, now cut off one end at an angle (to reduce weight and increase propeller clearance) and cap both ends with 1/64″ sheet balsa, glued on, and trimmed *after* the glue is set. No can is used, as this stick will not bend when properly handled. Also, it hasn't been known to twist under the maximum torque of the motor. The thrust bearing and rear hook are made as shown, of .010 music wire, not tinned.

If you've already studied the plans (it's a good thing to do), you'll have noticed that the wing is not centered above the stick. In fact, it is deliberately offset a definite amount—3/8″ to be exact—and its purpose is to eliminate the necessity for much washin and washout on each wing half, due to the torque of the prop. Thus it becomes possible to have the wing chords at different parts of the span all at about the same angle of incidence, which increases the wing efficiency and removes the source of a lot of trouble on the take-off due to the right wing usually washing out and causing a crash dive.

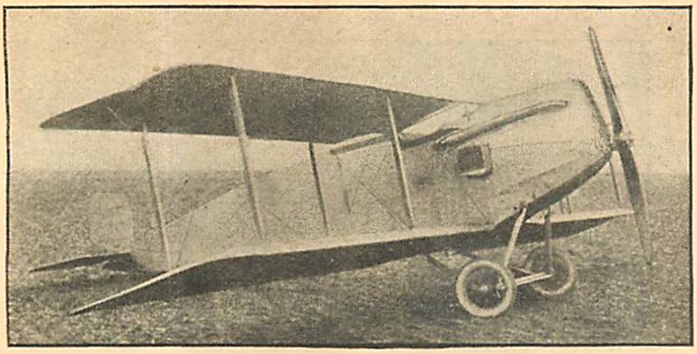
The wing spars are cut from 1/32″ sheet balsa and are 1/16″ wide in the center and 3/64″ wide at the tips. Each of the four spars is 6″ long. The ribs are cut out of 1/32″ sheet balsa by passing a razor blade around the curved edge of a metal template, one side of which has been cut and filed to the curve shown in the drawings. Ribs are 1/32″ square.

Now assemble the spars and ribs into two wing halves, gluing each joint well but without any more glue than absolutely necessary. Remember to leave the wing halves separate, as each must be covered separately with microfilm. Now, with strips of balsa 1/64″ square, soaked thoroughly in warm water, bend two wing tips, using a spool of thread or any such article to bend around. Hold in the bent position around the spool at a short height above a candle flame until dry. These tips are now attached with cement to the wing halves, which are then laid aside until the covering operation begins.

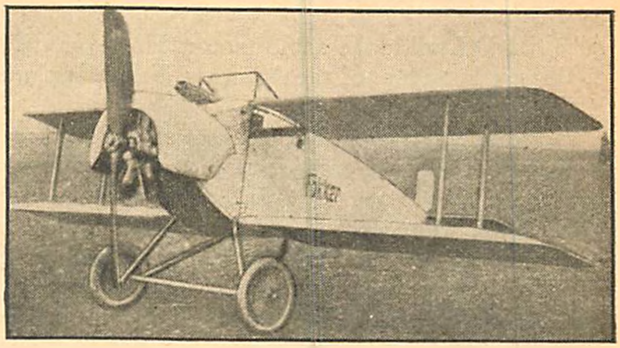
The stabilizer outline is made from strips of 1/64″ square balsa bent in the same manner as the wing tips just described. The ribs are also of 1/64″ sheet balsa. The rudder is made in identical fashion. The tail boom is 1/16″ square balsa tapering from that size at the joint to the stick to 1/32″ square at the rearmost end. The boom extends upward towards the rear at a very slight angle. Also, it is not bent in order to cause the model to circle; but rather the rudder is attached at an angle for this purpose. A careful study of the drawings will reveal this. Do not forget this; the rudder *must* be turned in order that the model fly at all. In fact, to have greatest hope of success, it would be best to follow all directions with the greatest minuteness and attention to accuracy of each detail.

The landing gear struts are balsa 1/32″ x 3/64″ at the point of attachment to the fuselage, and 1/32″ square at the lower end. Each strut is 4½″ long. Two balsa wheels ½″ in diameter and 1/64″ thick are employed. Each has a hub rolled from a piece of letter paper 1/8″ square. The wire axles are .010 wire, and are glued to the struts and bent L shape at the outer end to keep the wheels from slipping off. The wing clips are of the shape shown in the drawings and are also made of .010 music wire, and have one 1/16″ longer than the other. This becomes the front

*(Continued on page 48)*



The M-16B, a refinement of the M-16. This plane out-performed the Albatros of equal power.



The M-17, a miniature of the M-16, used as a pursuit ship. It led to the production of D.1.

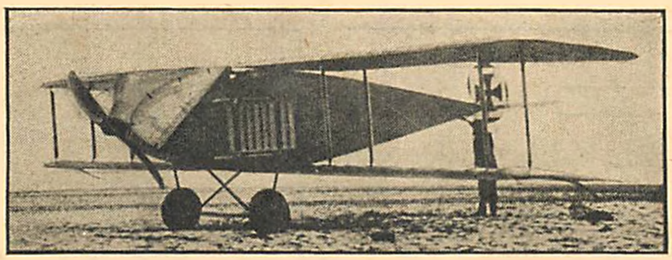
# The Development of the Fokker Fighters

**How the Advent of the German Albatros Resulted in the Production of Fokker Fighters of Greater Efficiency—The M-16 and M-17.**

By ROBERT C. HARE

PART SIX.

AS THE fall months of 1915 wore on, the battle fronts took a different aspect. Once more Germany was directing her efforts toward Verdun. Once more the sons of France were called to her defense at this strategic point. Each day the weary ground troops watched the darting Fokker monoplanes and the new Nieuport biplanes engaged in combat over the lines. It was timely for this Verdun offensive. These Fokker monoplanes of Germany were fast becoming old and obsolete. It seemed that with the new battle, new air equipment should come into general use. It did.



The M-16, upon which Fokker banked his future success in 1915; a single seater fighter.

However slow changes seemed at the fronts, there was always a busy back area. Shrouded in their usual secrecy, German aero-scientists were turning out weird and mean looking craft, true in every sense of the word, to substantiate their saying that "if an aeroplane is right it looks right." From the pictures shown here one can gather that these planes looked right for their duties, that of shooting the enemy out of the air.

The new aeroplanes were, however, at first little improved over their earlier cousins. Performance was no better, although aerodynamically they were considerably improved. What they really needed was a better and more powerful motor than those on hand. In the summer of 1915, German official engineers began experiments to lighten the large 160 h.p. Mercedes motor generally in use in two seaters at that time. It had been suggested that this motor be used before, but it proved too heavy. Since there was not sufficient time in which to design a completely new motor, the only alternative was to rebuild the Mercedes Six to suit pursuit work.

This conversion was made in late 1915 and orders were at once placed by all manufacturers. Immediately Fokker put in his application for a certain share but he was flatly refused any quota. He soon learned that the Albatros Flugzeugwerke of Berlin had been able to pull the strings of officialdom and have Fokker's supply diverted to their Berlin plant for the new D.I Albatros. This was done for two reasons supposedly: first, Fokker's latest plane, the M-16, could outperform the Albatros D.I with the same motor. With the extra forty h.p., the D.I would naturally be better. In order to prevent Fokker from getting his new motors and accomplishing this feat, the Albatros concern reminded the officials that Fokker was an alien and was sending his earnings to Holland. The latter is not true.

In spite of all the arguing Fokker could do with the German authorities, he could not swing them to his side and even in the face of proof that his fighters would be better than those of Albatros with the new motor, they turned against him.

On the morning of February 21st, 1916, at 7:15 o'clock, the Battle of Verdun began. Instead of improved Fokker types as the French might have expected, aviators encountered great numbers of speedy dark colored Albatros D.I scouts. From all appearances, the Fokker reign had ended. This was naturally a severe blow to Anthony Fokker. He had given the German Imperial Air Force the best fighting aeroplanes in all of France and the synchronized machine-gun. Yet when he should have had the upper floor again, he was flatly turned down.

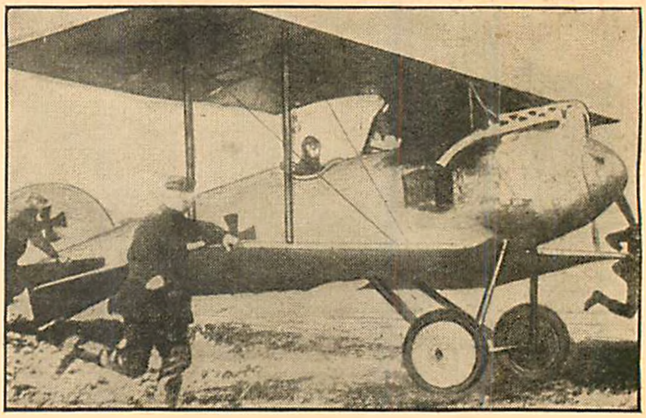
The plane on which Fokker had banked his future safely enough in 1915, was a speedy, tough looking biplane known as the M-16 by factory designation. With a motor of a 120 h.p., it could out-maneuver and out-speed the

Albatros D.I, with the same motor. However, with the additional forty h.p. of the Albatros, Fokker's plane was left behind.

In the side elevation, the fuselage of the Fokker M-16 looked much like the cross section of a streamlined strut with the wings secured at top and bottom of the longerons. The 120 h.p. Mercedes motor of the vertical type was well streamlined by a number of formed aluminum plates. Four steel tube longerons and wire braced uprights constituted the fuselage structure. Doped fabric covered all but an aluminum side cowling which was fastened to the framework by a series of buckles. The cockpit was let in just behind the fire wall, and to provide a good downward view, a portion of the fuselage was cut away at this point. On either side of the cockpit large radiators were located in the slipstream of the propeller. An entirely modern looking landing gear took the place of the old Fokker wire-braced type. The usual Fokker tail assembly was still retained in the M-16.

Twenty-two full sized ribs and two main spars formed the wing structure in a conventional manner. Between each full sized rib a false rib was included to maintain an even airfoil section throughout the span of the wings. The upper wing was fastened directly to the upper longerons by means of bolts and fittings. In this same plane the fourth and last ribs ran parallel to the compression members in the internal structure of the wing. Strut fittings and internal wiring stations were welded to these compression members.

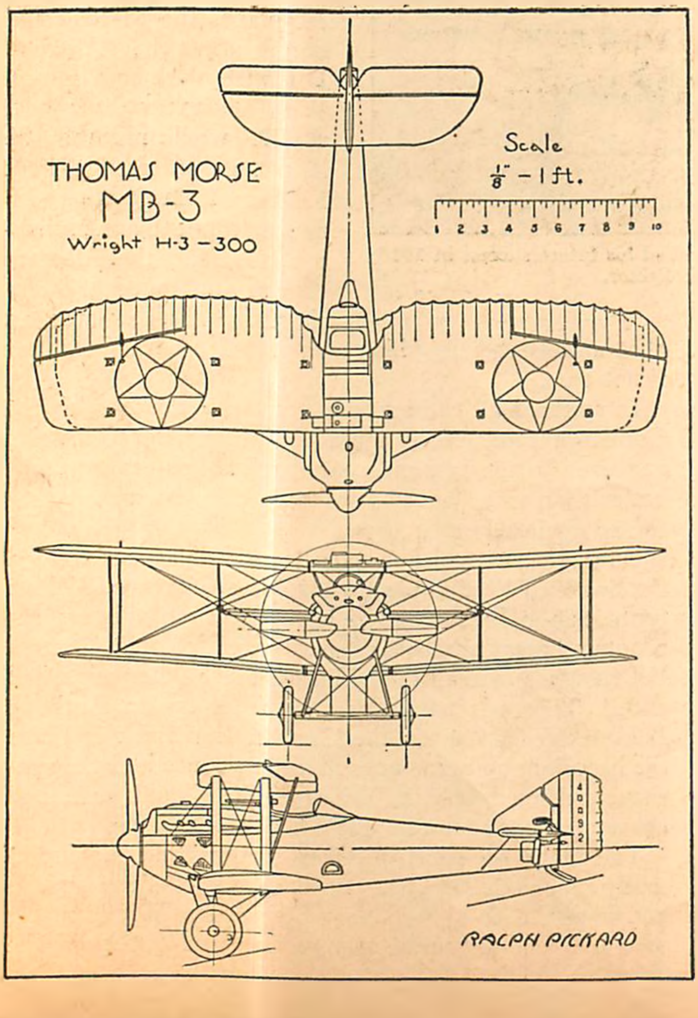
The M-16 was distinctive in that it was the first Fokker biplane to carry independent ailerons and the first Fokker product since the M-4 monoplane not to use wing warp control. Such control was fitted for strength and the freely moving surface of an independent aileron would of course impart greater lateral control.

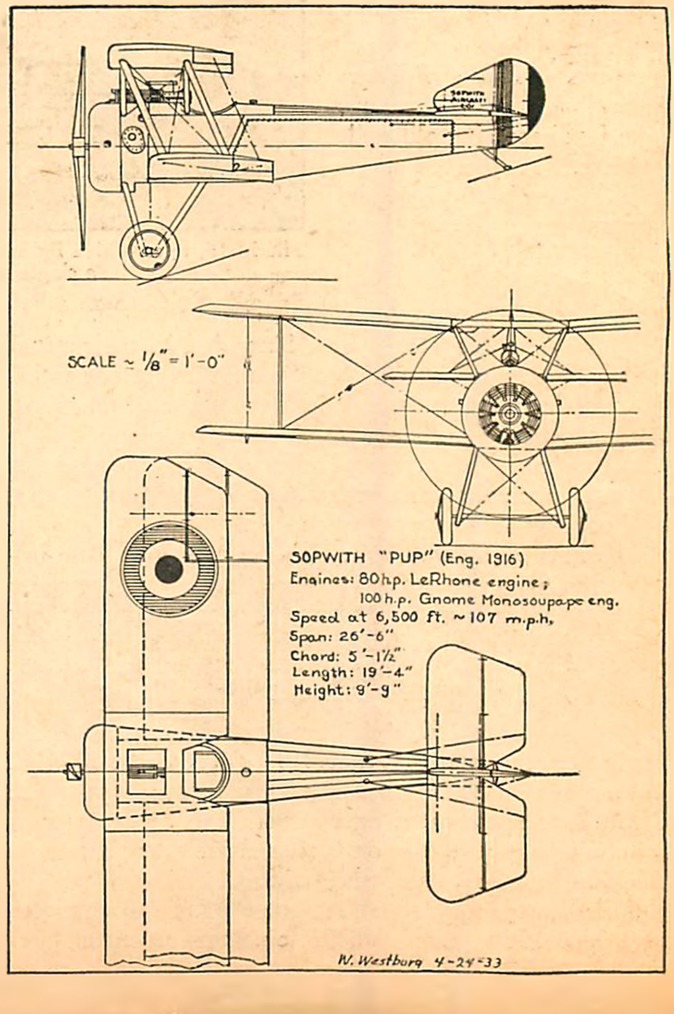


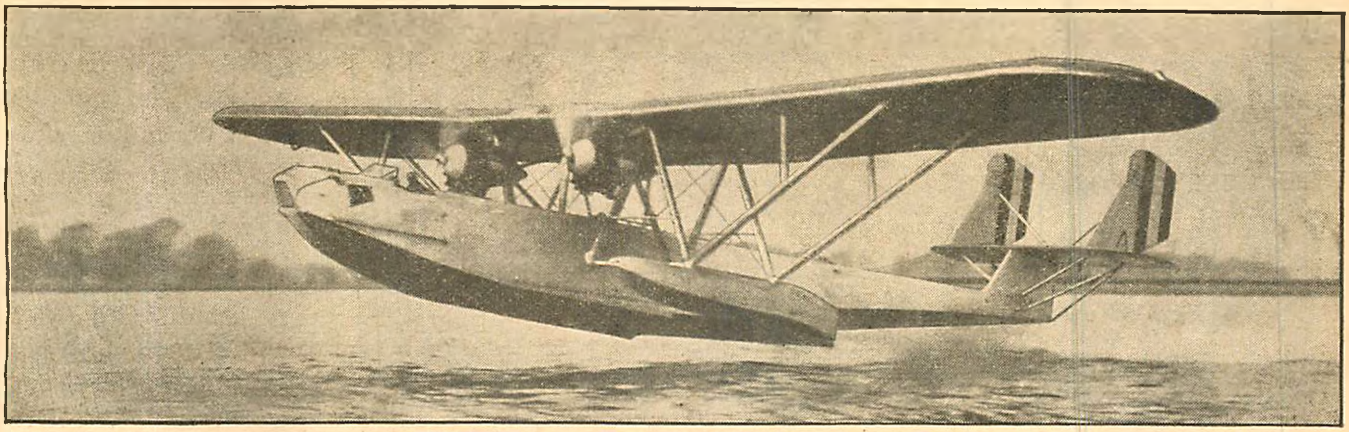
The Albatros D.1, which competed with the Fokker ships for German official favor in 1915.

Two sets of struts were built into each wing panel. Wood faired steel tubes were the materials. Numerous landing and flying wires completed a rigging too complicated to describe here. Because of the proximity of the lower wing to the ground, skids were fitted to the wing tips. This, no doubt, was an important factor in rough landings.

(Continued on page 40)



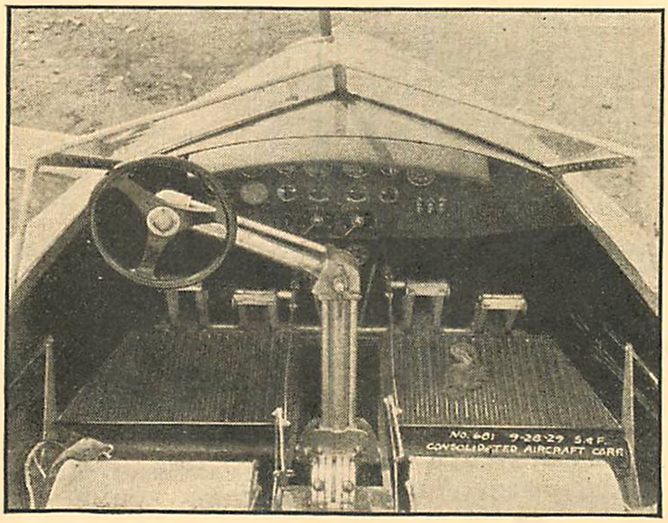


Six of these Navy "Admirals" flew 2100 miles in formation, from Virginia to Panama.

# The Navy "Admiral" in Detail

**Complete Description and Plans From Which You Can Create a Detail Scale Model of the Navy's Greatest Flying Boat.**

By JOE BATTAGLIA



The cockpit of the "Admiral," showing the controls, pilots' seats and instrument board.

As a result of design competition open to the American aircraft industry, the contract for a long distance naval patrol-type flying-boat was awarded to the Consolidated Aircraft Corporation by the United States Navy.

The ship was designed to meet the strictest requirements set forth by the United States Navy and to properly qualify for government service, it had to be well designed and constructed.

The (PY-1) as the ship is known, not only has inherent flying qualities, as was proven by the flight to Panama recently, but it has a great deal of detail and clean lines. This flight to Panama of approximately 2100 miles was made by six Commodore "Admirals" in formation. Now here is a chance for you model builders to accomplish something by following the dimensions and instructions carefully and turning out an A-1 model which will win one contest after another for you.

Plenty of work lies ahead, so buckle down to business. Let's start with the hull.

### The Hull

To obtain the best lined hull you must first make a jig or core on which to build it.

First cut down a block of soft balsa wood to the same depth and slightly wider than the inside width of each hull bulkhead. Drill a hole near each end of the block at the points which will form the sides of the hull, from one side through to the other. Then cut it into three pieces, each one the full length of the block. The center piece must be the shape of a wedge so that when the hull has been completed you simply pull out this center piece and the other two pieces fall loose and are easily removed.

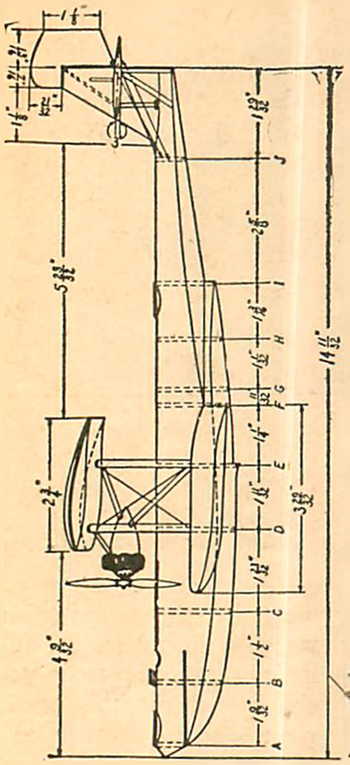
Now put them all back together again and hold them thus by inserting a dowel in each of the holes. Now sand the block down to the proper width and proceed to make it the shape of the hull.

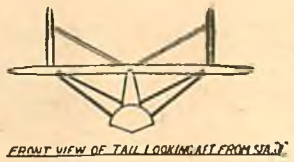
A perspective view of this is shown on page "B" diagram "A."

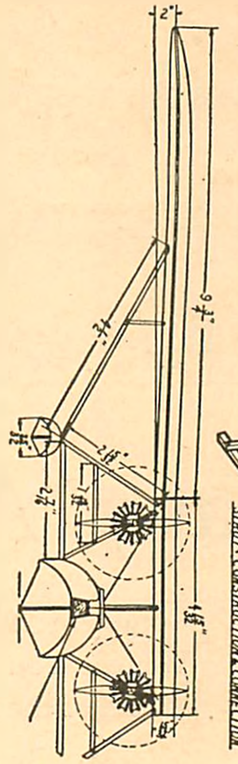
### The Bulkheads

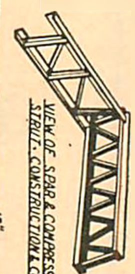
The bulkheads are "U" shaped in cross section on the real ship. If you wish you can make them of 3/32″ sq. solid brass or if you'll stick to absolute scale, you can use (.009) gauge sheet metal. If you follow the latter method, lay them out by rule and scriber.

