

Alvie Dague winding his entry for the first official American flight of the 1937 finals. Jesse Beiberman anchors the model while Dague leans on the 24 strand, $\frac{3}{16}$ " rubber to pack in turns.

The WAKEFIELD Elimination Winner

By
Herbert Fish

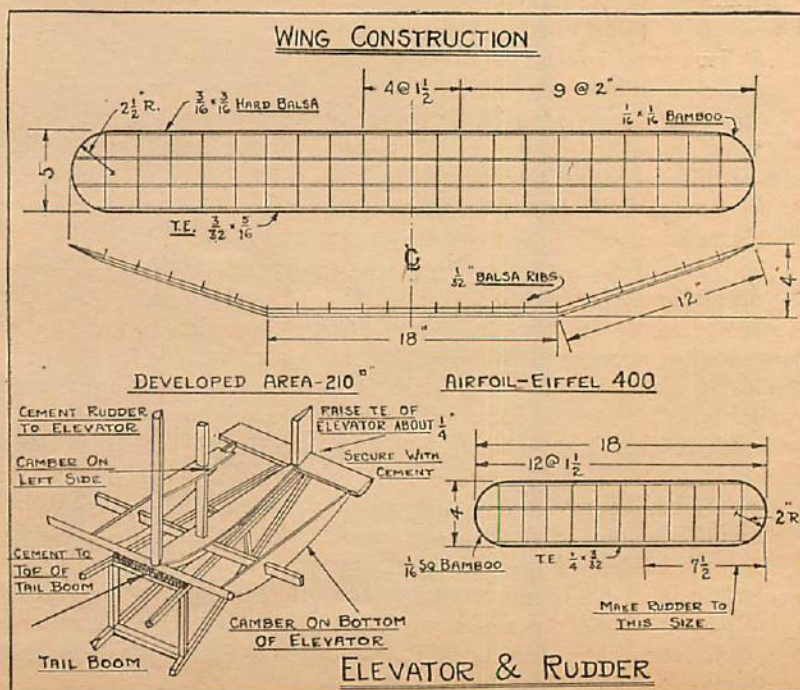
In collaboration with
Gordon S. Light.

The French model, winner of the finals, was so similar to the "Diamond" designs of Dague and Wrinston that Air Trails felt the American elimination winner to be of most interest to up-to-the-minute builders.

AIR TRAILS 16th Consecutive Championship Model

A TWENTY-THREE-MINUTE flight with a model is a thrill any time. But when there is a free trip to England at stake, it's even more exciting. As Herbert Fish describes it, "Watching my eight-ounce Wakefield job hang on a thermal for almost twenty-three minutes was by far the most pleasant experience I've ever had in the model game—even though the plane did go out of sight and was never recovered."

Because of this long flight, Fish's three-flight average hit the all-time high of 8:26.1 for Wakefield competitions. It put him in first position on the 1937 Wakefield team—.7 seconds ahead of Alvie Dague, who placed second. At once Herbert had visions of an Atlantic voyage with England and the Wakefield finals as his destination. Eventually all his dreams came true. But not until he had gone through some trying moments.



The National Aeronautic Association had been raising a fund to send a team of six American boys to England for the finals. But to the disappointment of every one—especially the six winners—the fund amounted to only \$144.00, hardly enough to send a team of six to England! Actually it was barely half of what was needed to send one representative. NAA officials decided that all the money would be given toward financing Fish's trip since he was the first on the team. It was up to him to raise the remainder of the money. He had only a few days to do this and still get to England by August 1st.

Luckily, Fish lives in Akron and the Akron Women's Chapter of the NAA is heart and soul behind modeling activities. Naturally they were thrilled that an Akron boy had won the elimination contest. But when they learned that another Akron boy—Richard Bodle—had placed fourth on the team, they really went into action. Preparations were already well underway by the time Fish and Bodle reached home Wednesday, July 14th, after the Detroit nationals. By Friday the Akron NAA women had raised the necessary funds. By Saturday passage had been booked to England. And every last detail—passports, tickets, etc.—had been taken care of by Monday morning.

Meanwhile, two other Akron women were making Wakefield plans. If Herbert Fish was going to England, his wife, Betty, could see no reason for staying at home. She enlisted the financial aid of her mother, who came through in great style. And that completed the Akron party—Mr. and Mrs. Herbert Fish and Richard Bodle.

A farewell dinner was given them Monday night with the mayor and other Akron notables present. The Chamber of Commerce fitted them with special uniforms. The next morning they were on a train to New York and from there to England.

During the trip across Fish spent most of his time in his cabin building a model for the contest to replace the one lost in the elimination contest. He describes modeling in a small cabin in mid-Atlantic as an interesting experience. Any tendency toward seasickness certainly was encouraged by the movement of the work table as it moved back and forth with the roll of the ship.

At the end of the trip across, just prior to docking at Southampton, Betty and Herbert were cleaning out the odds and ends in their cabin when they came across a current issue of Air Trails. Herb started for Dick Bodle's room, but seeing him at the top of the stairs, called, "Dick, do you want this copy of Air Trails?"

And before Dick could answer, a stranger came up and excitedly demanded, "Who owns that magazine?" "We do," Dick replied.

And much to their amazement, the stranger replied, "Then you must be the fellows I'm looking for." That is how Harry York, prominent in English modeling, welcomed the Akron delegation to England.