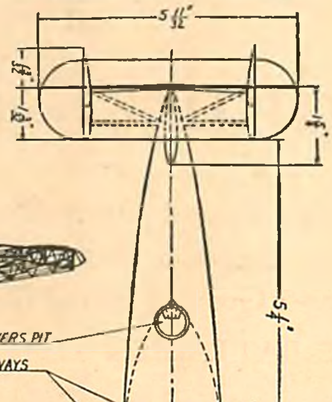
Draw four parallel lines 3/32″ apart about 4″ in length (this being the safest length to work with) if you have a vise with 4″ jaws. Now cut along the two outside lines. Make several of these pieces. Then place each one in the vise and bend them into "U" shaped channels. To do this you simply bend them along one of the inside lines first and then place a 3/32″ sq. piece of steel or brass about the same length as the strips to be bent, against the inside of the bent part. Open the jaws of the vise 3/32″ apart and place this piece of metal exactly in the center of the opening so the sides of the square piece line up with the insides of the jaws. Place a piece of solid metal 3/32″ thick by ½″ wide against the 3/32″ sq. piece with the 3/32″ side facing down and hammer it lightly until the (.009) sheet has been pressed

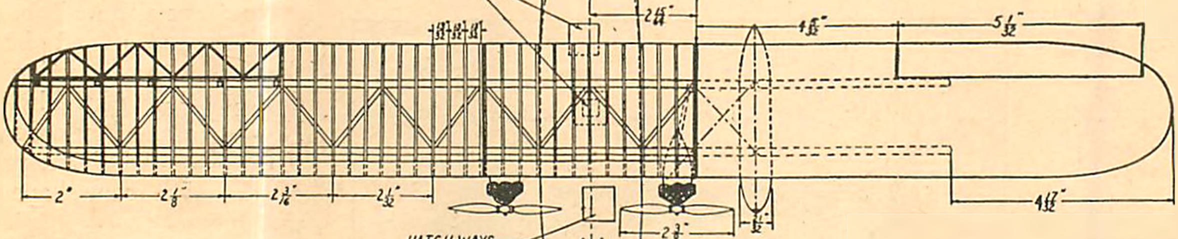


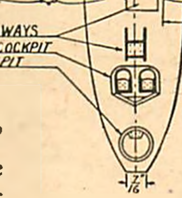







DRAWN BY JOE. F.P. BATTAGLIA

into the vise. When the two edges are flush with the tops of the jaws, tighten up the vise. Then take the "U" shaped channel out and go on to the next one. After you've made a number of these scratch lines on them to correspond with the points where the bulkheads are bent at an angle, file them along these lines with a sharp edged file and bend them at the proper angle. Now solder them at the bend.

To make the bulkhead all from one "U" shaped sheeting, cut out a piece of metal 3/32" thick into the full shape of each bulkhead. Then place the bent metal over it and bend it at the angular joints, placing it in the vise and squeezing it tightly. Do the same with all of the bulkheads and at the end of each of these operations, solder the free ends together. When they're all finished, slip each one on the jig at their respective stations, shown on page "A."

To the outside of the bulkheads you solder the horizontal metal stiffeners which are "T" shaped and are shown on page "B" diagram "A" and "B." Each stiffener is ½" apart, (starting at the top of the hull and measuring outward from the center) at the widest point in the hull and gradually coming closer together at the rear. When these are all soldered in place, cover the bottom side of the hull with (.007) gauge sheet metal (this metal is to be used on all metal covered parts, like the outboard wing floats, engine nacelle, etc.).

As soon as the hull bottom has been covered, remove the jig and file out all the joints where there is excess solder and wash it out with gasoline. Now cover the top part of the hull from station "C" to station "H." Between stations "H" and "I," you place a piece of metal containing a hole 9/16" diam. and a ring around this hole 1/16" thick and 23/32" in outside diam. Do the same with the front gunner's pit and put in the seats and side racks as shown in the three view drawing.

Now cover the rest of the hull from station "I" to the rear. Make the controls for the pilot's cockpits and set them in. This accomplished, put the sheet metal in between "B" and "C," but only temporarily, for you will have to connect the controls later. This allows you freedom to complete your work neatly.

### The Tail

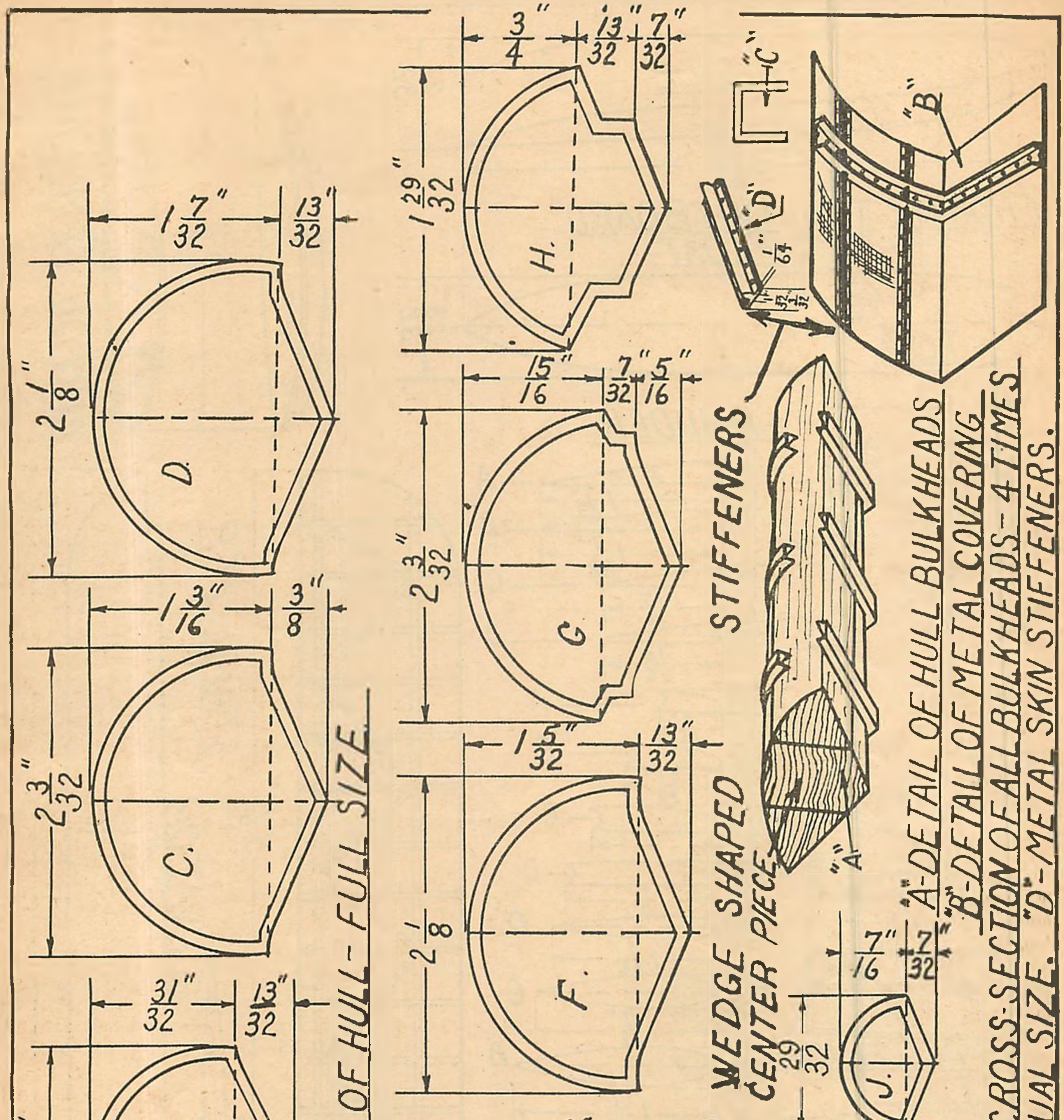
The ribs in the tail are built up similar to those in the wing except that they are streamlined in shape. The cap strips are made like the bulkheads ("U" shaped "cross sectioned channels") and the bracing in the ribs are also made the same way. Make a template 1/32" thick, bend the "U" shaped metal over it and solder the trailing edge; then slip out the template and solder the leading edge. Do the same with all the ribs. A perspective view of the spar is shown in three view layout.

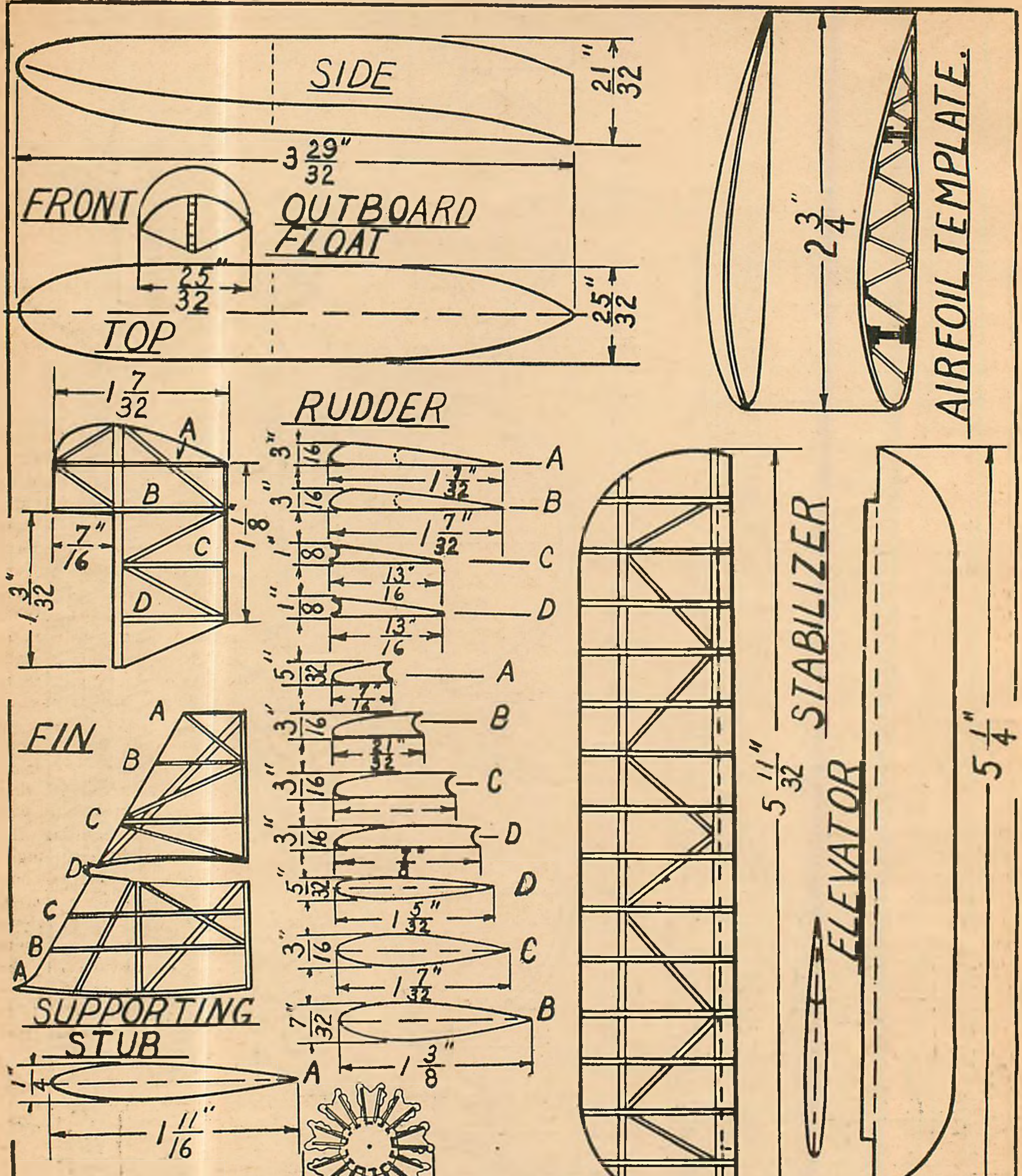
The spars and compression struts of the wing and tail surfaces are also similar in construction to each other. The "U" channels for the spars can be made by cutting a tube 1/16" x ⅛" down through the center along the ⅛" side. A "T" shaped piece is placed inside the channel and strips of metal are riveted or soldered on each side of the "T" piece at an angle to each other as shown.

As soon as you've completed the spars, make a jig for each part of the tail surface onto a transparent piece of paper and paste each one on a flat board. Then hammer in small headless wire brads along the outline.

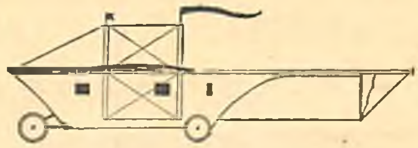
Now slip the ribs onto the spars, set them into the jig to line them up and solder all the joints together.

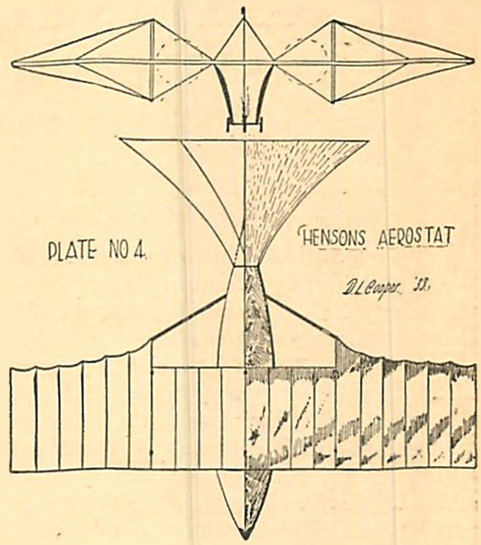
*(Continued on page 36)*


ALL BULKHEADS OF HULL - FULL SIZE
A. B. C. D. E. F. G. H. I. J.
STIFFENERS
WEDGE SHAPED CENTER PIECE
"A"-DETAIL OF HULL BULKHEADS
"B"-DETAIL OF METAL COVERING
"C"-CROSS-SECTION OF ALL BULKHEADS - 4 TIMES ACTUAL SIZE.
"D"-METAL SKIN STIFFENERS.
J.F.B.


SIDE
21/32"
3 29/32"
FRONT
OUTBOARD FLOAT
25/32"
TOP
25/32"
AIRFOIL TEMPLATE.
2 3/4"
1 7/32
RUDDER
A
B
C
D
7/16"
1 3/32"
1 1/8"
3/16"
1 7/32"
1/8"
13/16"
5/32"
7/16"
21/32"
FIN
SUPPORTING STUB
1/4"
1 11/16"
1 5/32"
1 7/32"
7/32"
1 3/8"
STABILIZER
5 11/32"
ELEVATOR
5 1/4"
ENGINE
15/16"
AILERON
5 1/32"
23/32"
11/32"
J.F.B.

# How the Aeroplane Was Created



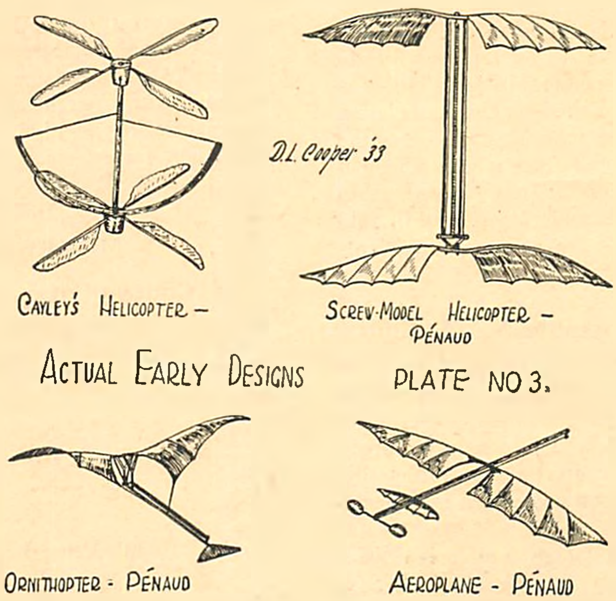



### How Early Attempts at Flight Laid the Foundation for the Design of Our Modern Planes

**PART No. 2**

**By DAVID COOPER**

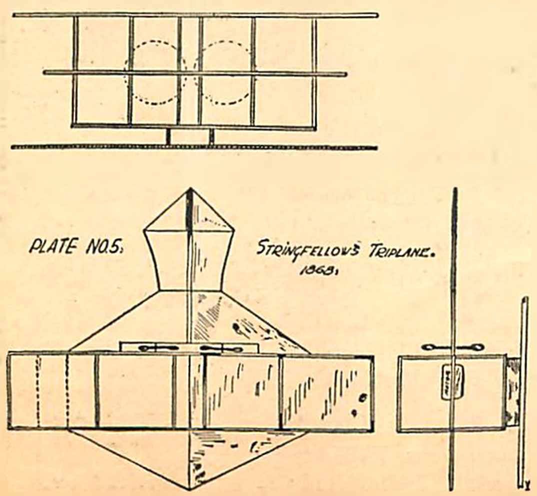
UP to this point we have found many advocates of the principle of a rotating wing but in 1767 Pettigrew made known his views on the elastic properties of this type of screw and a great revolution took place in the construction of flying models. D. S. Brown and Alphonse Pénaud also advocated elastic wings and screws in lieu of rigid ones. Paucton, in 1768 set forth his treatise on the subject of screws and suggested a machine with two screws, which he called "Pterophores." In 1769, Sir George Cayley gave a practical illustration of the efficacy of this screw as applied to the air by constructing a small machine in which he used feathers for the rotating screws. This machine, upon being wound and then released from the hand, made a swift upward flight. (fig 1—plate 3).

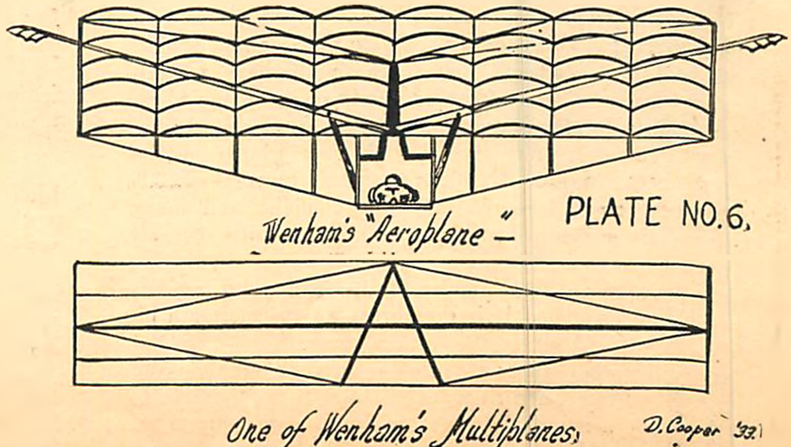



Sir George Cayley came to the fore in 1809 and created for himself undying fame by setting forth the scheme of driving a plane surface into the air, opposing the resistance of the air by means of a suitable motive power to force it to the requisite angle for support. Thus was born a new principle and in 1810 he proposed a machine having an elastic form of wings and driven by screws. He further established the fact that a curved, rather than a flat surface was desirable and should be rigid instead of flapping. He is also credited with the idea of hinging control surfaces to move laterally and horizontally to secure directional control, and indicated that inherent lateral stability was obtained by uptilting the wings at a dihedral angle. The use of the internal combustion engine for powering aircraft, too, was Cayley's suggestion and it can quite readily be realized why he was given the name of "The Father of Aeronautics."

All ideas henceforth seemed to have emanated from these findings and a new era may be said to have started

*(Continued on page 42)*



# THE NATIONAL AERONAUTIC ASSOCIATION JUNIOR MEMBERSHIP NEWS

### N.A.A. Junior Membership Groups and Chapters

Wherever practicable, the Association desires that junior activities be under the guidance and supervision of a regular membership chapter. Therefore, a charter will be granted to a junior membership club in a community that does not already have a chartered senior membership group, with the provision that when a senior group is chartered, the junior group will then become an affiliate of the senior group. In all cases, a junior membership club must have a club leader who is more than twenty-one years of age, and is an officially appointed N.A.A. Contest Director for model aircraft.

A club must agree to maintain not less than twenty-five junior members in good standing at all times before the Association will grant it a junior membership charter. The fee for group membership, payable in advance to the Association, is ten cents per year for each junior member, with the minimum annual fee for a group being $5.00. Thus, a group of fifty or less members makes one lump sum payment annually of $5.00. A group of 100 would pay $10.00, and so on. This club fee provides for affiliation with the N.A.A., for bulk mailing to the club headquarters of all junior membership news bulletins and other informative matter that is issued by the Association to the junior membership every three months, and covers the contest sanction fees for four local model plane meets to be held during the year for members of the club. Junior membership pins, which are silver replicas of the senior membership gold emblem, are provided by the Association at twenty-five cents each.

### How to Form a Junior Membership N.A.A. Club

Model airplane builders and flyers should be organized into local clubs. More rapid progress is thus insured because of the benefits to be derived from profiting by each other's experiences and by comparing methods and models. Clubs help to spread and increase interest. Clubs provide contest groups, promoting study and giving experience in contest flying which is so necessary in competition.

If there is a National Aeronautic Association chapter in your city or community, the junior group may be affiliated as a part of that chapter. This is the very best sort of arrangement as it unites under one management and leadership all the various correlated interests. If there is no regular N.A.A. chapter in a community, the Association will grant a charter to a junior group. Twenty-five members are necessary for a charter. Fewer than twenty-five may be affiliated with a regular chapter, or may work together as an unchartered group of individuals who are all junior members of the Association.

Each junior group, whether a separate club or not, should have its own junior officers. The club should have as club adviser and leader, a man of experience in model plane work, who can qualify for appointment as an N.A.A. Contest Director. Every community has several such men who would be willing to help. Manual training teachers, airport officials or employees, boys' leaders, Y.M.C.A. officials, and many others who have an enthusiastic interest in model airplanes, all make good advisers and leaders. This club leader should get right into the center of things and actually build and fly models along with the members. It is the surest way to maintain interest.

In large cities where there are often as many as one thousand or more fellows interested in model planes, it is advisable to divide them into a number of separate groups averaging about 25 to 30 in a group. It has been found that larger groups become unmanageable and not conducive to progress. All such groups should have their own leaders and their own officers, but all should be a part of the one local chapter. Provision should be made for admitting to membership only those who will definitely maintain active interest and participation in club activities. Make definite rules for cutting out dead timber and see that these rules are enforced.

Clubs should hold meetings at least once a week. Some of these meetings may be enlivened by holding informal contests. About every two months a real contest should be held. The records made at these contests are eligible for recognition by the Contest Committee of the N.A.A. if the competition rules are followed and if sanction has been secured in advance. All contest activity naturally will improve the workmanship and flying ability of the club members.

A definite program of progressive assignments should be worked out for each club to insure each member covering certain necessary fundamentals. A system of proficiency ratings may be worked out to show that a member has made the various required steps.

All who are interested in forming such clubs are urged to get in touch with their local N.A.A. chapter or with the National Aeronautic Association, Dupont Circle, Washington, D. C. Necessary forms, etc., will be provided.

## MODEL PLANE RECORDS

### Contest Committee Recognizes Records

RECORDS for model aircraft have been officially recognized by the Contest Committee up to December 10, 1933, as follows:

## INDOORS

STICK MODEL AIRPLANES, Hand-launched

| | *Min.* | *Sec.* |
|---|---|---|
| Class B | | |
| Junior: Joseph Prus, Philadelphia | 8 | 56 |
| Class C | | |
| Senior: Norman Schaller, Philadelphia | 16 | 20 1/5 |
| Junior: Richard Vogt, Philadelphia | 15 | 50 |
| Class D | | |
| Senior: John Bartol, Roxbury, Mass. | 17 | 47 3/5 |
| Junior: Merrell Malley, Atlantic City | 13 | 42 |

STICK MODEL AIRPLANES, R.O.G.

| | | |
|---|---|---|
| Class A | | |
| Senior: Carl Goldberg, Purchase, N. Y. | 9 | 34 4/5 |
| Junior: Louis Shumsky, Atlantic City | 6 | 22 1/5 |
| Class B | | |
| Junior: John Stokes, Huntington Valley, Pa. | 6 | 53 1/5 |

STICK MODEL AIRPLANES, R.O.W.

| | | |
|---|---|---|
| Class A | | |
| Senior: Paul Karnow, Philadelphia | 5 | 01 2/5 |
| Junior: James Shivler, Philadelphia | 3 | 41 4/5 |
| Class B | | |
| Senior: William Latour, Philadelphia | 5 | 41 2/5 |
| Junior: Alex Ostrow, Philadelphia | 2 | 43 |

## INDOORS Cont'd

GLIDERS. Hand-launched.

Class A

| | | |
|---|---|---|
| Senior: John Zaic, New York City | 0 | 19 |
| Junior: Stanley Congdon, Glen Ridge, N. J. | 0 | 13 4/5 |

Class B

| | | |
|---|---|---|
| Senior: John Young, New York City | 0 | 29 4/5 |
| Junior: Stanley Congdon, Glen Ridge, N. J. | 0 | 15 |

Class C

| | | |
|---|---|---|
| Junior: Stanley Congdon, Glen Ridge, N. J. | 0 | 17 |

STICK MODEL AUTOGIROS

| | | |
|---|---|---|
| Senior: Everett Ward, Newark, N. J. | 0 | 51 |
| Junior: Alton DuFlon, Ridgefield, N. J. | 0 | 44 |

FUSELAGE MODEL AIRPLANES. R.O.G.

Class B

| | | |
|---|---|---|
| Junior: Hyman Oslick, Philadelphia | 5 | 33 2/5 |

Class C

| | | |
|---|---|---|
| Senior: Albert Levy, Toronto, Canada | 8 | 56 |
| Junior: Alton DuFlon, Ridgefield, N. J. | 7 | 25 |

Class D

| | | |
|---|---|---|
| Senior: Allan Penn, New York City | 10 | 05 |
| Junior: William Sherwood, Tyrone, Pa. | 4 | 28 3/5 |

## OUTDOORS

STICK MODEL AIRPLANES. Hand-launched.

Class D

| | *Min.* | *Sec.* |
|---|---|---|
| Senior: August Ruggeri, New York City | 7 | 36 |
| Junior: Alton DuFlon, Ridgefield, N. J. | 7 | 02 |

Class E

| | | |
|---|---|---|
| Senior: David Hertzson, Rock Beach, N. Y. | 7 | 00 |
| Junior: Merrell Malley, Atlantic City, N. J. | 3 | 37 2/5 |

GLIDERS. Tow-line launched.

Class D

| | | |
|---|---|---|
| Senior: Fred Korn, New York City | 1 | 16 1/5 |
| Junior: Stanley Congdon, Glen Ridge, N. J. | 0 | 45 1/5 |

Class E

| | | |
|---|---|---|
| Junior: Stanley Congdon, Glen Ridge, N. J. | 0 | 40 1/5 |

STICK MODEL AUTOGIROS

| | | |
|---|---|---|
| Senior: Ralph Kummer, St. Louis, Mo. | 2 | 06 |

FUSELAGE MODEL AIRPLANES. R.O.G.

Class D

| | | |
|---|---|---|
| Senior: Vernon Boehle, Indianapolis, Ind. | 8 | 43 |

Class E

| | | |
|---|---|---|
| Senior: Joseph Kovel, Brooklyn, N. Y. | 2 | 30 |

Class F (Gas Engine) R.O.G.

| | | |
|---|---|---|
| Senior: Maxwell Bassett, Philadelphia | 28 | 18 |

### Akron to Hold Next Championship Meet

THE 1934 National Championship Model Plane meet will be held in Akron, Ohio, June 28-29 under the combined sponsorship of the Akron Women's Chapter and Akron Men's Chapter of the N.A.A., the Akron Chamber of Commerce Aeronautics Committee, and the Universal Model Airplane News; insuring a strong sponsoring group.

It is planned to hold the indoor flying contest in the huge Goodyear-Zeppelin Airdock. The outdoor flying will be conducted on either the Akron Airport or the Goodyear-Zeppelin field. Considering the near perfection of conditions, new records should be established in nearly all of the events.

Prospective entrants are requested not to write to any of the sponsors until the announcements in this publication indicate that entry blanks are ready for distribution, which will probably be in May.

Full information and rules for this gigantic meet will be published in these pages. There will be seven separate events similar to those in the 1933 meet with slight variations in the specifications and rules. Look for further information next month.

### Toledo N.A.A. Chapter Forms Junior Group

THE Toledo, Ohio, chapter has started a junior organization that seems destined to make much progress. Mr. Frank W. Hackett, President, has formulated a plan for a number of Squadrons throughout the city, each squadron to be about thirty members in size. The members of the various squadrons are to be designated as privates until they have passed an examination for promotion, passing in succession through the grades of military rank according to their progress.

Each squadron has its own organization and is in charge of a squadron leader or Captain, who in turn is responsible to the parent chapter.

Two squadrons have already been formed and it is more than likely that by the time this is in print there will be several additional squadrons established.

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 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)

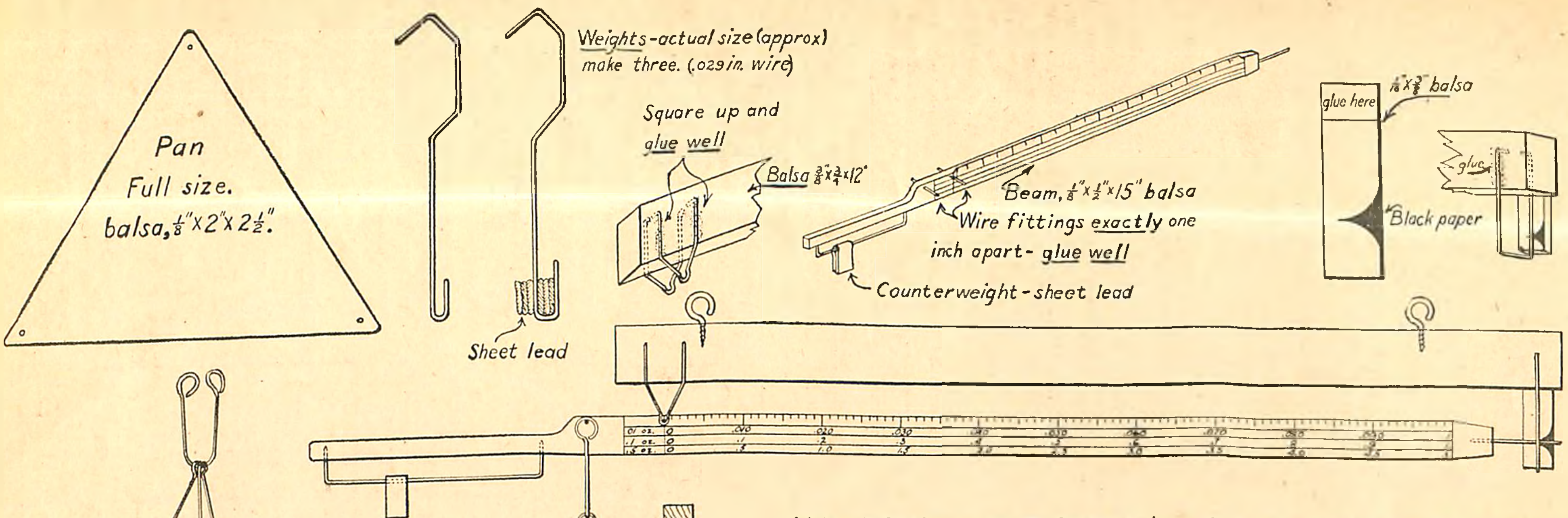
Approved ..............................................................
(Parent sign here, if applicant is under eighteen)

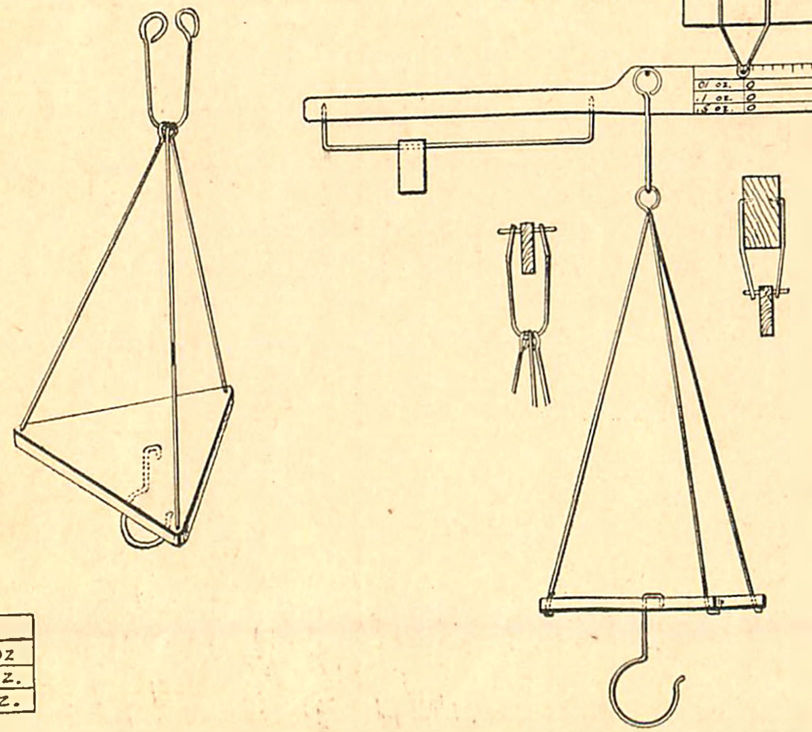
**YOU MAY COPY THIS FORM IF YOU DO NOT WISH TO CUT IT OUT.**

### Build Your Own Beam Balancing Scales

YOUR model parts must be accurately weighed so that you will know just how light you are making your models. The very light weight indoor models for contest use cannot be satisfactorily made without careful weighing. The outdoor models for contest use must weigh one ounce for each fifty square inches of wing area.

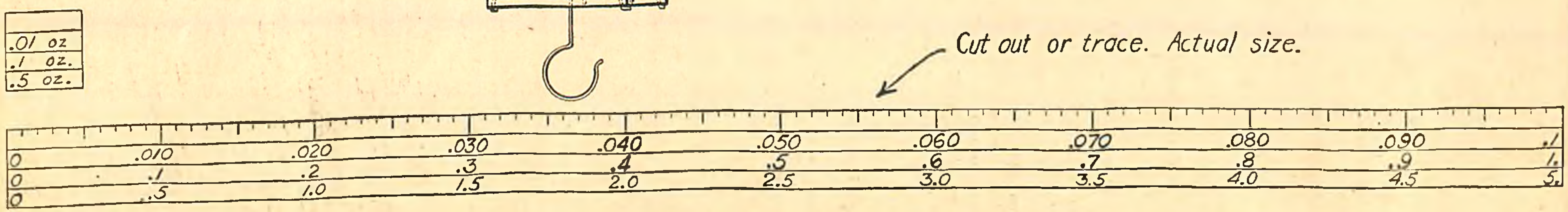
Now you can build your own scales that will weigh accurately to one thousandth of an ounce. On page 22 is a plan of a successful scale made entirely of wire and balsa wood.



Make all fittings of No. 12 (.029 in.) music wire. Glue together with several coats of model cement. Dope or varnish well balance beam and pan. Make counterweight heavy enough to balance scales in the position shown. Make three weights, .01 oz., .1 oz., .5 oz. Use laboratory scales to insure accuracy of your weights. Hang on edge of table or shelf to use. Cut out and use or trace accurately the scale at bottom of drawing. These balances are sensitive to one thousandth ounce.

Cut out or trace. Actual size.



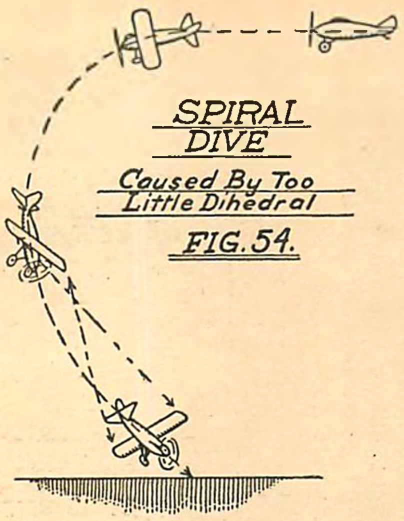


FIG. 54.

# The Aerodynamic Design of the Model Plane

## The Effects of the Distribution of Weights on Your Airplanes' Directional Stability, and Causes of Spiral Diving.

By Charles Hampson Grant

ARTICLE NO. 24 CHAPTER NO. 3

IN OUR endeavor to uncover the principles that govern directional stability and instability, three important factors have been considered. They are: (1) the fin area; (2) the wing span; (3) the tail moment arm.

Now we come to the fourth factor, one which causes more misconceptions than all of the others put together, possibly for the reason that actions induced by it are not thoroughly understood by the average person. In fact, the experts often become "hazy" and indefinite when called upon to explain clearly its significance.

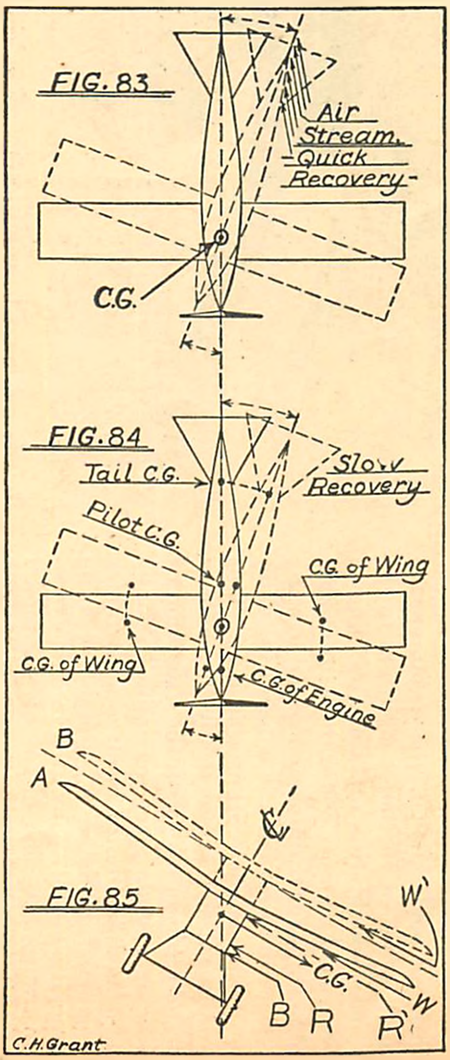
In order to understand the effect on the airplane in flight of the position of the weights embodied in the airplane's structure, we must consider carefully the characteristics of objects having weight when they are in motion and at rest.

First of all, what is weight? We may say that it is the measure of the pull exerted by the force of gravity on any object or substance. The weight of a chair or a table is the amount of force with which gravity tends to pull each towards the center of the earth. The hard substances forming the earth's crust, prevent the objects from being drawn into the earth toward its center. These objects therefore press against the substance forming the earth's crust with a force equal to the pull of gravity.

In the case of the airplane, gravity is trying to pull the airplane toward the earth when it is in flight, while the impact of the air particles on the wings exert a pressure opposite in effect to gravity. If this pressure is greater than the weight of the airplane, the airplane rises. If it is less, the plane drops toward the earth. Not necessarily at great speed, however.

Now we come to a quality of matter or substance which has a great influence on the directional stability of the airplane, and that is the *tendency* of a material object to remain at rest in a given position or in motion in a given direction at a constant speed. This quality of matter exists because of its *mass*. Do not confuse *mass* with weight. Weight is the result of the pull of gravity on the *mass* of an object or substance. The mass of any object is proportional to its weight at any particular point on the surface of the earth or in the air. The resistance exerted by the mass of an object to a change of motion or of rest, is called its *inertia*.

Possibly many readers are beginning to wonder what all of this "dry" discussion is about but we will not keep them in suspense much longer. Perhaps some of you have already suspected what we have been preparing to say when the word "inertia" was mentioned above. At any rate, this is most important to a complete understanding of stability problems.




The particular fact, important for you to realize, is that all of the parts of an airplane have *inertia*. For instance, the tail unit tends to keep moving with the airplane *along the straight line of flight.* If a gust of wind strikes the vertical tail surfaces, tending to push it to one side out of the straight path along which it is traveling, it resists being moved out of this path. The force with which it resists is proportional to its *mass* or its weight. The heavier the tail of the airplane, the greater is the resisting force.

If all of the weights of the airplane were concentrated at the center of gravity, fig. No. 83, then when a wind gust turned the plane around its vertical axis sideways, as shown by the dotted figure, no weights would be moved and consequently the airplane would offer no resistance to being displaced in this manner.

Now however, if we consider fig. No. 84 where the center of weights of the various parts are located at a considerable distance from the center of gravity, we can see that any displacement of the airplane about the vertical axis (dotted figure) will bring about a displacement of the various weights or masses. The force tending to cause displacement will be resisted because of the *inertia* of the various masses. The important fact to consider is that the farther the centers of weight of the parts (such as wings, tail, motor, pilot, etc.,) are from the center of gravity of the whole airplane, (C. of G. fig. No. 84), the *greater* will be their resistance to displacement.

In other words, the farther the weights of the airplane are distributed from the (C. of G.), the steadier the airplane will be. The steadiness of many of the modern airplanes is gained by making use of this fact. When a displacement takes place, it occurs *slowly*, yet none the less positively. If the airplane's weights are close to the center of gravity, the displacement takes place more *quickly* but less positively.

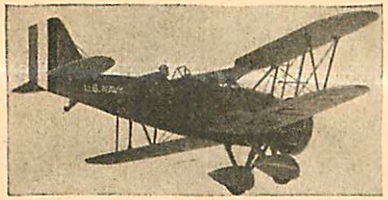
The larger the airplane is, the less it will be disturbed in flight. Large bombers are very steady because of this quality for in such cases, the weights of the parts of the ship are heavier and farther from

(*Continued on page 44*)

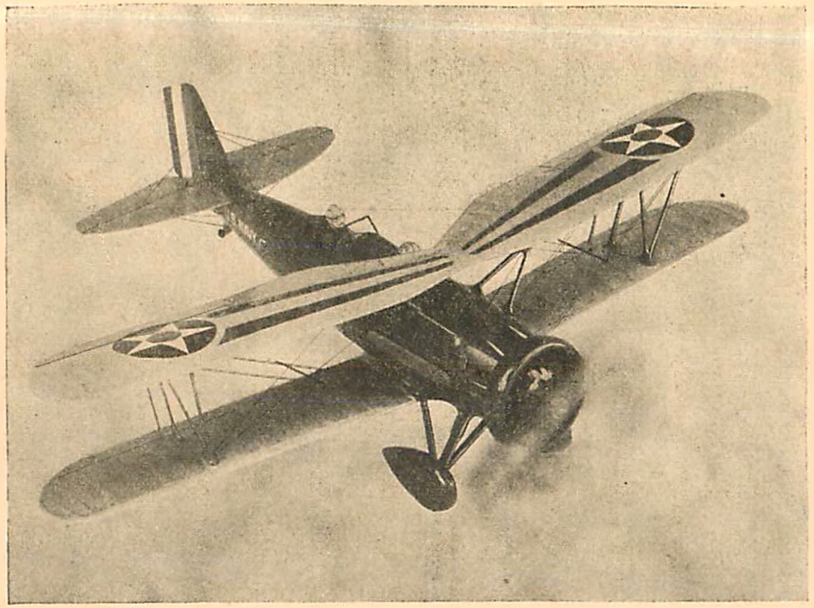
# 1934 will be a big year for Model Plane Builders

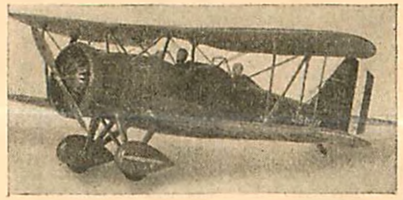
*—and here are some low priced, authentic Cee-Dee models that are not to be duplicated anywhere at any price—for model builders who have outgrown cheap TOY "model airplanes" and are now entitled to the best obtainable.*

## VOUGHT CORSAIR V65



Rounding the field after taking off, an actual C-D photograph.



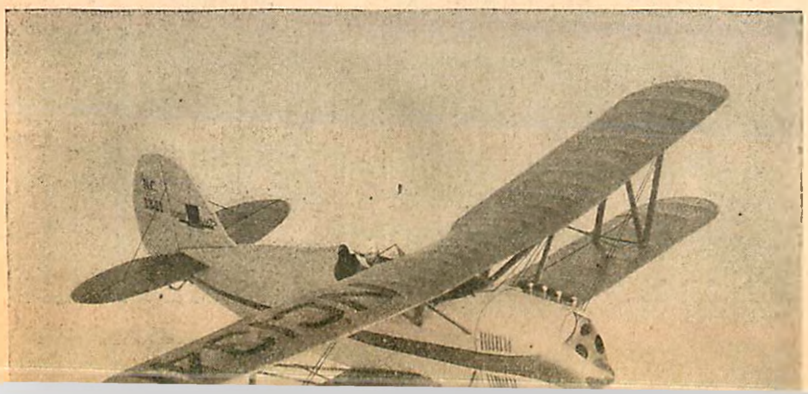


One of the most detailed Cleveland-Designed models ever produced.

This ¾" scale model, the prototype of which is one of the latest additions to the famous Vought line of "Corsairs" known over a good many years for their invaluable aid to ships for training and actual fighting services in Nicaragua, is a beautiful addition to any model enthusiast's fleet. This two place design is practically the same as the well known V80 with the exception of its being a single place job and with consequent modification of fuselage and rudder design. Besides being a reputable fighting plane, it is readily converted into an executive transport. The flights of this model are quite similar to the Curtiss Helldiver, but being a little heavier will be found to be more stable when being flown in gusty weather. It may be made as a super-detailed exhibition model as well as a flying model by the simple removal of the scale propeller for flying, or when building the ship, by using less dope, eliminating certain parts such as some of the ribs, stringers, etc., you can increase flying ability greatly.