Fish's Wakefield elimination winner was typical of the design that has proven so successful in contests in this

ABOUT HERBERT FISH

Few champions can match the experience of Herbert Fish. He started modeling in 1922 during the spruce-and-silk era. In the next eight years he turned in some outstanding flights. In 1925 he set a :42.6 record at the first Akron model contest. Next year he raised this record and took home his first trophy. Then he turned to speed-plane flying and set an unofficial record of 51.13 m.p.h. for a 150-foot course.

About this time the Airplane Model League of America was coming into existence. Herbert followed their activities and in 1927 he built his first balsa-and-tissue model and really went into big-time contest flying. He placed 3rd in the National Miniature Aircraft Tournament at Pittsburgh in 1928 and 13th in the first national AMLA contest in Detroit.

Even at this early date, Herbert had ideas of a trip to Europe. And he made a powerful bid for one of the free trips at the 1929 Nationals. Fate decreed that he would have to wait eight more years before seeing Europe when his model flew out over Lake St. Clair from Selfridge Field and couldn't be followed. Fish ended up in 4th place instead of 1st.

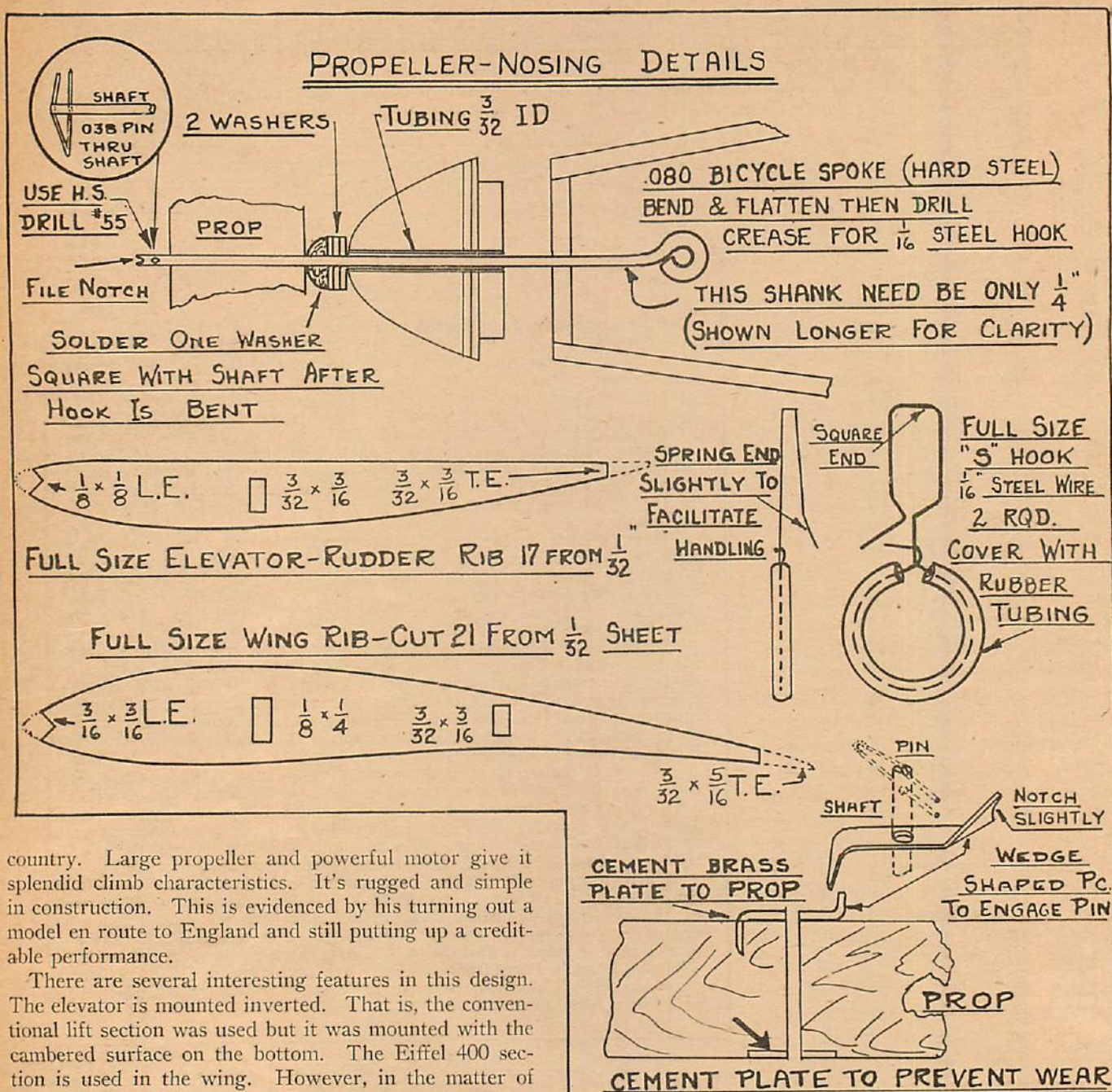
In the 1930 Nationals he again missed a free trip to Europe when his twin pusher flew out of sight to take 3rd place. About this time he became twenty-one and retired from contest flying. His modeling interest tapered off until 1936 when he joined a group of older model builders to form the Akron Advanced Model Airplane Club. Immediately he began a comeback, taking 2nd in the open stick event of the Scripps-Howard nationals in Buffalo.

This year his performance has been sensational. He won places on both Wakefield and Moffett teams at the Detroit Nationals. He placed 4th in the Moffett finals, 18th in the Wakefield, 8th in the open stick, and 12th in the open fuselage. In England he won the Bowden trophy for controlled gas-model flying. And he returned home in time to take 3rd in the open stick event of the Scripps-Howard nationals in Akron.