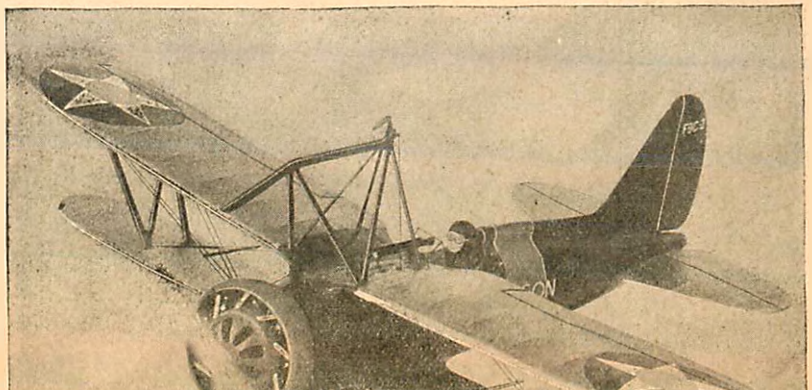
*All airplane pictures on this page are of actual C-D models. Built from kits containing printed out wood.*

The kit for this design comes complete with everything needed including completely routed out band-sawed wheel shoes, ready for final shaping, 6 bottles of liquids, paper cement, blue, yellow, red and black, and silver dope. Cleveland's new method makes striping easy. New principle gray flying blade, simulating aluminum propeller. Blocks for both the men's heads, which you can easily carve out with the new instructions given for heads, large quantity of balsa wood, including all curved parts, printed out as well as all the necessary strips, tissue, celluloid, music wire, hinge. wire, bracing thread, completed turned wheels, a flying propeller hub, material for the scale propeller, rubber, material for the flotation gear, motor and ring, etc.: its span is 27", length 19½", weight 4.2 oz. Complete **Kit SF-41** at dealers or postfree, anywhere .................... **$3.50**



*These designs are just as interesting but space restricts large photos and descriptions.*

**1933 WACO C CABIN PLANE**
¾" scale. Colored silver and red. Span 24¾", length 19⅛", weight 3.7 oz. Complete Kit SF-37, with printed out wood, only $3.00.



¾" model. Colored yellow and olive drab. Span 25¼", length 21", weight 3.0 oz. Complete Kit SF-39, with printed out wood, only $3.00.

**1933 AERONCA C-3**

¾" scale lightplane. Colored red and silver. Span 27", length 15¾", weight 1.9 oz. Complete Kit SF-40, with printed out wood, only $2.00.

**1932 BOEING P26**

¾" model. Colored yellow and olive drab. Span 20¼", length 17⅞", weight 2.5 oz. Complete Kit SF-23, with printed out wood, only $2.25.

**1932 LINCOLN SPORT**

¾" scale. Colored cream and black. Span 15", length 12⅛", weight 1 oz. Complete Kit SF-36, with printed out wood, only $1.50.

## *Redesigned*
## 1933 GREAT LAKES SPORT TRAINER

Authentic ¾" scale model of the world's outstanding outside looping record airplane. Used almost exclusively by a well known American school for training purposes. A real beauty, and highly respected by all. The redesigned model is far easier to build than our older No. SF-1E and SF-1F since it has no carved out nose and now contains all wood parts printed out, all necessary cements and enamel dope and all materials necessary, entirely complete; and a very fine drawing containing complete instructions for building an authentic scale exhibition model of the ship, or with the flying propeller attached, it is capable of excellent flights due to its center of gravity being much lower, with its heavier balloon wheels and dihedral in both wings and increased size of all tail surfaces. Also includes Cleveland's new method for striping, and grey flying blade to simulate aluminum propeller. Span 20", length 15⅛", weight 2.1 oz. Colored orange fuselage and rudder, balance black. Complete Kit **SF-1G** with printed out wood, at dealers or postfree, only........ **$2.50**

## *1932 Akron Fighter*
## OR 1933 CURTISS F9C2 (For the Macon)

The prototype of this particular design was known as the Akron Fighter (the 1932 design employed in connection with the airship Akron before it came to its disastrous end) which we modeled at the time of its construction according to all available photographs and drawings so that it was not entirely complete with respect to the airship arresting gear, tails, etc. Since this model was redesigned to a certain extent and drawings available for the arresting gear, its new tail surfaces and the three leg type landing gear, we took it upon ourselves to redesign this little beauty which is very popular with enthusiasts generally. It is now a much flashier appearing airplane, with all these new details incorporated, including, as the photograph above shows, the neat new wheel "open" shoes. Incidentally, these wheel shoes are now supplied completely drilled, routed out and bandsawed to shape, ready for carving. Completely turned wheels are now supplied. Kit also includes Cleveland's new method for striping, and new principle gray flying blade to simulate aluminum propeller. Span 19⅛", length 15⅛", weight, 2.2 oz. Colored silver wings, and tail surface, balance blue, red and black. Complete **Kit SF-22B** with printed out wood, at dealers or postfree, only.......................... **$2.50**

## IMPORTANT ANNOUNCEMENT TO ALL MODEL BUILDERS—Beginners or Advanced

Beginning with Issue No. 7 of "Cleveland Modelmaking News & Practical Hobbies," which is NOW READY, the policy of this Engineering service in magazine form is to be changed with only one thought in mind. BETTERMENT!

Therefore, in addition to other articles, there will be found a beautiful ¾" scale drawing of the Vought Corsair V-65, complete in every detail as are all Cleveland-Designed drawings. This drawing will, of course, be much larger than those contained within 4, 5 and 6. The ¾" scale Packard Phaeton (touring car) drawings are to be included as will be complete ¾" scale drawings for a "bread and butter" type, jig-saw-cut, easily "carved" Elephant and Howdah. Numerous eighth scale airplane drawings will continue, and since many requests have already been made for solid models of a slightly larger size, we will include a few to the 3/16" scale to see how they will be accepted.

There will also be included articles on a brand new and unique scale model Railway system that even aeromodelists will crave, on boating and on architectural modeling. Since some desire another scale for flying model aircraft, we will for the first time, since their invention in 1930, give drawings for one of our ⅜" scale flying models—a "pip" of a Supermarine S6.B. Many other varied and fascinating features to follow, which never become "stale." The price must be increased substantially to cover all this added engineering, publication and mailing cost. So, for the year 1934 there will be only 4 issues beginning with Issue No. 7, ending with Issue No. 10 (issue numbers will continue consecutively, volume only to change yearly), and published according to the seasons: Winter, Spring, Summer and Autumn. Thus the publication will be more easily produced and mailed on time, during the early days of the season, making each issue as heavy as that particular season requires. This, our experience shows, is the most logical way to publish the magazine instead of running a continuous 24 pages every two months of the year. Subscription price is $1.50 per year, consisting of the four seasonal copies which may be obtained separately at 40c per copy while the issues last. We only plan to run a limited number, setting aside a portion to be bound at the end of the year in **Regular Volume form.** Serving non-subscribers will therefore be a case of "first come, first served" for the limited extra copies to be published, so in order to avoid disappointment on these worth-while quarterly sections of a complete model textbook, with articles worth many times the price of its small cost, we urge you to subscribe NOW. In the event you cannot, send your 40c today (no stamps) for the 7th copy at least.

Some articles contemplated for future issues and upon which you may vote for or against are, all sizes and scales of: Airplanes, exhibition and flying; Balloons and Dirigibles; Railways and Trains; Boats (Racing, Shells, Tugs, Liners, Old timers, etc.); Automobiles, Trucks, Busses, Racing Cars, Coaches, Military models (Tanks, Cannons, etc.) Architectural and Landscape Modeling, Historic and Industrial Scenes, Display Cases, Accessories to all foregoing, shop kinks, materials, etc.

NOTE: All back issues of CLEVELAND MODELMAKING NEWS and Practical Hobbies are still available, but a few of the numbers are almost sold out, so, if you haven't completed your first volume, send in your order for fill-ins (except No. 3, obtainable only with complete sets) at the rate of 25c per copy, 6 issues $1.50 instead of the former price of $1.00 for 6. When "Cleveland" Says It's Going to Be Better, You Can Bet Your Boots It'll Be Better. SUBSCRIBE TODAY!

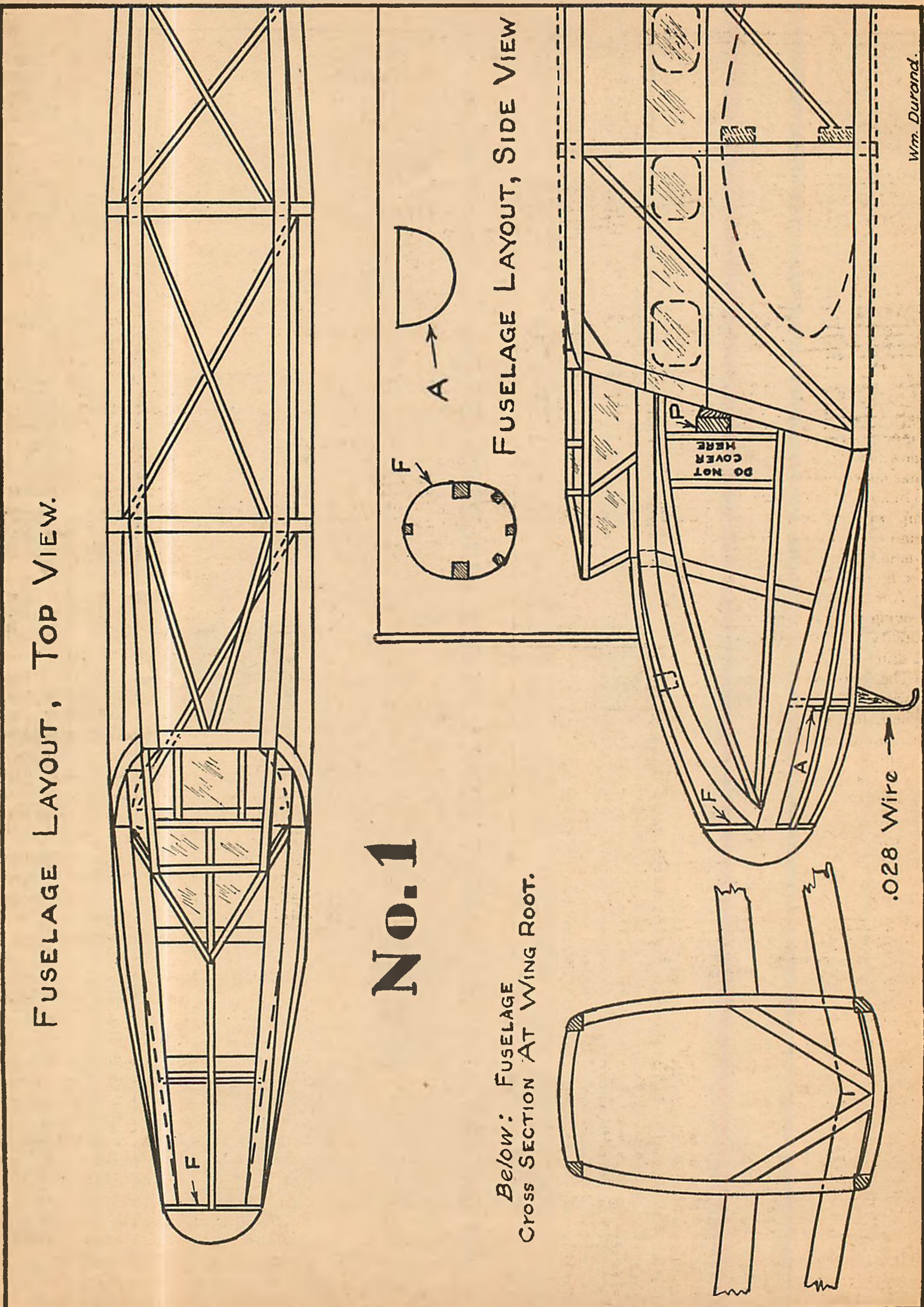
*Ask Your Dealer for these and other Cee-Dee Kits—if he hasn't them, order direct and receive courteous, immediate service*

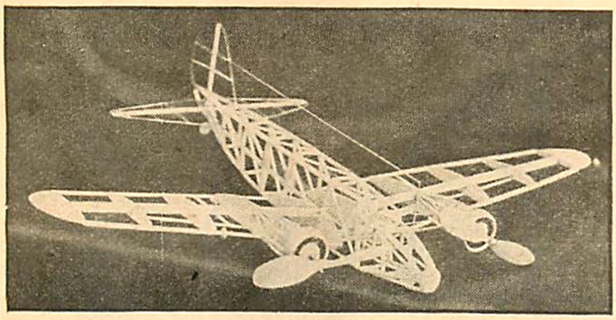
*Do not patronize the dealer who uses C-D's as decoys in his windows to sell you something "just as good."*

*Send for Catalog showing latest C-D models, parts and supplies—send 3c stamp for your copy*

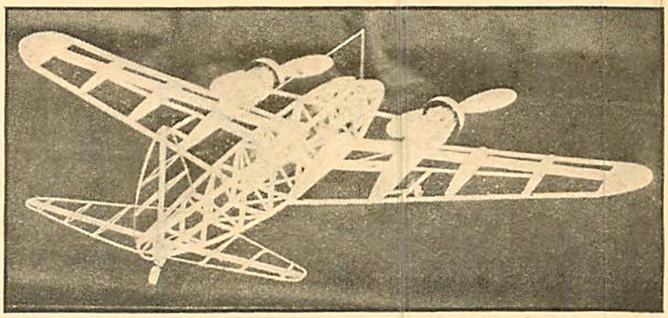
# CLEVELAND MODEL & SUPPLY CO., INC.

**1866N2 West 57th St.** *Dependable Model Engineers Since 1919—15 Years* **Cleveland, Ohio**


Fuselage Layout, Top View.
Fuselage Layout, Side View
No. 1
Below: Fuselage Cross Section At Wing Root.
A
F
P
Do not cover here
.028 Wire →
Wm. Durand.



The completed framework ready for the covering



The connecting rod propeller drive may be seen at the front

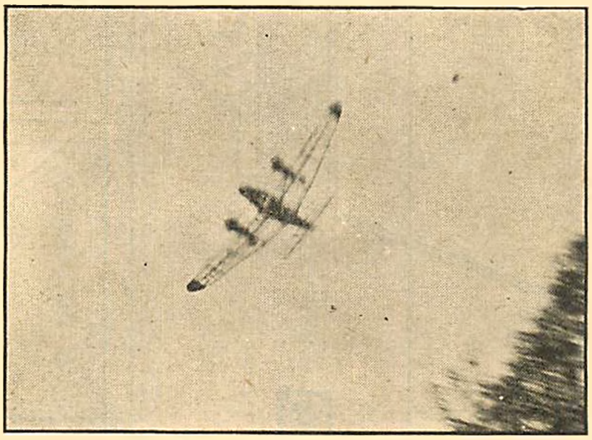
# How You Can Build a Flying Scale Boeing—247

## A Unique Propeller Drive Makes This Modern Transport Model a Fine Flier and Interesting to Build

By WM. H. DURAND

YOU will find that Boeing's new, high speed twin motor transport, technically known as the 247, makes an unusually interesting model to build. This fast, modern ship with its three-mile-a-minute top speed and its low landing speed of 59 miles per hour is making history on America's air lines and is proving the superior speed, reliability and economy of the medium size transport plane.

The problem of applying power to the two outboard propellers in a flying model of the twin motor variety is solved in a unique manner in this design which uses no unsightly motor sticks, expensive air or gas engines, nor the inefficient pulley transmission. The Boeing 247 model to be described here uses the crankshaft and connecting rod type of transmission which is very simple and cannot possibly slip. This transmission system is shown in detail on drawing number 5 which accompanies this article. Besides being easy to construct, the new system makes winding and launching easy and does not spoil the appearance of the model since the moving connecting rod is a mere blur when the plane is in flight. There is very little vibration, only a slight buzz being audible when the transmission is in operation.



The model banking in full flight

The model is very true to scale except that tail surface areas and dihedral have been increased in order to insure good flying qualities. Although this is not an extremely difficult model to build, it is not recommended for beginners.

### Fuselage

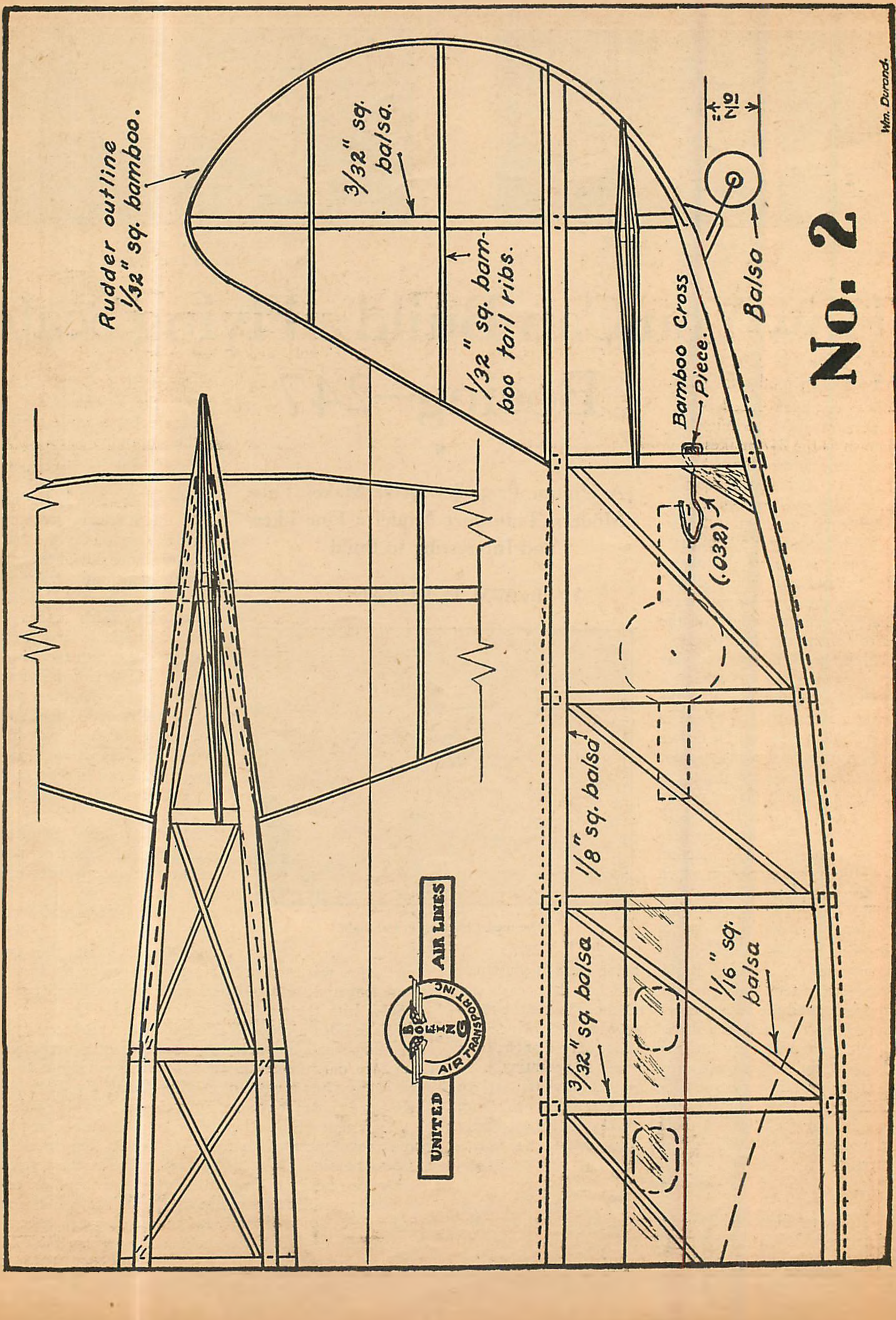
It is convenient to begin the model by constructing the fuselage. Refer to drawings 1 and 2. Lay out the two fuselage sides *flat* in the usual manner, but disregard all diagonal braces except the heavier members that may be placed at a slant. Notice that the longerons are ⅛" square balsa while most of the uprights are 3/32" square balsa. It is a very easy matter to form the curved longeron in the nose of the fuselage; just press small dents into the balsa on the inner side of the curve with your thumb-nail. Space these dents about 1/16 of an inch apart. This makes the wood very pliable, and it may easily be bent into the desired curve. This method is much quicker and easier than soaking or heating the balsa. After the entire fuselage has been assembled, these bent parts should be doped in order to restore their original strength.

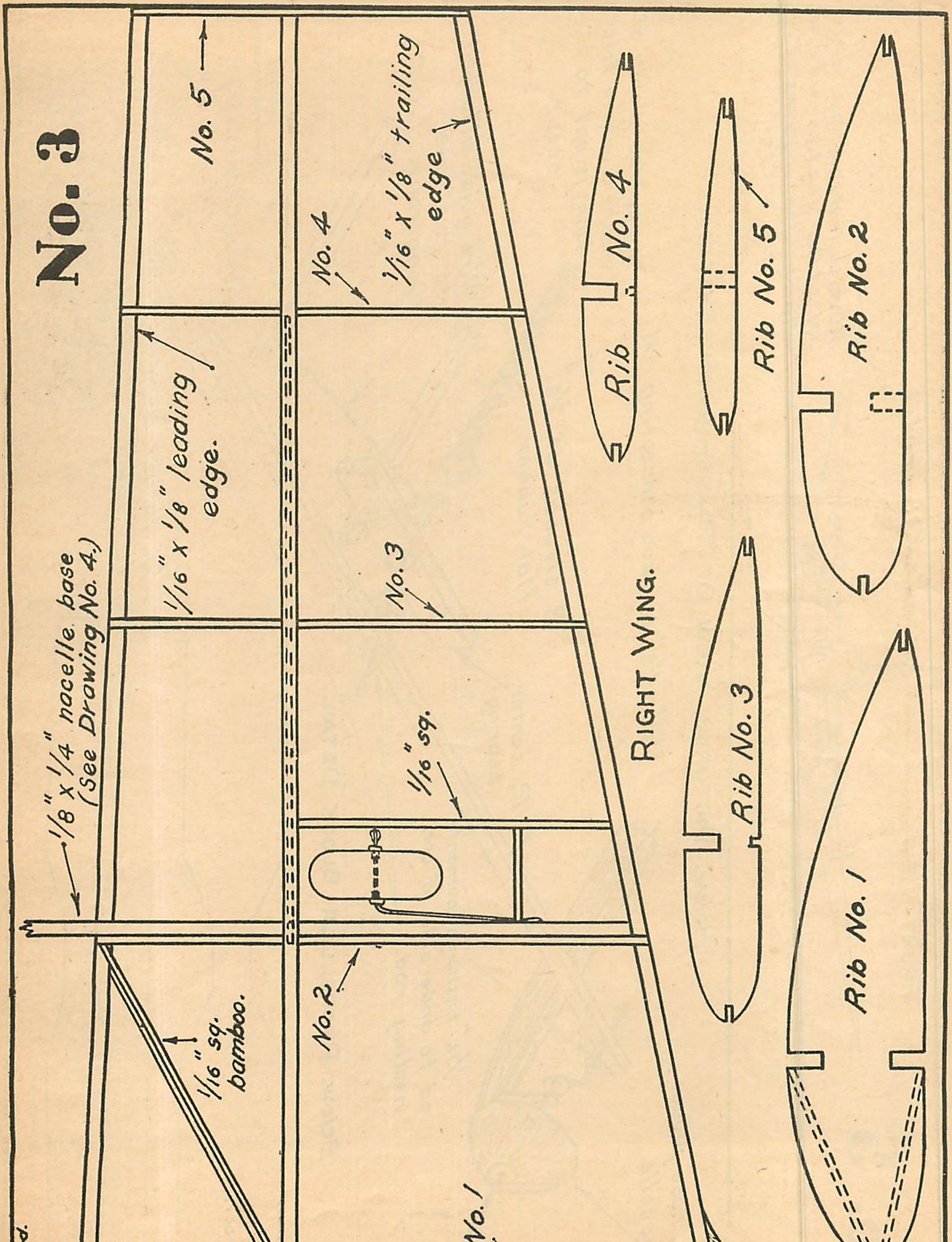
When both sides of the fuselage have been completed, lift them off the board on which you are working and proceed to give each of the uprights a curve similar to that shown in the cross section view in drawing No. 1. Use the same method as was used in forming the curve on the fuselage nose longeron; that is, by forming the wood between the fingers with the aid of your thumb-nail. This gives the fuselage sides a rounded effect like that produced by cementing small bulkheads to the sides of a rectangular fuselage, only the new method is much less tedious as well as lighter. Just a word of caution—don't give both sides the same curve; make one right side and one left side.

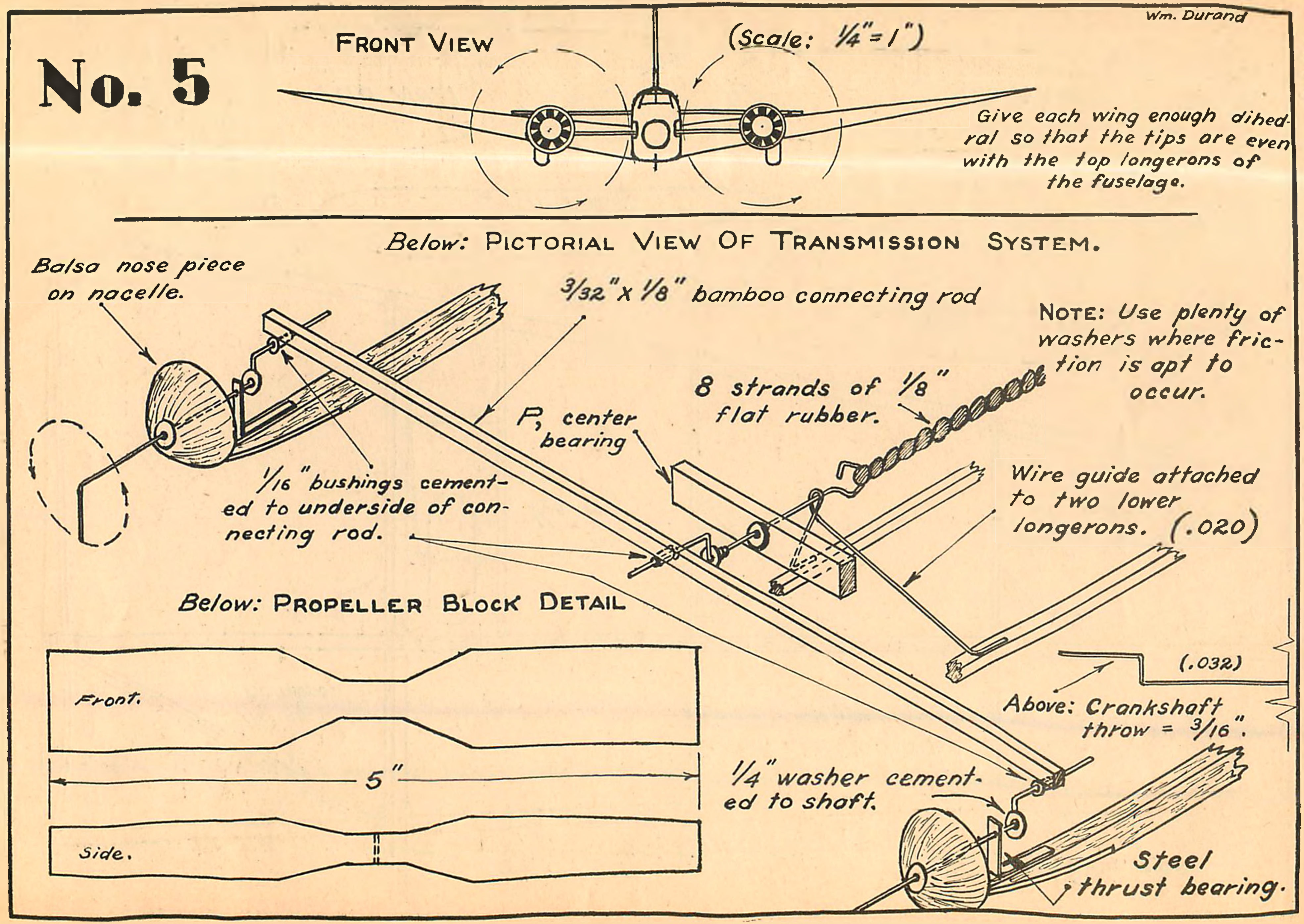
Your next job is to join the sides with the top and bottom cross braces which are formed into a slight curve before cementing in place. You will notice on the plan that the upper cross members are shorter than the lower ones.

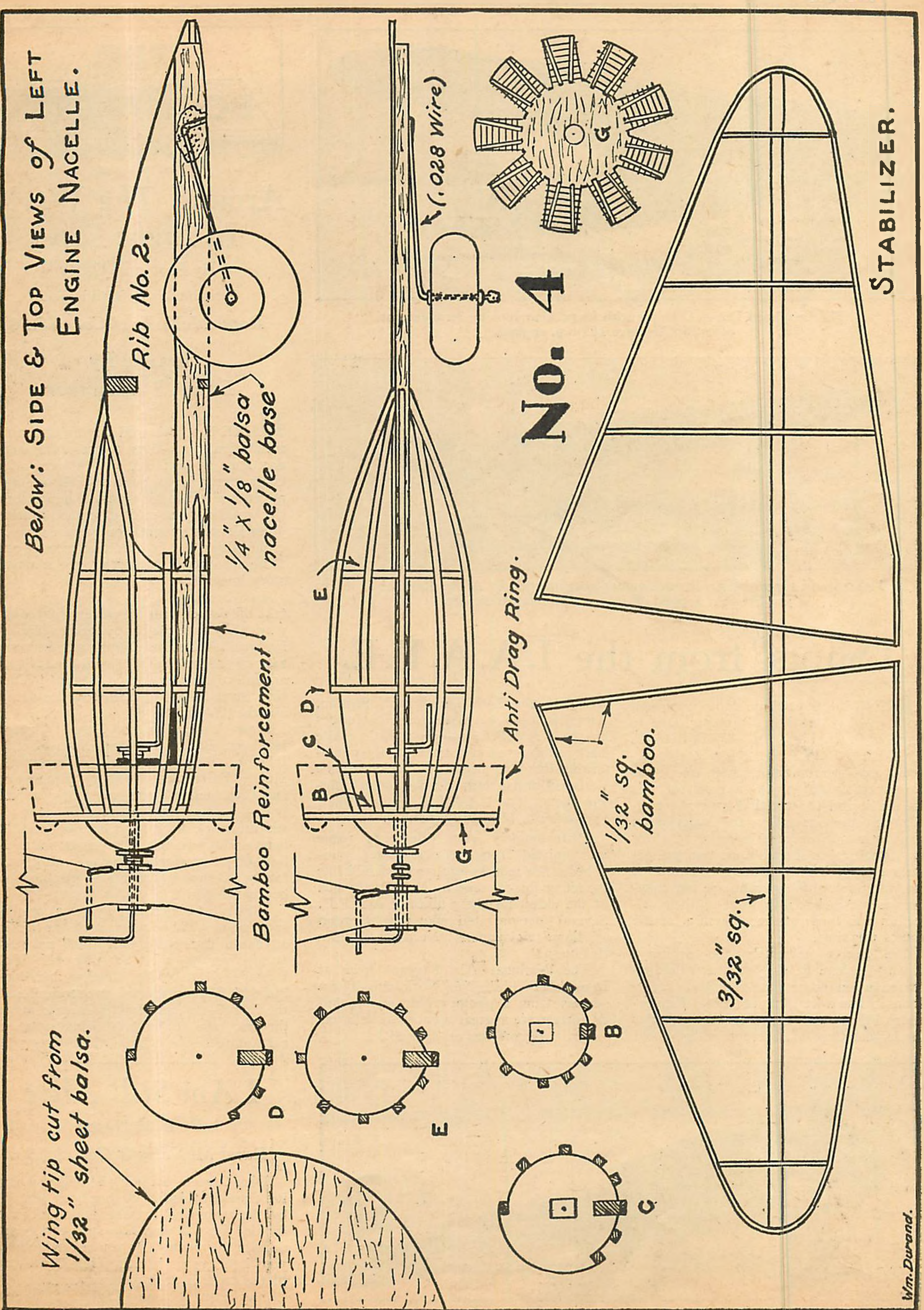
Now you are ready to line up the structure and secure it by the addition of the 1/16" square diagonals shown in the plan. At this stage you may also place the 1/16" square stringers around the nose. Bulkhead "A" is not

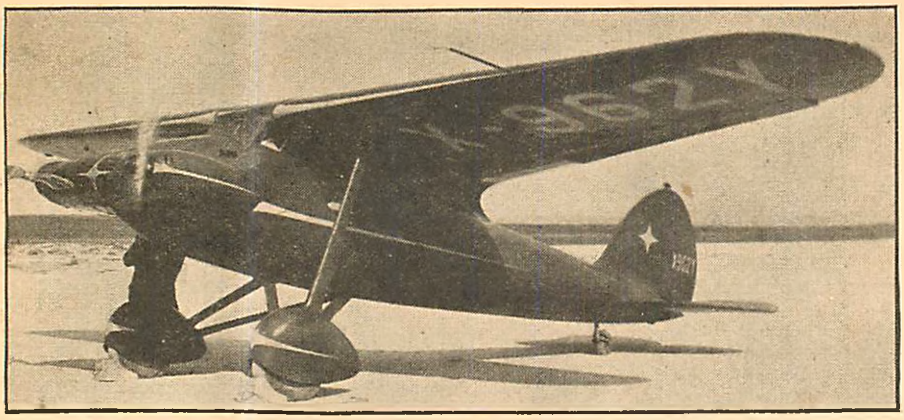
*(Continued on page 38)*


Rudder outline
1/32" sq. bamboo.
3/32" sq. balsa.
1/32" sq. bamboo tail ribs.
Bamboo Cross Piece.
(.032)
Balsa
No. 2
1/8" sq. balsa
3/32" sq. balsa
1/16" sq. balsa
UNITED AIR LINES
BOEING
AIR TRANSPORT INC
Wm. Durand.

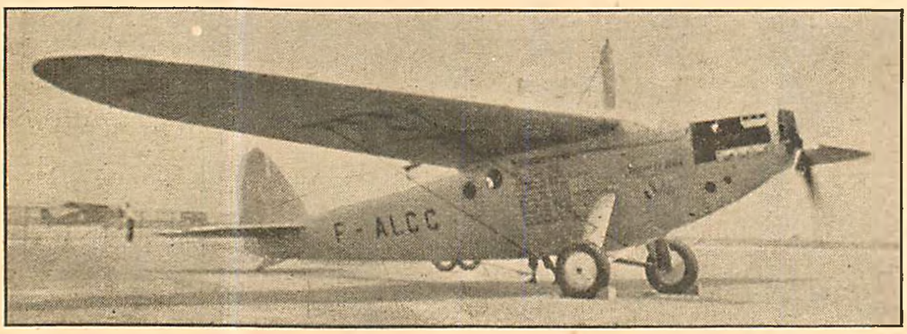

No. 3
1/8" x 1/4" nacelle base (See Drawing No. 4.)
1/16" x 1/8" leading edge.
No. 5
1/16" x 1/8" trailing edge
No. 4
No. 3
1/16" sq.
No. 2
1/16" sq. bamboo.
No. 1
Wm. Durand.
RIGHT WING.
Rib No. 4
Rib No. 5
Rib No. 2
Rib No. 3
Rib No. 1


No. 5
Front View
(Scale: 1/4" = 1")
Wm. Durand
Give each wing enough dihedral so that the tips are even with the top longerons of the fuselage.
Below: Pictorial View Of Transmission System.
Balsa nose piece on nacelle.
3/32" x 1/8" bamboo connecting rod
Note: Use plenty of washers where friction is apt to occur.
8 strands of 1/8" flat rubber.
P, center bearing
1/16" bushings cemented to underside of connecting rod.
Wire guide attached to two lower longerons. (.020)
(.032)
Above: Crankshaft throw = 3/16".
1/4" washer cemented to shaft.
Steel thrust bearing.
Below: Propeller Block Detail
Front.
5"
Side.


Below: Side & Top Views of Left Engine Nacelle.
Rib No. 2.
1/4" x 1/8" balsa nacelle base
Bamboo Reinforcement
(.028 Wire)
Anti Drag Ring.
B
C
D
E
G
No. 4
Stabilizer.
1/32" sq. bamboo.
3/32" sq.
Wing tip cut from 1/32" sheet balsa.
Wm. Durand.



The Loughead Duo-4 Olympic with its peculiar looking arrangement of its two Menasco 165 h.p. engines.



The Bleriot world's record long distance monoplane, snapped by Albert Rossi of Brooklyn just before it hopped off from Floyd Bennett airport.

# "Shots" from the I. A. A. P. E.

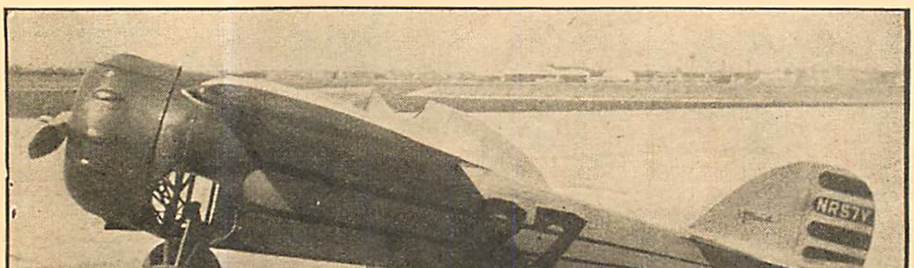
THINGS are getting along very well with the I.A.A.P.E. at present. Due to our little notices in UNIVERSAL MODEL AIRPLANE NEWS, the secretary has been swamped with queries as to our organization. As a result of this we are forced to state that we can not accept any more members for a period of another month or two, in order to allow us time to straighten up on our present membership. This ought to give interested aircraft photographers who are not members as yet, a chance to build up their collection and thus rate membership, at the end of this time.

We regret extremely the untimely death of Lieut. R. G. Johnson which occurred when he crashed recently. Lieut. Johnson was a well known Aerial Explorations Photographer, and he served under the famous Capt. A. Stevens in the World War, in the 14th Photograph Section. Lieut. Johnson was also one of the Judges in the I.A.A.P.E. contest a little while back, and so we can be sure that the photographs that won mention surely must have deserved praise with so able a man judging them. The I.A.A.P.E. extends their sympathy to his relatives and friends.

Unfortunately Art Whitmer's name was omitted from the club roster, published a few months ago, and I should like to rectify this mistake, as Art is really one of the oldest members of the I.A.A.P.E. Several persons tell me that Gordon Williams' nickname is "Needlenose." Can this be so?

The National Air Pageant held at Roosevelt Field, in New York, was quite a success from a photographic standpoint, as there were a great number of different

*(Continued on page 39)*



A new Cessna racer in the Howard Ike class. Warner engine, 110 h.p.


## *Around The World In Eight Days*

***By Post and Gatty***

***Introduction by Will Rogers***

***Rand McNally & Co. $2.50***

***Review By Edwin T. Hamilton***

HERE is a book well worthy of recommendation to all fliers, to those who some day hope to be fliers, and to every armchair flier with an ounce of romance and adventure left in his veins. A trip around the world for the price of a good dinner! Jules Verne's imagination gave it to us in eighty days, but he didn't go himself and those who read that seemingly fantastic story knew it.

But Post and Gatty did go and they take the reader with them every step of the way. They have the happy faculty of making you feel the rush of the air; hear the roar of the motor; thrill with the sense of adventurous unknown, and learn to love that never-to-be-forgotten favorite of the air, the "Winnie Mae."

New York, Harbor Grace, Chester, Hanover, Berlin, Moskva, Nova-Sibirsk, Irkutsk, Blagoveshchensk, Khabarovsk, Nome, Fairbanks, Dawson, Edmonton, and Cleveland may be only names to you now, but when you have read this true adventure story, they, their location, and the people who welcomed these modern Magellans on their arrival become well-known towns in close-by countries, peopled by happy friends.

Illustrated generously by actual on-the-spot photographs, your reviewer defies anyone to thumb through it and not read from cover to cover. Starting with Will Roger's hilarious introduction and ending with fifteen pages of true facsimiles of the Log Book that Harold Gatty kept on the trip, the reader will never come to earth until he has completed the last page.

## *I Am Still Alive*

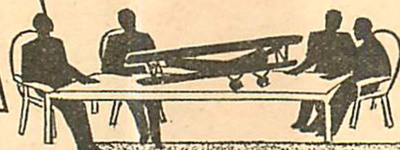
***By Dick Grace***

***Rand McNally & Co. $2.50***

Dick Grace is the boy who tells you how it's done. In this fascinating book, written by the man who "crashes" planes for a living, you will find how such things are done in the movies. Do you remember how you held your breath while watching planes crash in such pictures as "Wings," "Lilac Time," "Young Eagles," "The Air

*(Continued on page 39)*

# Aviation Advisory Board




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


HERE are a few more answers to questions that have puzzled you. Paul Prout of 327 Hutchins Ave., Columbus, Ind., asks a question the answer to which many of you would probably like to know. He says: "Often when I construct a scale model I paint it or dope it with banana oil colored dope. This has a natural lustre at first but after a time it loses this lustre and the general appearance is lowered. Is there any sort of polish or is there any way of restoring lustre to models covered with banana oil dope?

*Answer:* It has been the experience of expert model builders that the following procedure gives the best results. Dope or lacquer the surface which you wish to finish. The color is immaterial. Then sand very lightly all over the surface with very fine sandpaper. Be sure not to sand heavily in order not to injure the surface to any degree. After this has been done take a sheet of rubber and polish the surface with it. This will smooth and harden the finish. When this has been done and the surface has become lustrous apply some sort of polish, such as Johnson's Wax. Rub this in thoroughly until high lustre has been attained.

Harry Short of 5647 Normal Blvd., Chicago, Ill., comes to us with one of his troubles. He says: "I have a Fokker D-7 that glides perfectly but when I fly it under power it stalls. What is the cause of this?

*Answer:* When a plane glides the impetus or forward motion is given to the ship by the weight of the plane acting at the center of gravity. When the ship is in flight the forward motion is caused by the thrust on the propeller. As Short's plane stalls when under power it is evident that the propeller is pulling from a point considerably below the center of gravity.

The best way to correct this trouble is to build the ship and change it so that the center of gravity or center of weight is below the line of thrust. Then, when the airplane is adjusted for a glide it will fly under power with the same adjustment. Another way to make this plane fly more steadily is to increase the size of the tail surfaces, especially the stabilizer. Be sure that the angle of the stabilizer is not more than one or two degrees *less* than the angle of the wings. If the stabilizer has too much *negative* angle it will nose up the ship sharply when it attains speed under power.

Here is a question Warren Steely of 32 Second St., Shillington, Pa., sent in.

*Question:* I have a 4 ft. flying model of a "Curtiss Falcon." In order to get the proper flights out of it how much angle should the propeller blades have if the propeller is 16″ long and 2¾″ wide. The area of the blades is approximately 12% of the wing area; which is 359 sq. in.

*Answer:* A propeller with the dimensions given usually has about 30 sq. in. area. This is approximately 8% of the wing area. In order that this blade area shall be sufficient to propel the plane properly the pitch of the propeller should be approximately 12″. In other words, the block from which it is cut should be four times as wide as it is deep. I should advise Steely to cut the propeller from a block 16″ long, 3″ wide, by ¾″ deep.

Clayton Sherry of 25 Oswego Street, Springfield, Mass., honors us with a few questions:

*Question:* Why has Ben Howard's racer got double wheels and what advantages or disadvantages have they?

*Answer:* The landing gear of Ben Howard's racer has no shock absorbers. It is therefore necessary to give a great deal of shock absorbing quality to the wheels themselves. In order to do this, the tires are inflated to a very low pressure so that the tires themselves absorb a great deal of the shock. However, the weight of the machine is too great for one wheel on a side and the tires pumped to a low pressure. Therefore, two wheels are placed on a side so that each wheel will have to support one-half the usual weight. In this manner, greater shock absorbing qualities can be obtained. Also, two small wheels, one behind the other, offers less frontal area and therefore less air resistance than one large wheel. This possibly had some bearing upon the choice of this type of landing gear.

*Question:* What is the small rudder for which appears at the end of the modern ships?

*Answer:* This small rudder is to trim the controls so that it will not be necessary for the pilot to hold the controls in any position to obviate a side wind or other forces affecting the ship. By this means, the controls may be kept in neutral and yet have the ship perfectly trimmed. This small rudder is also being used to steer the ship, the action of it forcing the large rudder in the desired direction. This means of operation is very smooth and the action of the ship is not erratic.

Here are a few questions from Fred H. Parish of 165 Springfield Ave., West Kildanan, Winnipeg, Man., Canada, which he asked in a recent letter to us, but which we were unable to answer in our last issue:

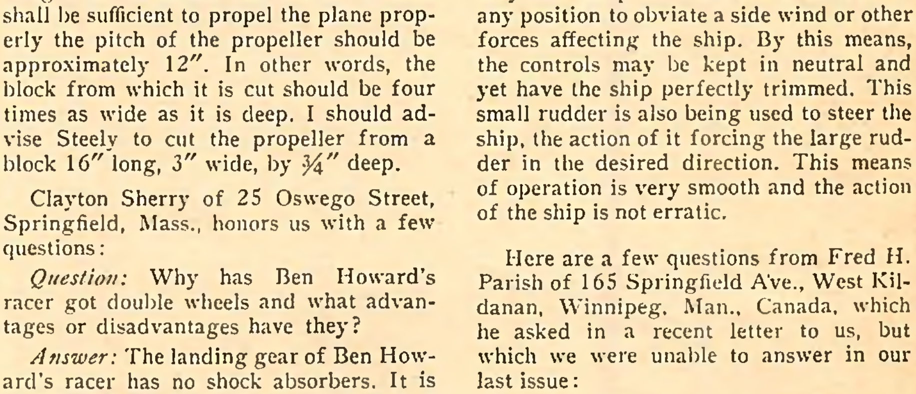
*Question:* What is air pilotage?