Herb is twenty-seven years old, married and lives in Akron. During the construction of the Akron he worked in the engineering department of the Goodyear-Zeppelin Corporation. He has a degree from the engineering college of Akron University. His wife, Betty, is also a model fan. After the failure of the American team to bring back the Wakefield, she's taken matters into her own hands. She's going to enter the 1938 Wakefield. And with Betty after the trophy, Mr. Fillon of France had better watch out!



American contestants abroad: Left to right—Frank Zaic, Alvie Dague, Dick Bodle, Jesse Beiberman, standing, and Herbert Fish.



country. Large propeller and powerful motor give it splendid climb characteristics. It's rugged and simple in construction. This is evidenced by his turning out a model en route to England and still putting up a creditable performance.

There are several interesting features in this design. The elevator is mounted inverted. That is, the conventional lift section was used but it was mounted with the cambered surface on the bottom. The Eiffel 400 section is used in the wing. However, in the matter of wing incidence, Fish again departs from usual practice. He has found that best results are obtained by flying the wing at a negative angle— $\frac{1}{8}$ to $\frac{3}{8}$ " block under the trailing edge.

Fish told me about an interesting flight he had with this model. It was a new job in the stages of test-flying. Preliminary flights showed a fast climb, flat glide, and

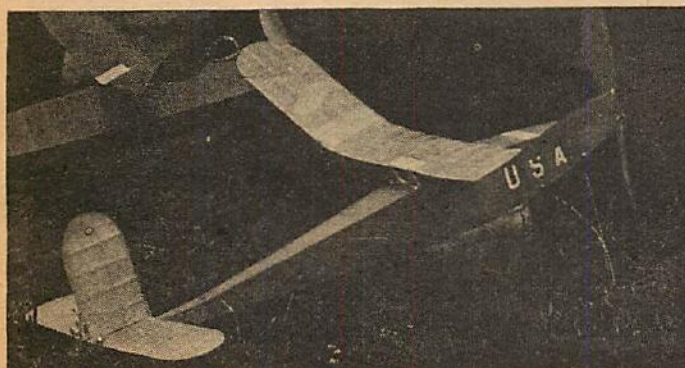
all-around good results. However, he had not tried it under full power. And when he did so, the results were surprising. After a good take-off it climbed about 100 feet, turned over on its back and flew upside down in wide circles for about half a minute, coming slightly lower on each turn. Even after the power ran out it continued inverted and finally made a perfect inverted landing. After that flight he increased the dihedral to its present amount and has never had another inverted demonstration.

FUSELAGE CONSTRUCTION

The fuselage is symmetrical. Dimensions used in making the two side panels hold when joining these two panels. Diagonal bracing is used throughout each of the four sides of the fuselage. The fuselage is lightweight and of ample strength to take the powerful "twist" of the motor.

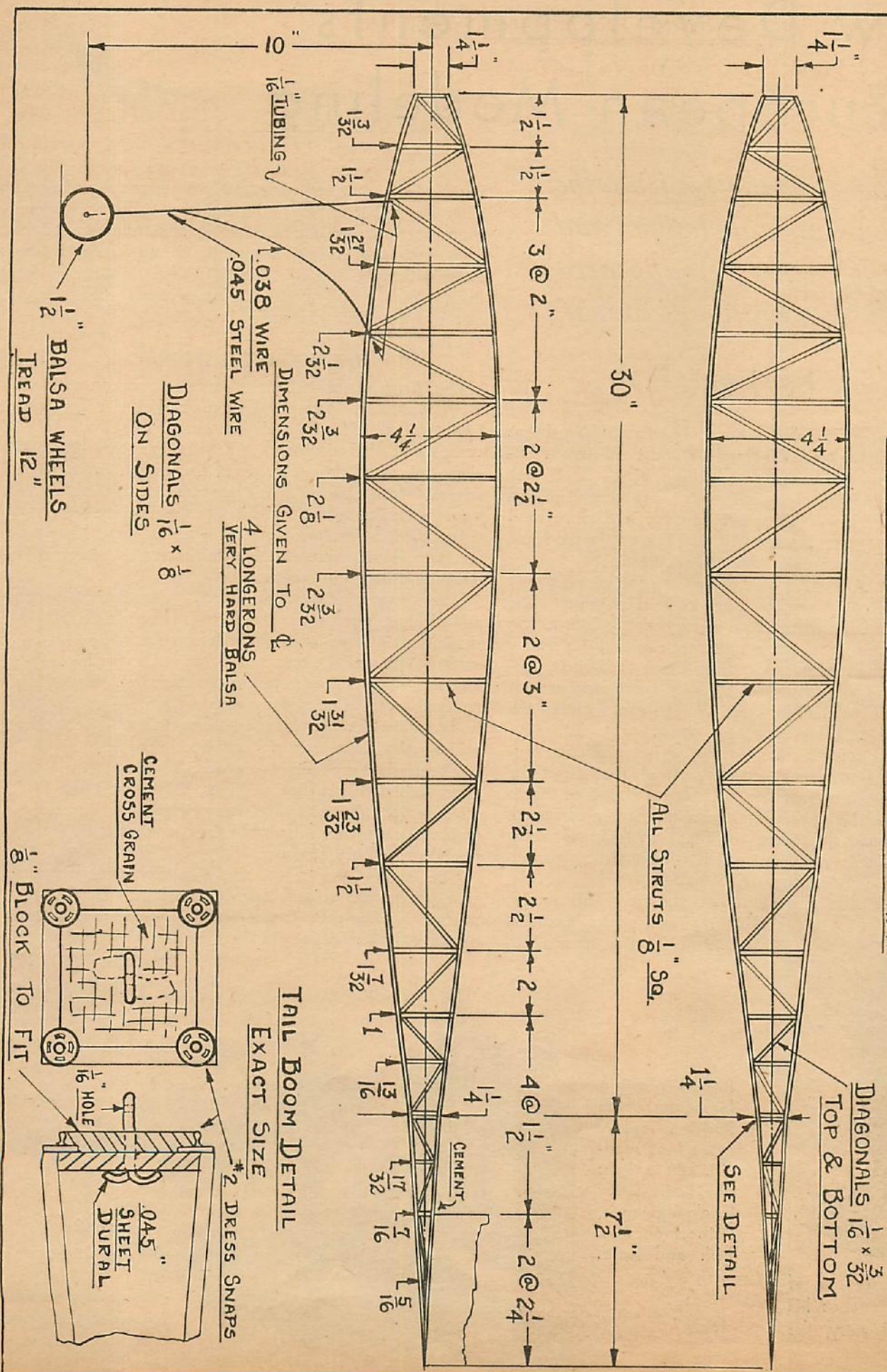
TAIL BOOM

The same type of construction is used here as in the forward part of the fuselage. The tail (Turn to page 94)



Fish's elimination winner.

TOP VIEW - DIMENSIONS SAME AS OTHER VIEW



New Developments In European Modeling



A participant reviews the many unusual designs and developments that appeared at the International contest.

By Herbert Fish

THIS is the French description of what happened that memorable day in England—August 1st—when Fillon won the 1937 Wakefield contest—*La Coupe Wakefield est gagnée par la France!* As a result of this victory, the trophy will spend the year in France until next summer when France will play host to the modelers of all nations at the 1938 Wakefield contest.

Fillon's first flight in the Wakefield contest was only 76 seconds. His model failed to gain altitude. The flights of his team mates were equally disappointing. So the French team went into conference to find the reason for the poor performance. They discovered their propellers were not adapted to the air conditions around Fairey's airdrome. The large 20" propellers turned too slowly to give the models a good climb.

Wakefield contest rules do not permit changing propellers. So the French entrants simply cut down the diameter of their propellers. The next round of flights showed that the trouble had been effectively corrected. Fillon's second flight was thrilling. It took off nicely and immediately went into a climb that took it high into the clouds, disappearing after 11:23.0.

Fillon left the airport in hot pursuit of his model. About 1½ hours later his model was returned to the airport, hav-

ing landed unharmed about 10 miles from the airport. This was still long before the end of the contest. Fillon continued to search for his "lost" model, unaware it had been found. He didn't return to the airport until late in the afternoon and was unable to take his third official flight. Thus on two flights, Fillon averaged 4:13 instead of the three which the rules allowed!

THE WAKEFIELD WINNER

Our American models have much in common with the 1937 Wakefield Winner. Fillon's model closely paralleled the type of model which has proved so successful in contests in this country. The fuselage was diamond shape, about 4" on each side at the widest point. The overall length was 38". There were no diagonal braces used in the fuselage. The sides of the fuselage were flat without cabin windows or streamline fairings. The tail and nose block were fastened with rubber bands as is common practice in our models.

The wingspan was 52" with a 4½" chord at the center and nicely tapered tips. The airfoil closely followed the shape of the Clark-Y section. It was flat on the bottom surface with a slight reverse camber at the trailing edge; 23 ribs and 18 riblets were used in the wing. Both wing and tail were of monospar construction. The elevator was roughly 26x3¼" and used a lift section. The rudder was 3¼x8½" and used a streamlined section.

The original propeller was nearly 20" in diameter. But after the first disappointing flight, Fillon cut about 1½" off each tip. The propeller was well carved with considerable blade area. About 2" slack was used in the 30 strands of ⅛" black rubber.

The landing gear was a single bamboo strut fastened well up on the second fuselage upright. Despite the narrow landing-gear tread—about 8"—the model took off nicely. The entire ship was neatly (Turn to page 94)