*Answer:* Air pilotage is the act of piloting an airplane.

*Question:* What is the time log of an airplane?

*Answer:* The time log of an airplane is the exact record or biography of the airplane from the time it goes into service until the time its services are discontinued.

*(Continued on page 48)*



**Here is the latest and fastest development in amphibians, designed and built by Mr. Seversky, who flew it at a rate of 180 miles per hour, a world's record.**

# More testimonials that speak for themselves about WOBURN'S

NRA MEMBER U.S. WE DO OUR PART

SEAL OF APPROVAL

Read what 2 of the many satisfied Woburn patrons say in unsolicited letters of approval. We have many more like these.

*Dear Sirs:*
*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.*

## HIGH QUALITY LOW PRICES PROMPT SERVICE

## ALL ITEMS SENT POSTPAID

*Gentlemen:*
*Just received order and I was highly satisfied with the splendid quality of the wood, and the accurately cut pieces. This is the second order I have given you and you may expect more orders in the future. I highly recommend your wood and supplies for quality, size, and remarkably low prices.*
*Enthusiastically yours,*
*HIRAM SHOUS,*
*Plankinton, S. Dokota.*

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known by model builders everywhere for their uniform high quality, accuracy and

### MONEY BACK GUARANTEE

**BALSA WOOD**
Best Quality in America
24" Lengths
1/32x1/16......4 for 1c
1/16x1/16......4 for 1c
1/16x3/32......3 for 1c
1/16x1/8 ......3 for 1c
1/16x3/16......2 for 1c
1/16x1/4 ......3 for 2c
1/16x1/2 ......3 for 3c
3/32x3/32......2 for 1c
3/16x3/16......2 for 4c
3/16x5/16......2 for 5c
1/4 x1/4 ......2 for 5c
1/8 x1/8 ......2 for 1c
1/8 x1/4 ......2 for 3c
1/4x1/2........1 for 4c
1/2 x1/2 ......1 for 5c
1 x1/2 ......1 for 6c
1 x1 ......1 for 10c
1 x2 ......1 for 18c

**SHEETS**
1/100x2........1 for 7c
1/64 x2........1 for 6c
1/32 x2........1 for 2c
1/16 x2........2 for 5c
3/32 x2........2 for 7c
1/8 x2........1 for 4c
3/16 x2........1 for 5c
1/4 x2........1 for 7c
5/16 x2........1 for 8c
1/2 x2........1 for 10c
2 x2........1 for 25c
2 x3........1 for 30c
2 x6........1 for 55c

**BRASS ROD**
1 ft. 1/16 O. D.......5c

**DOPE, ACETONE, BANANA OIL OR COLORLESS CEMENT**
All same price
Large bottle......... 4c
1 oz. 8c, 2 oz........16c
4 oz. 25c, 6" tube....10c
½ pint, .50; 1 pt.....80c

**POLISHED DURALUMIN MOTOR PLATES**
For 1½", .08; 2", .10; 3", .12

**DUMMY MOTORS**
1½" Diameter...... .15
2 " " .20
3 " " .30
4 " " .40

**CELLULOID WHEELS**
¾" diam...........05
1 " diam...........07
1⅜" diam...........09
1⅞" diam...........11
3¼" diam...........30

**WHEEL PANTS**
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6" diam. ........ 5c each
7" diam. ........ 6c each
8" diam. ........10c each
10" diam. ........15c each

**ALUMINUM WHEELS**
1 " diam. .....10c pr.
1¼" diam. .....12c pr.
1½" diam. .....15c pr.
1¾" diam. .....18c pr.

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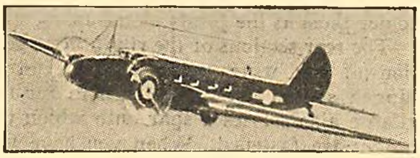

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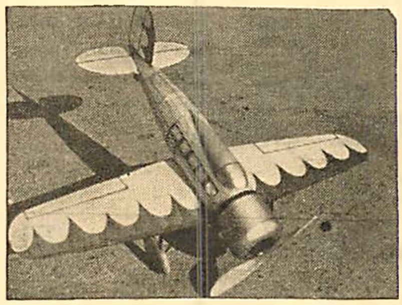

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# WOBURN MODEL AIRPLANE SHOP

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## The Navy "Admiral" in Detail

*(Continued from page 16)*

Make the stabilizer first, then the elevator and when these have been finished, solder in the cable horns.

The ribs in the rudders and vertical fins are shaped like the wing airfoil. The cambered sides face toward the inside while the flat sides face outward, as shown on page "A" top view.

These are similar in construction to the other ribs with the exception of the above mentioned features. Do not cover each part of the tail group as you finish it for if this is done, by the time you are ready to paint the model, the fabric might sag or wrinkle. File out all the excess solder in the joints of the framework and clean each part in gasoline; then lay them all aside.

### The Wing

Use the same method of construction in making the wing as is used in making the tail. Make flanged channels for the cap strips and internal bracing of the airfoil. The rib is made in three separate parts. First is the trailing end which extends from the rear spar to the trailing edge of the wing; secondly, the center section which extends between the two spars and thirdly, the front end which forms the nose of the rib and extends from the front spar forward.

The rib is joined and soldered at the above mentioned points only after the internal bracings have been fastened in each section of it and they are slipped onto the spars.

To make the spars, follow the perspective view on page "A". Then make the wing jig, using the same method as in the tail surfaces. Lay the spars between the wire brads, slip in all the rib sections and solder them at the joints to the spars.

The rear sections of the ribs at that portion of the wing where the aileron is hinged should not be fastened in for the aileron also carries a spar onto which the hinges are fastened. When you have finished soldering all joints on the ribs and spars, run a "T" shaped strip (similar to the metal bulkhead stiffeners) along the leading edge of the wing and fasten it in. Now solder a 1/32" diam. rod around the tips and along the trailing edge of each rib.

Bend a strip of sheet-metal around the leading edge and tip of the wing as shown, (top view page "A"), 7/16" from the edge on either side.

Now make the aileron as shown on page "B", the construction being the same as that of the wing. Fasten in the hinges and line them up on the wing.

Before setting the wing aside, make all the fittings for the struts and solder them in.

Make the struts next.

For the strongest struts, use 3/32" diam. tubing for struts marked "A" (on front view of the three view layout) and 7/64" diam. tubing for struts marked "B". Then wrap (.006) gauge sheet metal around them and solder along the seams at the rear of each strut. Place a fitting at each end of the struts and then give the model a preliminary rigging to see that everything is well lined.

Before dismounting the wing and struts, make the two outboard wing floats. The construction of these is identical to that of the hull, for they are really miniature hulls in themselves.

When you have finished these, fit them to the lower ends of the struts as shown on page "A" front and side views.

### The Engines

Both engines are identical, so you can use the same material and mould for the two of them. To make the model of the crankcase, trace it from the drawing of the engine on page "C". When you cut the model to the shape of the template, sand it down smoothly and give it a coat of shellac. Now make a small box of thick metal consisting of two halves and having a hole at each end. Each half should be flanged around the sides so they can be clamped together. Fill one of the halves with casting sand and press the model in until only half of it is visible. Then fill the other side and press both halves together.

Now melt your metal in a small ladle until it runs. Then pour it into the mould through one of the holes. Do not place it into water to cool off for it is *DANGEROUS*. When it has cooled sufficiently, take out the casting and file it smoothly. Scoop out the inside of it on a lathe, then drill the holes on all nine cylinder blocks for the cylinder skirts to fit into. Make a small model for the cylinder heads out of wood and shellac it. Then turn the cylinder barrel on the lathe; fasten the cylinder head model to the latter firmly, then cast this as you did with the crankcase. You can use the same mould for this purpose.

### The Engine Nacelles

These are shells which cowl the rear end of the engine. They are made in two halves by hammering them into the block of hard balsa wood. Drill holes in these to accommodate the struts which hold up the engines. Line these up with the engines and then dismantle the wing struts and so on. Wash all the parts off thoroughly with gasoline and place them aside.

Now run the control cables out to the tail end of the hull. Cover the tail surface with silk (fine China silk being the best for this type of covering). To do this, tack the silk on a large flat board around the edges of the wing and tail surfaces, but before doing this, wrap silk thread around the leading and trailing edges and tips of the surfaces to be covered. Paint these over with clear nitrate aerodope so it will hold firmly.

After tacking the silk down, pass a brush with aerodope over the edges, letting it penetrate to the thread. When the dope has dried, cut closely around the edges of the wing and tail and dope the loose edge onto the thread. Turn each surface over and repeat the operation. Now dope all the edges again and when they have thoroughly dried, sand them down lightly with fine sandpaper. The best way to dope these surfaces is with a spray-gun. But if you haven't one, apply with a wad of cotton on a small round dowel of wood. Give it five or six coats and sand every second coat with fine emory paper, lightly.

When this is done assemble the tail onto the fuselage and connect the control cables.

*(Continued on page 40)*

## How You Can Build a Flying Scale Boeing-247

*(Continued from page 27)*

notched as the stringers run over it instead of through the customary notches. Sand the longerons down to a quarter round section, then add the pilots' cabin and nose block.

### Wings

As usual, the first job here is to cut out the ribs. These are made from 1/16" sheet balsa. It is advisable to sand a *slight* lower camber into the left wing ribs to assist in overcoming propeller torque. Cement the ribs in position on the upper wing spars, allowing for dihedral in the root ribs. Next install the nacelle base (see Fig. 3 & 4) and the leading and trailing edges, as well as the sheet balsa wing tips. Cement the wings in position on the fuselage as indicated in drawings 1 and 2 and join the two halves of the wing and the fuselage by means of the 1/4" x 1/8" lower root spar. Place the remaining miscellaneous braces as shown in the plans.

### Nacelles

First cut out bulkheads B, C, D, E and the dummy motor, G, all of which are made from 1/16" sheet balsa. These are shown in Fig. 4. Mount bulkheads B and C on the nacelle base and proceed to finish the dummy motor by wrapping thread around each cylinder to represent cooling fins; then cement in place the small bamboo push rods which, besides adding to the appearance of the model, keep the cylinders from breaking off with the grain of the wood. Assemble dummy motor and nose block as shown in the plan. The steel thrust bearing is next cemented to the nacelle base in the position indicated in the drawings. It may be necessary to flatten out a standard type thrust bearing and bend it to the desired shape. Cement a 1/4" washer to the nacelle nose block and install the crankshaft. With this done you are ready to assemble the remaining bulkheads and place the stringers around them. Remember that there is an uncovered gap in each nacelle through which the connecting rod runs.

### Landing Gear

After careful consideration it was decided that a permanently retracted landing gear would be practical and very appropriate for the Boeing twin motor transport model since this is one of the most distinguished features of the real plane.

If you are still steadfast in your belief that the model needs the conventional landing gear, you may gather sufficient information from photographs of the real ship to enable you to construct this type.

### Tail Surfaces

These are built up of 3/32" square balsa spars with thin bamboo ribs and outlines. This type of construction was decided upon because it was found to be light and exceedingly warp proof. Cover the tail structures before assembling them on the fuselage. Don't cement them in place too securely at first as they may have to be cut loose and their setting changed during test flights.

### Transmission Installation

The success of your model depends largely upon the care with which this part of the work is done. Follow instructions and plans carefully. Construct the center bearing, P, of 1/4 x 1/8 hard balsa, punching or drilling a hole through its center and cementing 1/4" copper washer to each side to be used as bearings for the motor shaft. If you so desire, you may insert and cement a 1/16" brass eyelet or bushing in the washer hole as this makes a much smoother running unit.

To make the connecting rod, use the material specified and cut it so that it is at least 1/4" longer than the distance between the two propeller shafts. Then with the cranks on both prop shafts at absolute lower dead center, slip a 1/16" brass eyelet or bushing on each crank pin. Put a small drop of cement on the top of each of the two bushings. Another bushing should be cemented to the under-side of the connecting rod at the exact center and a small drop of cement should also be placed near each end of the rod. Now slide the rod through the fuselage and into each nacelle and set it down so that it will be cemented to each of two bushings on the propeller shafts. It is important that both shafts are at absolute lower dead center during this operation! Assemble the motor crankshaft in the center bearing as shown in Fig. 5. The position of the center bearing, P, as shown in Fig. 1 is only approximately correct, the exact location being determined as follows:

With the motor shaft assembled in the center bearing, the crank pin is slipped forward into the center bushing on the connecting rod. Meanwhile, the connecting rod should be level, both prop shafts being at lower dead center. With the center motor shaft in an absolute lower dead center position, cement the bearing block, P, to the fuselage members, using filler blocks where necessary.

Wait until you are sure the cement has set. Then remove the rod with bushings *on* by bending the center forward far enough so that the center bushing can slip off the front of the center crank pin. It is then an easy matter to disconnect the rod from the outer shafts. Remove the rod and give each bushing a generous coating of cement, binding it with silk thread if necessary. When you are satisfied that the bushings are cemented to the connecting rod permanently, snap the rod into posision again and give the system a few turns with the hand to be sure that none of the moving parts bind or otherwise fail to work properly. Realign if necessary.

### Propeller Installation

The propellers are carved from blanks like that shown in Fig. 5. Give the blades plenty of area and slight camber. The simplified free wheeling system which works by air pressure alone without the use of springs or rubber tension is used in connection with the propellers. This is shown in detail in Fig. 4, the side view of the nacelle showing the propeller in free wheeling and the top view of the nacelle, showing the prop engaged. The person flying the model engages the props before launching. *(Continued on page 40)*

## "Shots" from the I.A.A.P.E.

*(Continued from page 32)*

type "crates" to "shoot". The I.A.A.P.E. was well represented here as four of the N. Y. boys were there covering it. They were Harold Martin or as he is called "Doctor Martin." Also there were Jim Hawkins and Justin Durrenberger, winners of the I.A.A.P.E. Contest, 1st and 2nd respectively, and lastly (but not least, I HOPE) was Ye Scribe himself, the "Baron" Fritz. One of the most prized ships to photograph was the Seversky Amphibian, which broke the world's Amphibian record at a speed of about 180 m.p.h. with amphibian gear attached.

Wally "Tex" Jackson of Elizabeth drops me a line, just to let me know "He is still alive" and so I pass the word on. Here goes, "Jackson is still alive" (Amen).

There are a great many new ships in Production and testing at present. The Curtiss XP-32 is being tested now, by the Army. The XP-32 is the Navy Curtiss XF1, F11C-2 Model Goshawk in the Army. The Douglas Company is working on a new Transport Amphibian known as the Y1C-29.

The Grumman People have delivered a new Fighter to the Navy known as the XF2F-1 Grumman Fighter. Details of this plane cannot be furnished as this is one of the latest ships in the Navy and is undergoing tests at present. It has been rumored that the Berliner Joyce two seater fighter for the Navy, known as the B/J XF2J-1 has been scrapped in favor of the Douglas XFD-1, also a two seater job, built along somewhat similar design as the B/J.

Admiral Byrd's expedition has left for its jaunt to the South Pole. Amongst his equipment is a Curtiss Condor of the new type on pontoons. The pontoons, built by the Edo Co., are probably the largest set of pontoons ever built for an airplane. Again members are requested to send in news and information of interest. Till next month.

Ye "Baron Fritz."

## THE BOOKPLATE

### I Am Still Alive

*(Continued from page 32)*

Circus," and "The Flying Fool"? Dick Grace, the author of this book, is the man who handled the stick in those planes. To say "handled" is quite proper, for Mr. Grace plans and executes each crash with the fine precision of the engineer.

It is not the luck of the dare-devil, but the careful, exact timing of a fearless "crack-up engineer," as he calls himself, which has allowed him to make over thirty successful crashes before the cameras. We assume that all must have been successes, or his book would never have been written. It only takes one failure in any crash to silence the best of authors, and Dick Grace is very much alive.

If you're looking for thrills, exciting reading, and something to talk about, don't miss this chance. The illustrative photographs are worth the price alone, as each of them packs a thrill.

## How You Can Build A Flying Scale Boeing 247

*(Continued from page 38)*

### Finishing Touches

With the entire model assembled and the transmission operating correctly, you are ready to cover. Contrary to popular opinion the color of the real Boeing is not aluminum but gray, which is the natural color of anodically treated duralumin with no pigment finish. White or a light green are probably the closest colors you can get in the form of colored tissue. Colored dope is too heavy for the purpose. A single strip of celluloid on each side of the cabin is covered with tissue except for the open spaces left for windows. Leave small sections under the front and rear rubber hook uncovered to permit winding and replacement of rubber. Balsa, aluminum, celluloid, or paper cowlings may be used around the dummy motors. If you are using aluminum anti-drag rings, it is advisable to cement a narrow strip of ordinary paper around the motor and then cement the metal cowling to the paper. If you feel that you cannot afford a ready made cowling, you may use a two-ply paper drag ring similar to those furnished with many of the present "two bit" kits. Better yet, bend a strip of celluloid around the motor and paint it to match the fuselage. Propellers are finished in aluminum and the motors are, of course, black. Numbers may be cut from black tissue and doped down to the wing. You may refer to photographs of the large plane for further decorating. This makes a beautiful model to hang in your room and the free wheeling propellers will spin in a light breeze.

### Flight Tests

If you have followed the plans, your model should not be difficult to balance. The model when hand launched should make a long, flat glide. If it turns sharply and dives, examine the wings to see that they have sufficient dihedral. The trouble might also be in the rudder setting. If the model seems nose heavy, give the stabilizer a greater angle of negative incidence, or give it a smaller angle if the model seems tail heavy and tends to stall. When you have it gliding satisfactorily you are ready to test it with power. Have a friend hold the model and connecting rod stationary while you wind the motor from the rear by means of a winder and S hook attachment. Give it about 30 turns with a 4 to 1 winder and launch the model level.

## The Navy Admiral In Detail

*(Continued from page 36)*

Now paint the fuselage and tail at one time. Then paint the wing while it is still unassembled. Connect the ailerons to the wing and fasten the control cables to them. Now paint the struts and the outboard floats. Connect the wing, struts and floats to the hull when dry. Now place the insignia on the wings and on the other parts of the ship.

### The Propellers

Any metal can be used for the propellers, (brass, steel, etc.). To make the hub, turn a piece of metal stock to the size of the largest outside diam. Next drill a hole through the end, the entire length of the hub. Then turn out flanges, one on each end to accommodate the clamps. Polish the hub with fine emery cloth and cut it down to proper length.

The blades are next. Make a template the shape of half of the blade and turn the stock down to the shape of the template every so often, applying the template to get the correct curve of the blade. When you finish them all, cut them off to the proper length and grind or file each one to the shape of an airfoil. Polish them off smoothly and chrome-plate them. Now drill a hole through the hub to accommodate the shaft and solder the shaft to it. Now plate the hub, insert the finished blades and the prop is complete.

### The Color Scheme

Entire ship is of natural aluminum finish with red, white and blue color bars on the rudders. Stars are on the wing, one on each end. U.S.N. is painted on the hull underneath the tail.

## The Development of the Fokker Fighters

*(Continued from page 14)*

In the design of the M-16, Fokker made the same mistake that the designers of the Sopwith Dolphin made when they placed the pilot's head on a level with the top plane. This was dangerous for in event of a crash in which the plane turned over on its back, the pilot might receive a broken neck or serious head injury.

No doubt the M-16 had a high landing speed. With the weight of the Mercedes motor, the large radiators and the structural weight, the wing loading was necessarily high. At the same time a probable low power loading gave the ship a high speed of about 93 miles per hour. In its day, this speed was something to be considered as exceptional for a water-cooled fighter.

Still unable to obtain better motors, Fokker was forced to the only expedient of refining the M-16 to obtain better performance.

The next Fokker product was almost identical to the M-16. Although outwardly different, it is essentially the same design and wartime records serving as a basis for these articles, do not give it a new classification. Because of the similarity, we will call the new ship the M-16B.

As can be gathered by comparing photos of the M-16 and its brother, the M-16B refinement was carried out in three directions: first, reduction of head resistance; second, a lighter construction; third, general refinement of design. All three of these improvements bear heavily on the success of each other.

In reducing head resistance, Fokker did away with those monstrous M-16 radiators and substituted smaller cooling systems of about one-fourth the size of the old types. The cowling around the motor was constructed of fabric-covered framework in this case instead of sheet metal. Better wood streamlining was added to the wing and landing gear struts. By streamlining, the structure was lightened as in the case of the radiators. These factors of refinement led to the possibility of a cleaner all-around design.

For the first time, balanced ailerons were used. The area was increased by several square feet over ailerons of the M-16. At the same time their efficiency was improved by virtue of a high aspect ratio.

Because of the greater speed brought out through the above mentioned improvements, a smaller rudder was made possible. At the same time this reduction in size reduced drag somewhat. With a change in shape, the rudder was lightened and strengthened at the same time. The combination elevator and stabilizer was essentially the same as used on previous Fokker types.

The fuselage of the M-16B in profile was curved on top and bottom instead of being flat. This was necessitated by the deeper fuselage of the M-16B. A small tail skid sprung on rubber finished the fuselage.

By raising the upper wing above the level of the pilot's eyes, the gap was increased and wing efficiency improved. Visibility was increased by leaving uncovered the center section of the wings, in addition to large cut out spaces near the fuselage.

With the above mentioned refinements in design, the performance of the M-16B was probably much better than the M-16. The high speed could be set at 100 miles per hour. No doubt the general maneuverability was improved by the use of balanced surfaces. However, there must have been very few "bugs" in the design or it would not have lasted as long as it did.

Still unable to get any of the new Mercedes Six motors, Anthony Fokker decided to try a small light scout, to be built around the supply of 80 h.p. rotary motors left over from his early monoplanes. For a design, he took the efficient M-16B and reduced it to approximately one-half the latter's size and fitted an 80 h.p. revolving motor.

The new ship, known as the M-17, can justly be called a pocket edition of the M-16B. Its size can be judged from the fact that only seven ribs were provided for each wing panel. We could safely estimate the ribs to be one foot apart and allowing thirty inches for the fuselage width, we have a wing span of something like 16 feet, 6 inches! If the aspect ratio of 5 were used (which is not at all improbable) the three foot chord would give a wing area of 84 square feet! By comparing dimensions of wing and fuselage of the earlier monoplanes, the biplane cellule of the M-17 would allow a much longer fuselage in proportion to span, about 14 foot overall length in this case. By comparing the tires which were probably 24 inches in diameter with the rest of the M-17, we have a gap of slightly over three feet, and an overall height of about 6 feet. This was indeed a backyard fighter if there ever was such!