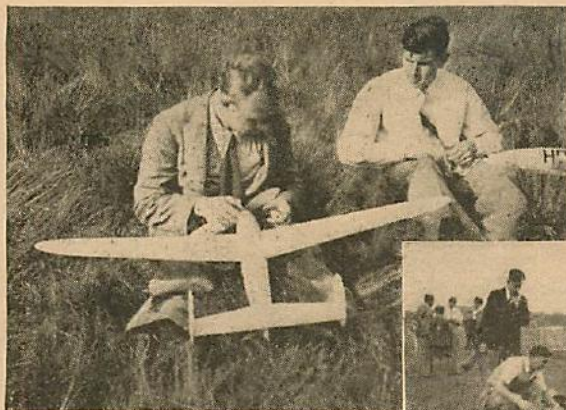
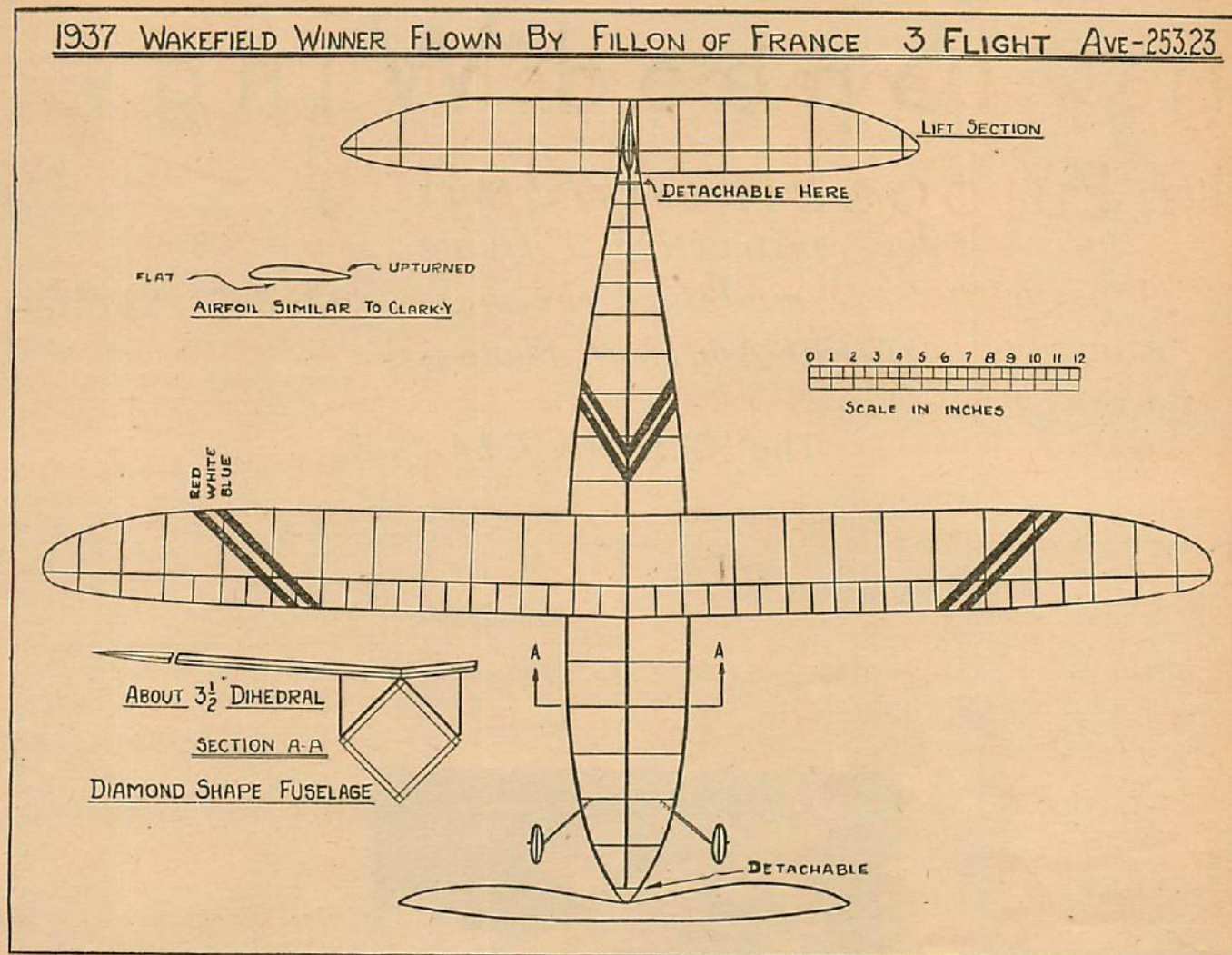


C. S. Rushbrooke of England launches his Wakefield entry, the same model flown in the British Eliminations.

Right—Waiting for the start of the Bowden Trophy event (gas models). Left to right: Fish, Bodle, Crow (England), Dague, Beiberman, Mrs. Fish and Zaic.



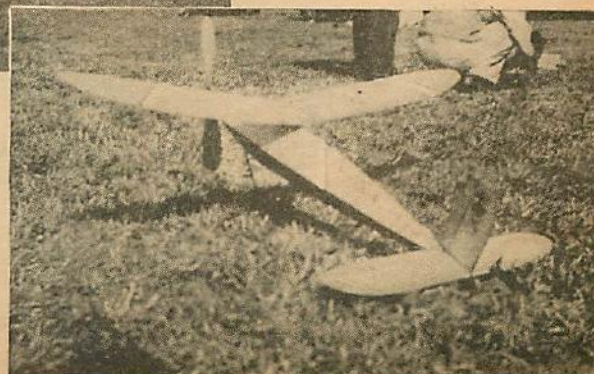
1937 WAKEFIELD WINNER FLOWN BY FILLON OF FRANCE 3 FLIGHT AVE-253.23



Above—The boys from Holland, Mr. Von Hattum left. The smooth looking twin-tail model is typical of the efficient designs entered by the many competing nations.



Above right: The American pen showing Herbert Fish's elimination winner, foreground, and Alvie Dague's "Diamond," directly behind. Right: The winning model, a diamond-fuselage design flown by Fillon of France. Lost after the second flight, its three-flight average was still high enough to shade all competitors. It seems significant that the conservative designs are more than holding their own against the new school of ultramodern streamlining.



A plan view made from sketches by Herbert Fish illustrates the similarity of Fillon's winning Wakefield model to the American-developed "Diamonds," flown by the Tulsa group (winners by Wriston and Dague—see "The Diamond" in October Air Trails). These models bear such a remarkable resemblance to the Fillon design that the sketch above was considered adequate for descriptive purpose. Plans for the American elimination winner appear on pages 48-51. The diamond-fuselage models are attaining increased popularity. The wing-fuselage junction interference drag is minimum. This type model is simple to build and efficient to fly.



The model in flight.

Speed Wings

*Complete and detailed plans
for constructing a flying
scale model of the most
efficient American plane—*

By
Alan D. Booton

The CESSNA C34

THE Cessna C34, a four-place, Warner Super Scarab powered job, was judged to be the most efficient American airplane. Cessna has always built planes noted for their unprecedented wide range of performance.

Experienced model builders have known, since the advent of the first real Cessna, that a flying-scale model of that ship is perfection in performance. No other plane duplicated in miniature can surpass its stability, speed, climb and endurance.

In building this month's project, all modelers will agree that the Cessna is the most worthy selection for many hours of building and flying pleasure.

To build the model, follow accepted model construction methods. First, build the sides to the extent shown on the nonscale detail on sheet #3 and then start with B and C to install the spacers. Cut the former A as a unit and cement it to the four extending longerons. Complete the fuselage frame by adding parts shown on the drawing.

WINGS

Make a left-wing tracing and build both frames at the same time—that is, let each operation apply to both frames. The drawing is self-explanatory, though it is good advice to build the ailerons in with the wings and cut them loose later. A line on the drawing gives the flap location, though no operating flap is provided.

TAIL SURFACES

Build these up on the drawing for accuracy. Use standard stock to build the frames from and then trim and sand them

to shape when they have dried. The stabilizer should be made as a unit to permit accurate and easy installation.

LANDING GEAR

The landing gear is of a special design that can be pushed up for scale appearance and pulled down to let the long propeller clear on take-offs and landings. Make four $\frac{1}{8}$ " sheet blanks and groove them so the flattened $\frac{1}{8}$ " aluminum tubing can be easily sandwiched between.

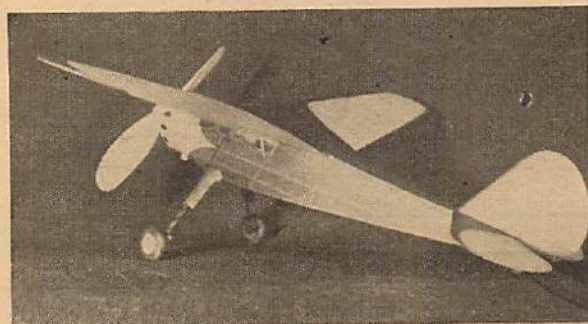
Bend #12 music wire double (like the slide of a trombone) to the desired length. Leave enough for the axle and cut off. Make a pair of these and slide them into the flattened tubes. Crimp the lower ends to keep them from being pulled completely out. Cement the balsa blanks over the tubes, the lower ends of which are kept $\frac{1}{2}$ " from the axles. When dry, carve out the struts and cut through them $\frac{1}{2}$ " from the axles to separate them as

shown on the drawing. The inside wheel disks are cemented to the strut ends, while outer disks are left off until the wheels are secured on the axles with washers and cement. Make the tail wheel assembly as shown.

COWL

The detail and instructions are on sheet #2. It will be the best idea to leave off the worts and scoop until the cowl has been finished smoothly.

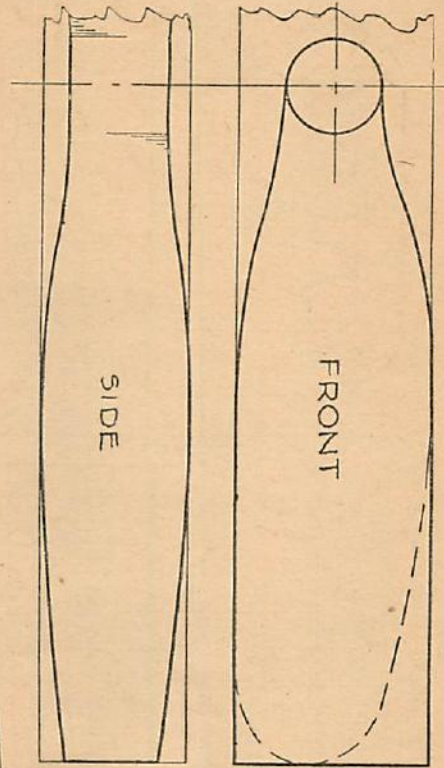
(Turn to page 87)



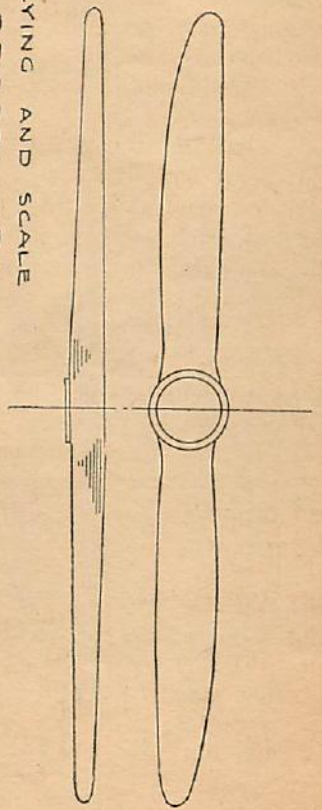
The landing legs are telescopic, combining the advantages of scale and flying features.



Those familiar with flying scale models know that the Cessna is unbeatable in performance.