In general disposition, the M-17 was a one bay biplane without stagger or dihedral. Steel tubing was used exclusively in the fuselage framework which was fabric-covered up to the firewall. Aluminum covered the motor end in much the same manner as that employed in the early monoplanes.

The M-17 must have been designed for

*(Continued on page 42)*

## The Development Of The Fokker Fighters

*(Continued from page 41)*

a run of small pilots, for our imagination can't connect a characteristic obese German and the M-17! However, access was allowed through a small door which swung backward. Vision downward was aided by removing part of the top of this door and also a section of the lower wing.

One Spandau machine-gun was fitted slightly to the left of the pilot. Since the gun butt extended so far into the cockpit, the end was probably protected and padded against the possibility of the pilot injuring himself in case of a rough landing.

In the M-17, the disadvantage of the pilot having his head above the level of the top plane was nicely taken care of. Perhaps a broken neck or two inspired the steel tubing superstructure in front and above the cockpit. In the event that the plane should nose over, this structure would hold the weight of the plane off the pilot's head.

For a tail assembly, the M-17 Fokker had simply a reduced M-16B type, testimony of the efficiency of design. The M-17 was another of the "Einstlg" machines. An M-17 "Zweistlg" also followed. The performance of the M-17 Einstlg is unknown. It was powered with a 7 cylinder Le Rhone rotary motor.

A photograph of the 1916 Albatros D.I is shown here in order to show the lead the Albatros Werke was getting on the Fokker concern. With the large, reliable Mercedes six motor, the Albatros Werke was able to produce an aeroplane of good dimensions. On the other hand, in the M-17 Fokker you can see what this great designer was driven to do without this motor.

Part seven of this series will show how the M-17 developed into the Fokker D.I, the planes that started Fokker on the road to success once more.

## How the Aeroplane Was Created

*(Continued from page 19)*

with Sir George Cayley. Experimenters such as J. Degen in 1816 and Ottoris Sarto in 1823, constructed models following the principle of the helicopter set forth by Cayley, with fair success and W. H. Phillip in 1842 built a steam-driven model helicopter which according to his own account, made a few flights, but of short duration.

W. S. Henson in 1843 followed in Cayley's footsteps and designed his "Aerostat", a machine resembling remarkably today's type of flying machine, as will be seen from the accompanying plan. It had a boat-like car with a single oblong wing surface cambered after Cayley's and the tail or rear surface copied the dove. This, for horizontal control, while a rudder placed underneath steered the machine. Powered with a steam engine, Henson's "Aerostat" was the most pretentious attempt on a large scale tried up to this time, and the first to combine an extensive flat supporting surface in combination with propelling screws.

Stringfellow, who had earlier been associated with Henson, now designed and built a much improved model along the same lines. This model, highly successful, was destined to make history being the first powered model to make an extensive recorded flight. It was a monoplane propelled by a highly efficient steam engine and weighed only eight pounds. Stringfellow's feat is considered a milestone for he certainly set a mark for others to shoot at.

It is interesting to note that in 1859 a patent was granted to H. Bright on a machine sustained by vertical screws and in 1863 models were shown by d'Amecourt, Landelle and Nodar, the latter two operated by clock-work springs and shifting weights but all unsatisfactory because of their fragility and their flights were all of short duration.

In 1866, F. H. Wenham, thinking to improve upon Henson, designed several machines, two of which plans are given for here. They were long narrow plane surfaces and lay in tiers like shelves. Wenham's theory was that when these were driven forward, the vanes would rest upon a stratum of undisturbed air and thereby give greater support than a single wing, the combined area being equal to a single large surface. Thus was born the multiplane, a serious attempt to get away from the single bird wing. (see plate 6.)

Two years later Stringfellow made a second model, combining Wenham's aeroplanes with screws. The result was a triplane with an undoubtedly prophetic trend of design—it contained an aggregate surface area of approximately 36 square feet and the engine developed about one-third horsepower, weighing complete, less than 12 pounds. A wire cable supported the machine and after gaining speed in its forward travel, was supposed to lift itself. Stringfellow claimed that it did, but there is no definite proof, despite the fact that it seemed to have more than sufficient power. At any rate, because of compactness of design and especially the efficiency of its engine, it took the 100 pound prize at Crystal Palace in London. Although the monoplane was Stringfellow's bid to fame, his triplane is given here to show how advanced this design was at that time.

Ponton d'Amecourt again comes to the fore in 1868 showing a steam helicopter in London; this revived interest in this type although it was not a success, being able to lift only one third its own weight. Thomas Moy showed about the same time an aerial "steamer" with much promise. This "steamer" had two large wings and two very large screws. However it was doomed to disappointment and finally abandoned.

Pénaud after carefully studying the foregoing, decided that it was best to abandon the idea of rigid screws and substituted flexible ones instead. At about this same time, D. S. Brown wrote in support of flexible biplane wings and further, by his experiments, proved that two elastic aeroplanes, when placed on the same axis and separated by a wide interval, produced a greatly increased stability.

However, Pénaud constructed first, a helicopter copying closely Cayley's design. This was successful as far as this type of device went, reaching an altitude at times as great as fifty feet. Next, he turned his attention to the aeroplane type as illustrated in figure 3 and made several models which flew rather haphazardly, it being exceedingly difficult to control them.

Pénaud overcame this difficulty, however, by the addition of a smaller wing aft of the main one: this, in effect, was a further practical demonstration of the principle advocated by Brown. Stability was greatly improved in this model which on being released from the hand, descended a short distance to gain momentum, and then flew as far as fifty feet or more, at an average height of seven to nine feet.

Pénaud, still far from being satisfied, associated himself with the helicopter, thinking that perhaps success lay here. He and A. H. de Villeneuve, building contemporaneously, each constructed models on different lines, Pénaud selecting the bird with flexing wings, while the latter's was a copy of bat wings. De Villeneuve's machine possessed great lifting power, being able to lift itself from the ground with ease and fly horizontally for a distance of 24 feet, at a speed of 20 miles an hour. Pénaud's model had very flexible wings, the margins of which were permitted to give a rolling motion as it moved up and down.

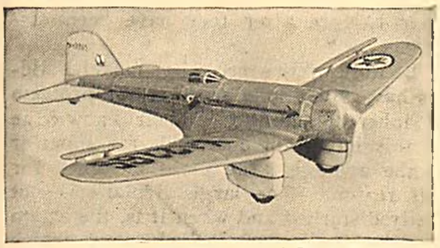
The energy for driving these models was derived from India rubber in a state of tertion, one end of which was connected to a crank arm, which imparted the up and down movement to the wings by means of arms. This "Flapping Wing" machine of Pénaud's, made quite a few flights and by the introduction of a rear surface like the tail of a bird it possessed a fair degree of stability. It will be noted that he used twisted rubber strands for motive power whereas practically all of his predecessors used steam or clock-work systems.

Unquestionably, Pénaud added much to the store of knowledge on hand at that time and contributed new ideas that were to play a large part in the development of the heavier-than-air-craft.

Soon after, Charles A. Parson, a marine turbine engineer, built a remarkably compact and efficient steam engine and an aeroplane closely following the general lines of design in use. This machine made some flights of one hundred yards or more but did not signally contribute anything startling in the form of original design.

In retrospect, we find that up to this point, about the year 1889, man has formulated a very promising system of support in a wing surface and ascertained the fact that a curved or cambered rather than a flat surface, improved its efficiency: developed a practical method of lateral and horizontal control by the use of pivoted surfaces, and subsequent use of dihedral in the wings and also placement of additional supporting surfaces fore or aft to further accomplish this. Add to this, a fair basis for a satisfactory source of driving energy in the form of the steam engine. It appeared then, that what was needed was a better ratio of power to supporting surface. This, we shall see is what is being slowly but surely accomplished.









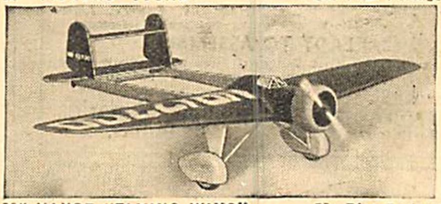






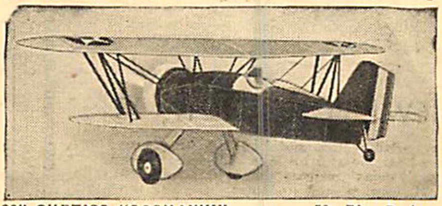






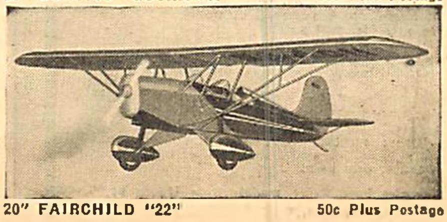












## The Aerodynamic Design of the Model Plane

*(Continued from page 23)*

the (C. of G.) than in smaller airplanes, a model for instance.

Model builders with experience know that they cannot depend upon the inertia of their planes to keep them from being disturbed. It is necessary to design and build their models so they will recover their balance after they have been disturbed.

Because of this necessity, model builders have given long study to the problem of inherent stability. Their knowledge of this important quality is far superior to the average large plane designer for this reason. The large airplane is not easily disturbed and when it is, the action of the ship is comparatively slow, which gives the pilot plenty of time to operate the controls in the proper manner to bring the plane back to normal flight. Thus the average large plane designer depends upon the *pilot* to stabilize his ship. The model builder obviously must build his model so it will recover its balance by itself.

Many readers have had the experience of trying to fly a model built to the exact scale and design of a full size plane, with the result that it is very unstable. Its big brother is just as unstable but the pilot corrects its eccentricities with the controls. The scale model lacks two things by means of which the large plane retains its equilibrium; first, inertia because its size and weights are small and second, a pilot to operate controls so as to keep it in correct flight position

It is obvious therefore that if large planes were designed in such a manner that they embodied the stability characteristics of a model, as well as having the advantage of great weight and consequent resistance to disturbance, they would be more foolproof. Planes will have to be designed this way before the public can take to flying universally with safety. Such planes will be built when designers look upon the flying model as a valuable means of experiment rather than child's play. One might say that their dignity and shortsightedness is defeating their purpose.

In any case, model or large plane, the condition of widely distributed weights is a distinct advantage from a standpoint of *resistance to displacement.* This in conjunction with the operation of the controls by the pilot is about the whole story to a large plane designer. However, this is only half the story to the model builder. Let us consider the other vital factor relative to the distribution of weights that he must (and the large plane designer should) take into account.

Whereas large, heavy planes with weights distributed so that they are a considerable distance from the center of gravity, have resistance to a displacement, they are extremely *difficult* to bring back into normal flight attitude *when once they have been displaced.* For instance, a heavy model with the rubber band motor distributed throughout the whole length of the fuselage is steady in flight, but once it is thrown out of flight position, its resistance to disturbance causes a great resistance to recovery, because of its inertia. If this same model was propelled by a gasoline engine, thus insuring a condition of more concentrated weights, (without the weight of rubber at the tail), it would recover its balance more readily. In other words, for *quick recovery* from any disturbance, the weights of the model should be as close to the center of gravity as possible.

If the weights of your plane are not concentrated, it will be necessary to make the vertical fin larger. This will increase the recovery force exerted by it. This force will then be sufficient to overcome the greater momentum of the tail swing due to the remote distribution of weights. If the fin area is not large enough, the directional stability of the ship will be poor. Usually it will have a tendency to spin or "crab" from one side to the other.

Summarizing our discussion, we would say that directional stability is obtained by the proper application of the following features.

First, the vertical tail surface should be large in order to insure quick recovery from a displacement and reduce the magnitude of the swing of the tail.

Second, the wing span should not be excessive, rather, as small as possible in order that impulses of air gusts on the wings will not have too much leverage to twist the machine about the vertical axis.

Third, the tail moment arm should be as long as possible (about ½ to 3/5 wing span). This is for extreme directional stability.

Fourth, the center of weight of the units composing the airplane should be as close to the center of gravity as possible in order to insure quick and positive recovery from a directional displacement about the vertical axis of the airplane.

### Spiral Stability

Because of the desire on the part of the model builder to endow his plane with plenty of directional stability, he often produces one which is spirally unstable. He puts a large vertical fin on his model to make it directionally stable and neglects to give sufficient dihedral to the wings to overcome the spiral instability which the large fin has a tendency to produce.

As we stated in the first part of the chapter on stability, the proper proportion between fin area and dihedral should exist if the airplane is to be spirally stable. However, before we proceed to discuss the theory underlying spiral stability, let us thoroughly understand what it is. Fig. No. 54 shows a plane which is spirally unstable executing the maneuver which invariably results under these conditions, a spiral dive. This results from too little dihedral for the amount of fin area used. Spiral instability may be defined as that quality in an airplane which gives it a tendency to turn, dive and roll over sideways about its longitudinal axis simultaneously.

Let us analyze this maneuver and determine the causes. Suppose we have an airplane which is flying level, as shown in the first position in fig. No. 54. An air gust or some other force turns it over sideways so that one wing droops. When this occurs, the wing loses its lift and the plane begins to slide down sideways as in the second position. This side slipping causes the air to strike the side of the fin. Thus the tail is held up while the nose continues to drop. At this juncture, if there is sufficient dihedral in the wing, the side slipping will cause the plane to rock back into level flying position and it will continue in flight.

However, when the plane has not enough dihedral to rock it back again, it continues to turn over sideways about its longitudinal axis and the nose drops more until it is diving nearly straight down as shown by plane in position three in fig. No. 54. The turning, diving and rotating about the longitudinal axis continues without correction until the plane strikes the earth. Usually with shocking results.

It can be plainly seen that by giving the wing sufficient dihedral, the rotating will cease and the ship will then be flying level laterally, with the nose down. As the plane is nosed down, the speed increases and the ship zooms up again into level flight.

It is obvious too that if the fin area is comparatively small, the tail will not be held up to as great an extent while the nose drops. Thus the whole ship will slide sideways without a dive developing as quickly as in the case of large fin area.

What is the fundamental cause of the ship rolling over sideways about its longitudinal axis, in the first place? Let us see. Suppose a plane is thrown into a position shown by the second figure in diagram No. 54. It starts to slip sideways. The air, therefore, strikes the side of the ship, causing a pressure against the side. In fig. No. 85 a plane is shown in a slipping position. It is sliding sideways in the direction shown by arrow C. G. The sideways pull of the center of gravity is acting at the point and in the direction indicated by the arrow. The center of pressure of the air striking the wing is shown by W. (The low wing, heavy lines). The center of pressure acting on the body, landing gear, etc. is shown by arrow B. The resultant pressure of these two pressures acts as shown by arrow R, at the center of side area of the airplane. If the distribution of the side area of the body and landing gear is such that a large part of it is below the center of gravity, we will have the resultant side pressure acting below the center of gravity as shown in this case, in Fig. No. 85. Faring between the landing gear struts and a low bellied body together with a straight wing or one with very little dihedral, usually causes this condition.

Now what will happen when the plane slips sideways? The center of gravity is pulling the plane to the right and the air pressure is acting *below* it to the left, this forming a couple which tends to roll the airplane over to the right still farther. An airplane with this condition in a turn is sure to roll over sideways into a beautiful spiral dive.

Now let us see what happens when we raise the wing into the position shown by the dotted lines. This raises the effective side area of the wing and therefore the side pressure of the air as shown by arrow W. The *resultant* side pressure is therefore raised and acts at a point as indicated by arrow R. Now this pressure is above the C.G. arrow, so we have a couple which tends to turn the plane over to the left and therefore into a position of normal level flight. This is what we want. It is accomplished by raising the side pressure caused by the dihedralled wing.

The same effect may be obtained by *increasing* the value of the side pressure caused by the wing, through the use of greater dihedral on the wing. This gives greater wing side area and therefore a greater wing side pressure. This causes the resultant side pressure shown by R, to act at a higher point on the body, as arrow R.

Thus we see that not only an increased dihedral angle corrects spiral diving, but raising the wing and therefore its projected side area is a way to cure the trouble also. If the wing is straight very little benefit is derived. There should be at least a slight amount of dihedral to provide the wing with an effective side area.

In summarizing we would say that the cure for spiral diving or nosing into the ground when banking on a turn is greater dihedral, a higher wing, a smaller fin or a proper combination of these changes. This will right the plane preventing the nose from dropping, and the ship from rolling over sideways to a dangerous degree.

If the foregoing discussion does not make the matter clear, take a small model plane and hold it in the several positions shown in diagram No. 54. While it is in each position, visualize the action gravity and the air will have upon it. This should give you a better understanding of the whole problem.

Next month we will try to explain away the mysteries of longitudinal stability. Until then, happy landings.

## Making the Air Safe

*(Continued from page 6)*

through the exit, where a lock is automatically tripped. The chair falls clear, pulling the chute out from a container carried under the fuselage of the plane. The whole process takes only two seconds. Passengers who made the demonstration jumps declared that they were out of the plane and descending safely before they even realized what was happening.

Since the earliest days of aviation, fire has presented a serious hazard. Aircraft fires usually follow the smashing of the gasoline tank in a crack-up when the liquid sprays over the hot engine, or is ignited by an electrical spark. In some tanks, compressed air is built up to force the gasoline into the carburetor. When this type of tank is broken, a veritable shower of gasoline is thrown out.

Now a crash-resistant tank constructed of fabric and rubber has been produced. During recent tests, the tank was filled

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## Making the Air Safe

*(Continued from page 45)*

with water and dropped on concrete from a considerable height. Instead of bursting, as metallic tanks did during the same test, it simply doubled up and bounced like a rubber ball.

Another method of combating the fire menace has recently appeared in France. It is a gasoline which is not inflammable under ordinary conditions. Now the pilot who absent-mindedly looks into his tank with a lighted match need have no fear of waking up in another world.

Although the pilot's cockpit of an airplane is no place for an absent-minded man to be, human nature is much the same the world over and an occasional bit of forgetfulness causes trouble in aviation as elsewhere. Pilots flying planes with retractable landing gears have sometimes attempted to land with the wheels still drawn up inside the fuselage—a disastrous mistake with a heavily loaded transport ship.

To guard against this danger, the giant new 18-passenger Curtiss Condors are being equipped with a special warning device. If the pilot cuts his motors while the wheels are retracted, a klaxon horn blows in his ear and two red lights flash on the instrument panel, reminding him to let down his wheels before making contact with the ground. This apparatus has proved to be an effective way of jogging faulty memories.

Had it been in use a few years ago it would have saved a famous aviator from considerable embarrassment. He took off from the water in a fast amphibian for a cross-country flight to an airport far inland. Upon arrival at the field, he circled about over the crowd of spectators waiting to welcome him and then proceeded to set the ship down on its pontoon, crashing it beautifully.

## "Air-Ways"—Here and There

*(Continued from page 12)*

background of some sort at every airdrome. (4) The flags are not blowing while the wind-sock is. (5) I could have put in more lead figures. Some field, with no employees!

If you look carefully you will notice a smudge directly back of the center section of the Keystone "Commuter." This is caused by the lights being too low. A word about the models in the picture. The one coming in for a landing is a Bellanca Standard Pacemaker, as is the one going out. In front of the Raleka Hangar, which is incidentally, the name of my airline, is a Fairchild "71." Next is a Keystone, then an airport gasoline truck. The last is a Lockheed "Speed Sirius." All these models are built to 3/16" scale which gives them an average wing span of 6". They are all hollow, containing scale furniture correctly placed, full controls, dashboards made under a magnifying glass, etc. These models may be seen by anyone who wishes to if they communicate with me in advance."

In picture No. 11 is shown a Curtiss Hawk P6E, built by Jack Seidenwand of 2361 E. 82nd St., Cleveland, Ohio. This is a flying scale job and shows unusually fine workmanship. It is of the usual Balsa construction, covered with tissue and doped.

John Andrews of 145-36 19th Ave., Whitestone, Long Island, has been treating himself to a real thrill. He has just built a 5' Stinson "R" from Mr. Bristol's plans which appeared recently in our magazine. Andrews is shown adjusting the model in picture No. 12. He regrets extremely that he cannot send us a flying picture of it right now as it was damaged while on exhibition at a recent scale model contest. However, we do not doubt his word that it will perform beautifully. He says, "This ship embodies details such as exhaust pipe, Venturi tube, air speed indicator, dummy lights, step, door, instrument board, control wheels, 3 overstuffed chairs, safety belts and a door in the rear of the cabin through which the motor stick passes. This plane weighs approximately ⅞ lb., with the chairs and extras removed. I took about one month and one-half of my vacation to complete it."

William C. Eymann of 609 Riley St., Atchison, Kansas, recently built a tailless plane from plans in a recent issue of this magazine, which is shown in picture No. 13. He tells us that "It has a duration of 60 to 100 seconds and is as stable as a rock." He does not say that it flies like one, but instead, it climbs very quickly after a beautiful take-off. This plane would undoubtedly afford several hours of pleasure to those boys who like to make "different" ships.

We have another unusually fine model by Frank Distler of 130 Tremont Ave., Fort Thomas, Ky., shown in picture No. 14. It is a 24" Lockheed Air-Express, completely built up even to the fuselage. The unusual part of this ship is that the fuselage is made from newspaper. Distler says, "It is just as strong as a solid wood one. It is built in layers. There are no bulkheads in the fuselage to give it shape, but there are some to divide the cabin from the rest of the ship. Details are complete, even to cabin chairs and a tiny seat in the cockpit for the pilot, also an instrument board and controls." We would like to say that this is a swell job. Distler has shown great ingenuity in adapting a new method of construction, namely layers of newspaper. Possibly the leaders would be interested in hearing about the technique he used in building this fuselage.

Oscar Adamoff of 74 Market St., Passaic, N. J., has recently completed the framework of a Savoia Marchetti, which is shown in picture No. 15. We selected this picture because of the fine workmanship. Adamoff tells us that he will let us know how it flies when he has finished it.

Picture No. 16 is not a picture of an airplane resting on a patch-work quilt nor is it an airplane flying over a big city, as it apparently shows. It is another case of trick photography originated by William R. Bennett of P. O. Box 2017, Fort Worth, Texas. The effect was accomplished by super-imposing a picture of a 1' scale model Travelaire "Mystery Ship" on another picture taken from a plane over Fort Worth, Tex.

These young men who are now getting an education in trick photography should be in great demand in the moving picture industry.

## CLUB NEWS

### Junior Aviation League—Boston

Probably many of you are familiar with the activities of the Junior Aviation League of Boston. This league held its first meeting in April, 1929. At the present date, it has a membership of over 3,000. Meetings are held every Saturday in the assembly hall of the Jordan-Marsh Company, who have stimulated interest by having pilots and officials from the Boston Airport address the boys occasionally. Among the prominent speakers in the past were included Mr. Guiseppe Bellanca, Mr. Russell Boardman, Mr. John Polando, Capt. Julian Dexter, Lt. Com. Carl E. Shumway, Capt. Frank Hawks and Jimmie Doolittle.