FLYING AND SCALE
PROPELLERS



SCALE DIHEDRAL 21°

DIHEDRAL
ANGLE 7°
8

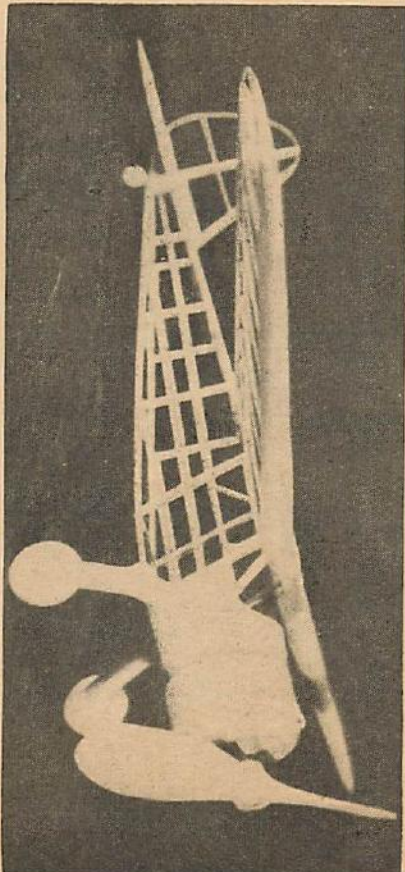
ENLARGED DETAIL
OF CRIMPED TUBE

3" ALUM TUBE SANDWICHED
BETWEEN 8 SHEET BLANKS,
CRIMP TUBE AT BOTTOM
TO STOP TROMBONE STRUTS,
#12 MUSIC WIRE

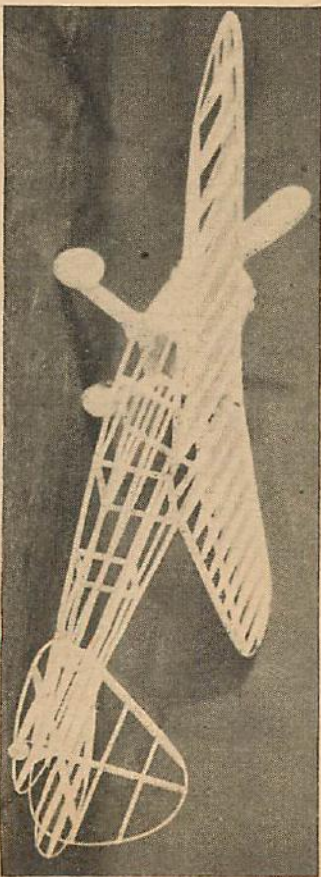
LANDING
GEAR
DETAIL

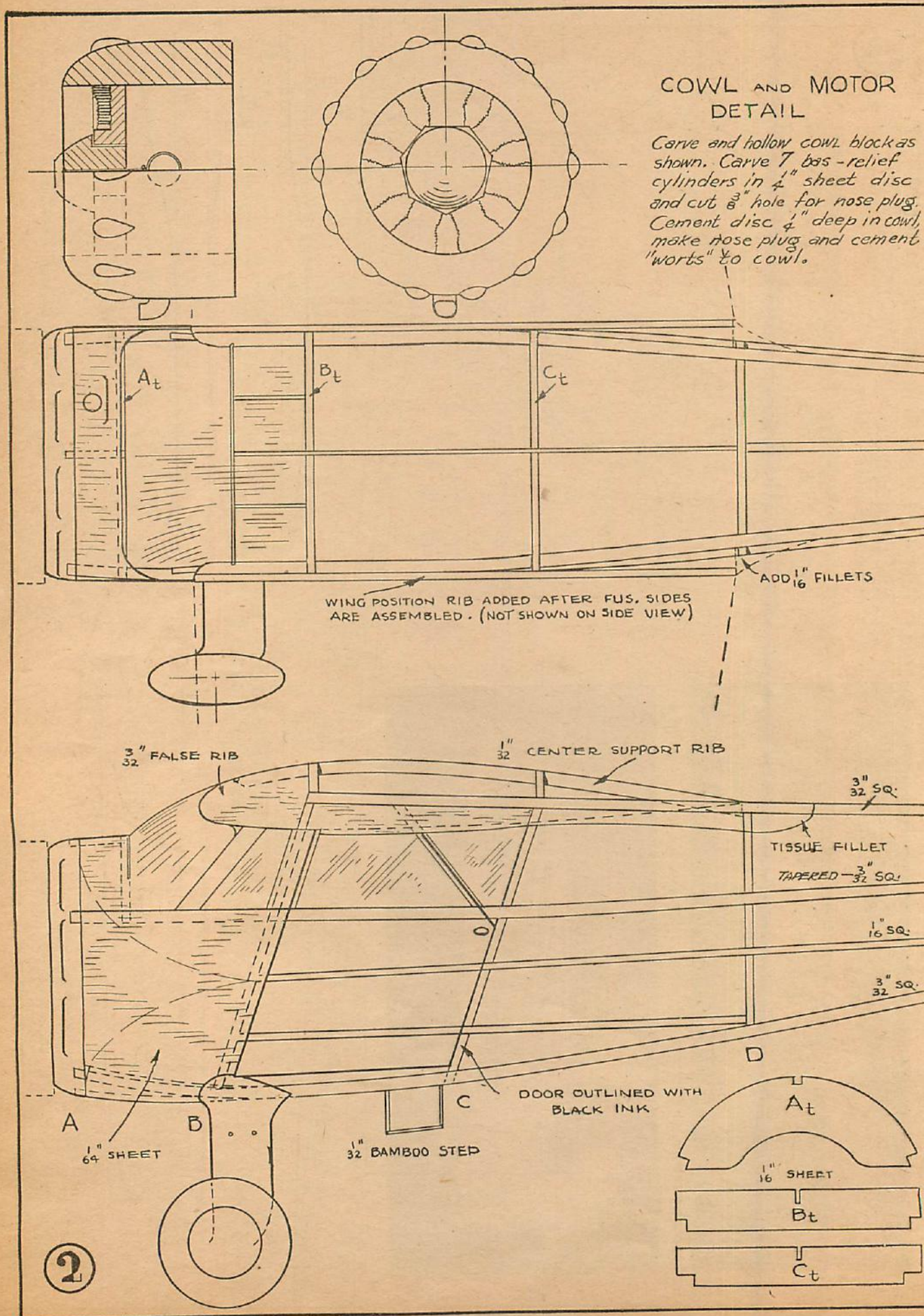
NOTE CLOSED WHEEL
ARRANGEMENT.