A weekly two page news sheet "Wing Overs" helps to keep each member acquainted with the activities that are being carried on. Further interest is stimulated and a great deal of model information acquired through the contests which are conducted once a month. This organization sponsors the New England Championship meet held annually. Invitations to participate in this contest which includes both indoor and outdoor flying are sent to all active groups in New England. A scale model contest has been conducted yearly since the club started. Usually one model is selected for all the boys to build. In every case the builders have had an opportunity to inspect the full size ship before the contest. The league is under the directorship of Captain Willis C. Brown, who has been a model builder since 1914. His experience has been supplemented by aeronautical work at the Massachusetts Institute of Technology.

This club is one of the leading model organizations in the country. Recently, as you will remember, two of its members, John Bartol and Wilbur Tyler, distinguished themselves in the Indoor Endurance Contest of the 1933 Nationals by placing first and second.

Gordon L. Everett of 408 Adams St., Freeland, Pa., writes us that he has formed a very progressive model club with the aid of a friend. They have been able to provide workrooms and space to fly their models through the courtesy of the local Y. M. C. A. superintendent. They have been very active this summer at several contests. We wish this budding young club all the success in the world.

B. Henry Pring of 498 South River St., Wilkes-Barre, Pa., is an experienced and enthusiastic model engineer. He has endeavored to promote the art of model building and flying by forming a model club in his town. After a great deal of time and work promoting his idea through the Y. M. C. A., high schools and Boy Scout troops, 61 applications were received, 41 of which materialized into memberships. At the end of the sixth week of existence of this club, the members asked for and received permission to hold a contest at the local park. Seventeen of the members competed and the owner of the fastest plane was given a set of parts to build a model of the Graf Zeppelin. This contest boosted the membership sharply, members enrolling who lived as far as 15 miles away. These contests are now held once a month and stimulate great interest.

Some enterprising young men have recently formed the Geneva Model Airplane Club at Geneva, N. Y. Harold DeBolt of 7 N. Main St., Geneva, N. Y., is the president. Three-fourths of their members competed in their first contest.

### Bamberger Aero Club

The rumor is about that the Bamberger Aero Club of Newark, N. J., has been experimenting diligently with a new gas engine model. This model is a Curtiss "Junior," built to scale. It has a wing span of 6′ to 7′ and uses a Brown Jr. engine. It seems that these engines run beautifully but are rather tricky and one must have a little experience with their eccentricities in order to get them turning over properly, for as yet the builders of the plane have been unable to get it running properly. Therefore, we have no news of flights being made by this model and we are waiting expectantly for some information regarding their progress.

### Correspondents

We have recently received a letter from Mr. E. Shaffhauser of 1520 Liberty St., Allentown, Pa. He says, "I have started a group of model clubs and would like to extend them throughout the Lehigh Valley. They are drawn up on plans similar

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**STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933**

Of UNIVERSAL MODEL AIRPLANE NEWS published monthly at Springfield, Mass., for October 1st, 1933. 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, 125 W. 45th St., New York, N. Y. Editor, Charles H. Grant, 125 W. 45th St., New York, N. Y. Managing Editor, George C. Johnson, 125 W. 45th St., New York, N. Y. Business Manager, George C. Johnson, 125 W. 45th St., New York, N. Y.

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

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of 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.

George C. Johnson, publisher. Sworn to and subscribed before me this 14th day of December, 1933. Charlotte Shapiro. (My commission expires March 30, 1935.)

## Classified Directory

Advertise in this directory for quick results. Rate: 10c per word. Cash with order. Minimum space, 16 words. March ads must be in January 4th.





### Air Ways—Here and There

*(Continued from page 47)*

to the P. M. A. A. of Philadelphia. The clubs are to be called the Lehigh Model Engineers. Each club will be called a "flight" and there will be monthly contests. Instructions will be given on model design. Mr. Shaffhauser would like to have any young man or young woman in the Lehigh Valley who is interested in enjoying a progressive model club communicate with him.

Sam Simons of 999½ E. 40th St., Los Angeles, Calif., would like to correspond with boys from other countries about model airplane building, preferably from the Hawaiian Islands and Canada. He guarantees to answer every letter. (Sometimes this is very dangerous, considering the interest in model aeronautics in all parts of the world. One is liable to get writer's cramp in a very short time.)

Bernard C. Campbell of 216-14 Ave. S., St. Cloud, Minn., who is 18 years old and extremely interested in aviation, would like to have anyone in the world write to him concerning aeronautical matters.

### Keeping Pace With Model Science

*(Continued from page 12)*

wingclip, giving the desired angle of incidence to the wing. These clips are glued to the left front and rear wing spars, after the covering and final assembly of the two wing halves has taken place, at a point ⅜" to the right of the wing center.

The propeller is carved from a clear, light, straight grained piece of balsa 8" x 1" x ⅝", taking about four hours for the job. If you usually have poor success in making props, it is a good idea to force yourself to take even longer than four hours by sanding slowly and very carefully, and frequently holding it up to the light to find the thick spots which need thinning down. Naturally, the greatest thickness should be at the hub, *gradually* tapering outward along the blade until at the tips the thickness is about equal to that of a page of Universal Model Airplane News. The thickness at the hub is about 1/32". The camber of the blades is about 1/32" deep. Get the prop blade shape as close to that shown in the drawing as you can; it's important. Weight of the prop without shaft and washers should be no more than .004 ounce. The shaft is made of .010 wire to the shape shown. After being inserted in the prop, about 3/32" is bent over at the top and glued. One well-oiled washer is used. Be very careful that the prop is balanced and runs true.

Now for the covering. Make the microfilm by pouring half a teaspoonful on the water in the bathtub. Do this slowly and carefully. After a couple of minutes have passed, you may lift the sheet gradually off the water, using a hoop made from a wire clothes hanger. Take off a number of sheets made in this manner, and lay them aside to dry. When most of the water has evaporated, you may cover the wing halves, rudder and stabilizer by coating the spars and ribs with water or whatever adhesive you use (banana oil will not do), and pressing the framework onto the sheet of film while still on the hoop. A red hot wire is used to trim the covered portions out of the sheet.

The wing halves are now securely glued together and when the joint has dried solid, the wing clips are attached as previously specified. The tail assembly is completed and butt-jointed to the fuselage. Be careful that everything lines up true. Nothing should be lopsided, else it may have an adverse effect on the flying qualities.

Little remains to be said, as the ship is extremely easy to fly. The rubber motor is about a 10" loop of 1/32" x 1/30" brown rubber. Lubricate after every flight. When attaching (wound) to the stick, be careful not to exert undue strain, as the thin walls may collapse, although they take ordinary strains easily. If you do have such an accident, thoroughly moisten the collapsed part after straightening it out, and then let it dry well. It will be able to give you plenty of service as long as you continue to handle with the greatest care. The approximate wing placement has the front clip about 1¾" from the nose of the stick.

If you've read this article thoroughly, no doubt you have noticed how very much the word "care" is used. Well, it's the keynote of good model-building. Follow the plans and instructions closely, do your work patiently and accurately, put into it your heart and soul, never use a piece that isn't 100% satisfactory to yourself. Then the fellows will crowd around and say, "Gee! Where'd ja get the dandy workmanship?" And a little later when you release the model, it'll be, "Gosh! Look at that baby FLY!"

### Aviation Advisory Board

*(Continued from page 34)*

In the log are recorded the flights that it makes, the crashes, the overhauls and who piloted the ship; in fact, every detail concerning the operation and maintenance.

# Who's Afraid of the Big Bad Wolf?

**. . . and who is this big bad wolf of the Model Airplane Industry? . . . Competition, of course! . . . But Madison will still continue to give High Quality, Prompt Service and Value at the Lowest Possible Prices in spite of competition. Let's prove it to you NOW!**

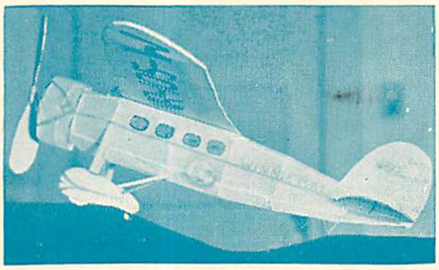
# NOT MADISON!

## 2-in-1 KIT

**Contains the around-the-world WINNIE MAE (Illustrated below) and the TRANSATLANTIC BELLANCA (above)**

Both 15" wing spans, Kit contains full-size plans, bulkheads, large tube of cement and a good supply of all other necessary materals needed to complete these two wonderful models. Send your order now!

**75c** Add 10c for Postage

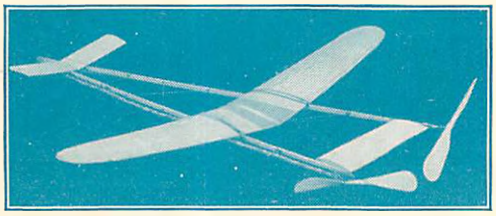


## 3-in-1 KIT

Three separate flying stick models; 3 fuselages, 3 wings, and 3 propellers. For a HIGH-PERFORMANCE R.O.G., a SENIOR R.O.G., and a new 11 MINUTE INDOOR TRACTOR. The retail price for these 3 models is less than some ask for plane alone.

**Plans for 3-in-1 Kit—10**

**75c** Add 10c for Postage



## OUTDOOR TWIN PUSHER

The twin pusher that has actually flown 12 minutes on numerous occasions. It has many exclusive features: 40-inch "A" frame that is a marvel for lightness and strength; 36-inch high cambered, tapered wing, and two 12-inch, high pitch props, powered by 68 feet of ⅛ flat rubber. Kit contains complete plans and instructions, stamped ribs, and all other materials needed for the construction of the model.

**75c** Add 10c for Postage

## OUTDOOR CABIN TRACTOR

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

**75c** Add 10c for Postage

WE DO OUR PART

## FREE

With each purchase of $1.00 or more, complete kit to build a lifelike replica of **Famous Dirigible LOS ANGELES** with MOORING MAST. Kit includes everything! Send your order NOW!

### NOTE

All Balsa shown here in 18" lengths can also be had in 36" lengths, if requested. Half the quantity at the same price.

**Balsa Wood**

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

**18" Lengths**

1/16 x 1/16..30 for 5c
1/16 x 1/8 ..24 for 5c
1/16 x 1/4 ..24 for 7c
1/8 x 1/8 ..24 for 8c
1/8 x 3/16 ..24 for 9c
1/8 x 1/4 ..24 for 12c
3/16 x 3/16..10 for 6c
3/16 x 1/4 ..10 for 7c
1/4 x 1/4 ..10 for 8c
1/4 x 3/8 ..6 for 8c
1/4 x 1/2 ..6 for 9c
3/8 x 3/8 ..6 for 9c
3/8 x 1/2 ..6 for 15c
1/2 x 1/2 ..4 for 10c
1 x 1.......... 2 for 16c

**40" Lengths**

1/8 x 3/8.......... 5c
1/8 x 1/2.......... 6c
3/16 x 3/8.......... 8c
3/16 x 1/2..........10c

**18" Sheet Balsa**

1/32 x 2.......4 for 3c
1/16 x 2.......4 for 6c
1/8 x 2.......4 for 9c
3/16 x 2.......2 for 8c
1/4 x 2.......2 for 9c
1/2 x 2.......2 for 13c

**36" Plank Balsa**

2 x 6...............75c
2 x 3...............40c
1 x 6...............38c
1 x 3...............25c
2 x 5...............75c

**Prop Blocks**

½ x ¾ x 5...8 for 6c
½ x ¾ x 6...8 for 7c
⅝ x 1 x 7 ..8 for 9c
⅝ x 1 x 8...4 for 6c
¾ x 1⅛ x 8....2 for 7c
¾ x 1¼ x 10...4 for 9c
¾ x 1⅛ x 11...2 for 7c
⅞ x 1½ x 11...2 for 8c
⅝ x 1¼ x 12...2 for 7c
⅞ x 1½ x 12 ..2 for 9c
⅞ x 1½ x 14...2 for 16c

**Dowels**

1/8 x 30....1 for 3c
3/16 x 36....1 for 3½c
1/4 x 36....1 for 1½c
1/8 x 12....1 for 1c

**Bamboo**

Genuine straight grained, no-knot TONKIN Bamboo. Strong and light. Splits easily. Doz.
1/16 x 1/4 x 11"....9c
1/32 x 1/4 x 8"....8c
1/16 x 1/16 x 9"....5c

**Japanese Tissue**

A fine tissue for covering flying scale models. Strong, light, and takes dope well.
20 x 24.........3 for 5c

**Veri-Fine Tissue**

One of the lightest tissues known. Excellent for endurance models, because of its extremely light weight.
20 x 15...............4c

**Colored Tissue**

Just the thing for the new bright colored ships that are so popular nowadays. Red, Orange, Brown, Blue, Green.
20 x 24..........2 for 5c

**Wood Veneer Paper**

Very useful in scale and flying-scale models. Strong, yet light enough to fly.
20 x 30...............17c

**Celluloid Wheels**

Experience has proven these wheels best for flying scale models. Pair
¾" wheels ......... 5c
1" wheels ......... 7c
1⅜" wheels ......... 9c
1⅞" wheels .........11c

**Bushings**

for wheels ......4 for 2c

**Thrust Bearings**

Light, strong bearings. Hole is truly centered.
Large size ea. doz.
.035 hole.... 1½c 15c
Small size
.025 hole.... 1½c 15c

**Model Making Pins**

Pkg. .................5c

**Music Wire**

Strong, springy wire sold in this new, convenient manner.
1 ft. lengths—straight .014, .020, .028, .034
6 feet for 2c.

**Dummy Motors**

The very thing for adding that realistic touch to scale and flying scale models. Extremely light. Nine cylinders.
1½" diam. ..........15c
3" diam. ..........28c

**Rubber Thread**

Careful testing has proven this rubber to be the highest in energy content per unit of weight. This means more turns and less breakage.
.045 sq. ...50 ft. for 12c
3/32 flat...50 ft. for 13c
1/8 flat...50 ft. for 13c
3/16 flat...50 ft. for 16c

**Washers**

For indoor, outdoor, and flying scale models.
Large size, ¼ O.D.
Dozen 1½c; Per 100, 10c
Small size, ⅛ O.D.
Dozen, 1½c; Per 100, 10c

**Clear Cement**

The fastest drying, lightest and strongest cement on the market. Try some now. You'll be amazed at its marvelous properties.
1 oz. tubes ......... 6c
2 oz. tubes ......... 8c
4 oz. cans .........15c
1 pint cans .........75c

**Acetone**

For thinning out liquids.
2 oz. cans ......... 7c
4 oz. cans ..........13c
1 pt. cans..........75c

**Colored Dope**

Highest quality pigmented dope. Do not confuse with inferior grades. Leaves a smooth even color upon drying.
Blue, Red, Yellow, Orange, Silver, Black, Olive Drab.
2 oz. cans............ 9c
4 oz. cans ..........17c
1 pint cans ..........75c

**Clear Dope**

Just suited for the model user's requirements.
2 oz. cans ........... 7c
4 oz. cans ...........13c
1 pt. cans............75c

**ALUMINUM ITEMS**

**Drag Rings**

Used on the real ships for cutting down wind resistance. Makes a beautiful addition to any radial motored model.
1½" diam. ..........15c
2" diam. ..........17c
2½" diam. ..........22c
3" diam. ..........25c

**N.A.C.A. Cowlings**

No dummy motor needed when this cowling is used. Has a hole for thrust bearing in the nose.
1½" diam. ..........15c
2" diam. ..........17c
2¼" diam. ..........23c
3" diam. ..........[illegible]

**Aluminum Tubing**

.010 wall thickness ft.
1/8 O.D. ..........7c
3/16 O.D. ..........8c
1/4 O.D. ..........9c

**Aluminum Leaf**

Real sheet aluminum yet almost as light as paper. Makes a beautiful covering job.
.0003 thick
3½" wide—5 ft. for .05

**12" Sheet Aluminum**

.003, 12c ft.; .005, 12c ft. .010, 25c ft.

**Insignia**

U. S. Army and Navy type Improves the appearance of models by 100%. Each sheet contains 4 stars in circles for the wings, and red, white and blue stripes for both sides of the rudder.
Sheet
1" diam. ..........3c
1½" diam. ..........4c
2" diam. ..........5c
2½" diam. ..........6c

**Sandpaper**

Large Size Sheet......[illegible]

## PLANS

24" Flying Model Travel Air "Texaco 13"......25c
Bellanca Pace Flying Scale Model 14"......15c
Lockheed Vega Winnie Mae Flying Scale Model 15"......15c
Cabin Tractor....10c
Twin Pusher.....10c
Puss Moth De Haviland Flying Scale Model, 12".....10c
R.O.G. 3 drawing consisting of Sr. R.O.G. Endurance Tractor and high performance R. O. G. printed on one sheet. 10c

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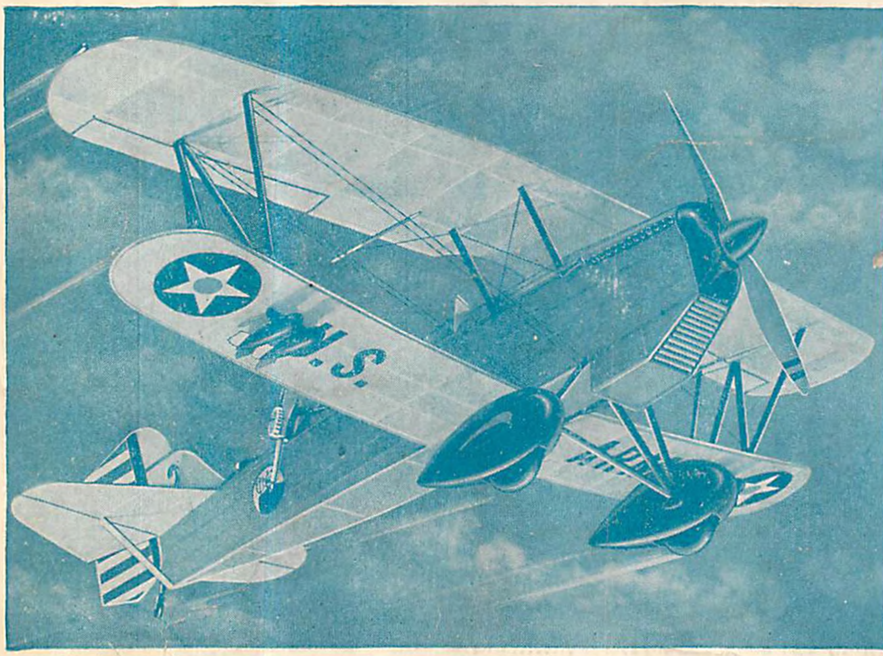


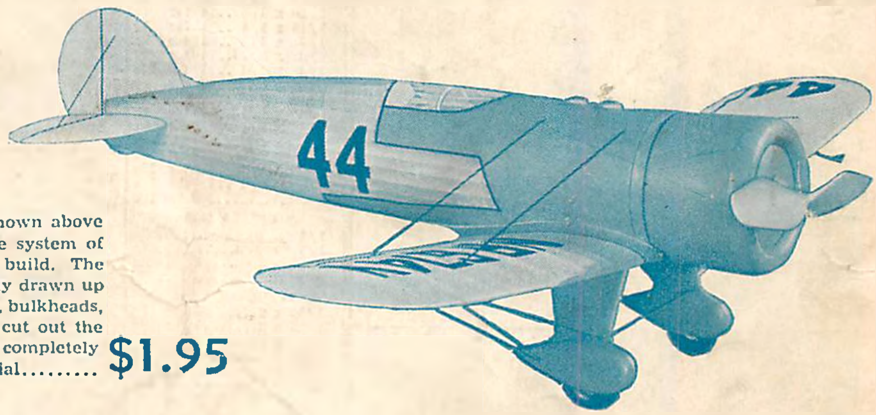
## *The Great New* CURTISS-FALCON

**24″ Wingspan—19″ long**

Comet's latest and greatest triumph—the Curtiss-Falcon—a strikingly realistic model of the ship that is the Army's most valuable aid during war. It has been truly called "The Eyes of the Army." Comet has reproduced in a true flying scale model, the newest ship of this type, fully equipped for observation and light bombing. Every detail of this big plane has been faithfully incorporated in this dandy model, as the photograph at the left shows you. Note the realistic observer's machine-gun, the streamlined wheel pants, the exhaust pipes and other details. This kit is absolutely complete—it is equipped with Comet's well-known thoroughness. Both flying and scale propeller are furnished. Here is a real value—it took all of Comet's skillful engineering, manufacturing genius and added facilities in its new big plant to produce this outstanding kit at the low price of .... **$1.95**

## *The* NEW WEDELL-WILLIAMS

**25½″ Wingspan**

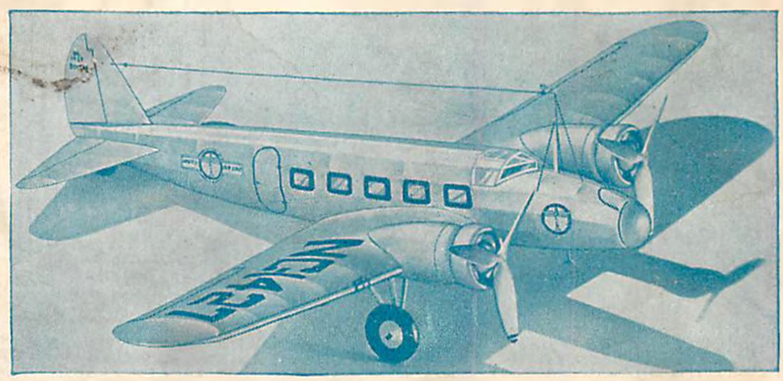



The design and construction of the Wedell-Williams shown above is typical of Comet's leadership. Comet uses a simple system of fuselage construction which makes this model easy to build. The large, actual size plan is carefully engineered, not merely drawn up in any old way—and is chuck-full of details. All formers, bulkheads, etc., are imprinted on Balsa wood—all you need do is cut out the parts with a razor blade. Difficult parts are semi or completely finished. And Comet gives you plenty of surplus material......... **$1.95**

## *and the* BOEING TRANSPORT 247

**23″ Wingspan**

This flying scale represents the big 23″ wing span **BOEING TRANSPORT 247 Plane** which is called "The Flying City!" Such features as heat and light plants, a telephone system and other features make the Boeing Transport Wasp-powered plane of United Air Lines the latest thing in design and construction. Complete Kit! Printed balsa rib, bulkhead sheets—longeron strips—sandpaper—rubber motor—balsa leading, trailing edges —1⅜″ dia. wheels—printed prop. blade outline—silver dope—shred, bamboo—noseblock—cement—banana oil—window cellophane—Boeing insignia, numerals—balsa cylindrical nacelles, engine cowlings—package with washers, prop. shafts, rear hook, bushings, fitting. Two FULL size detailed plans, Jap tissue, waxed tissue...... **$1.50**



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