1

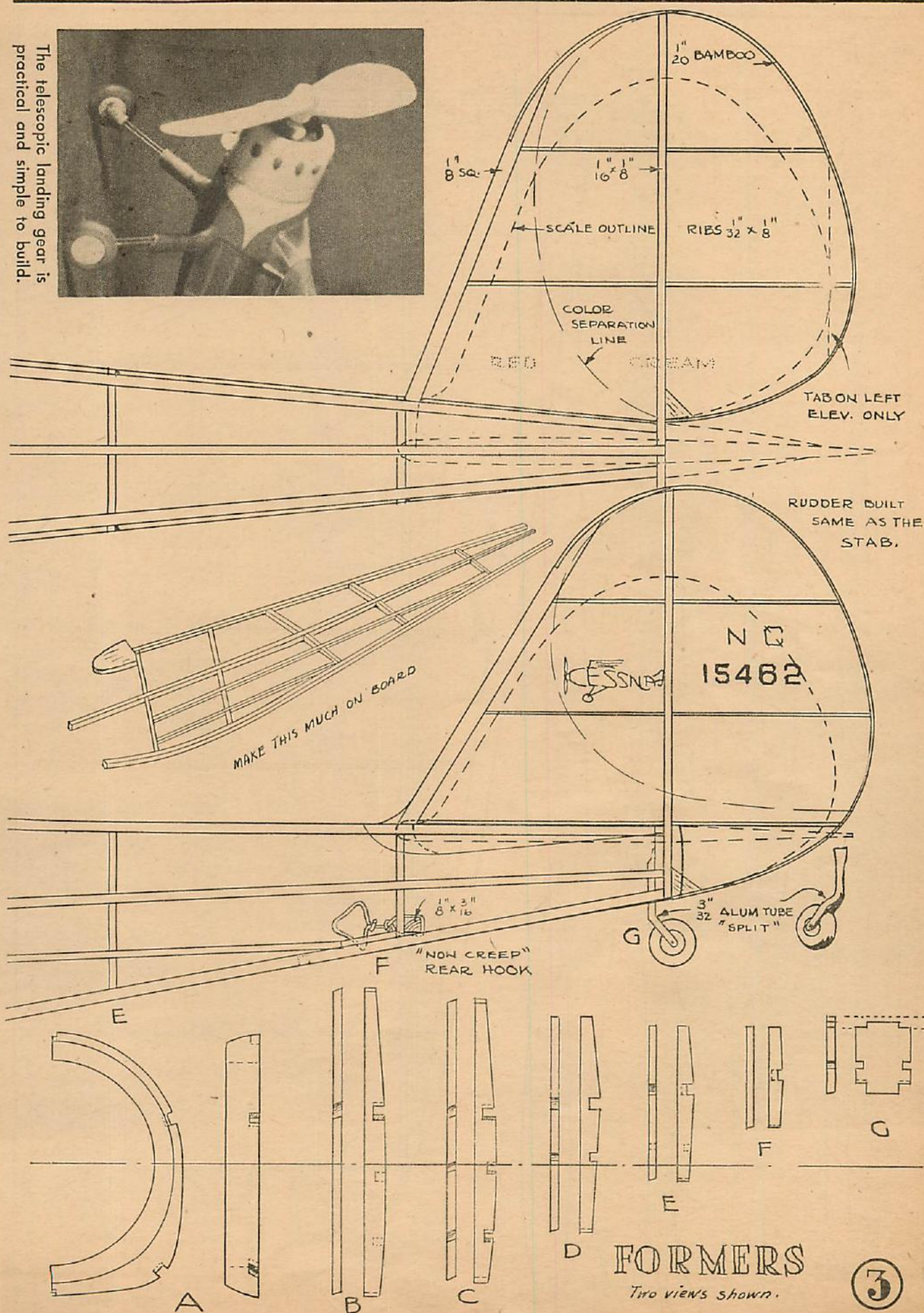
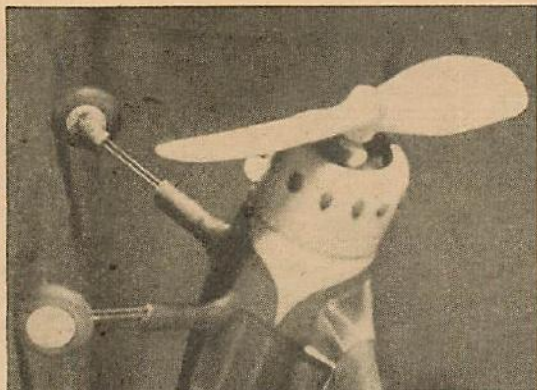


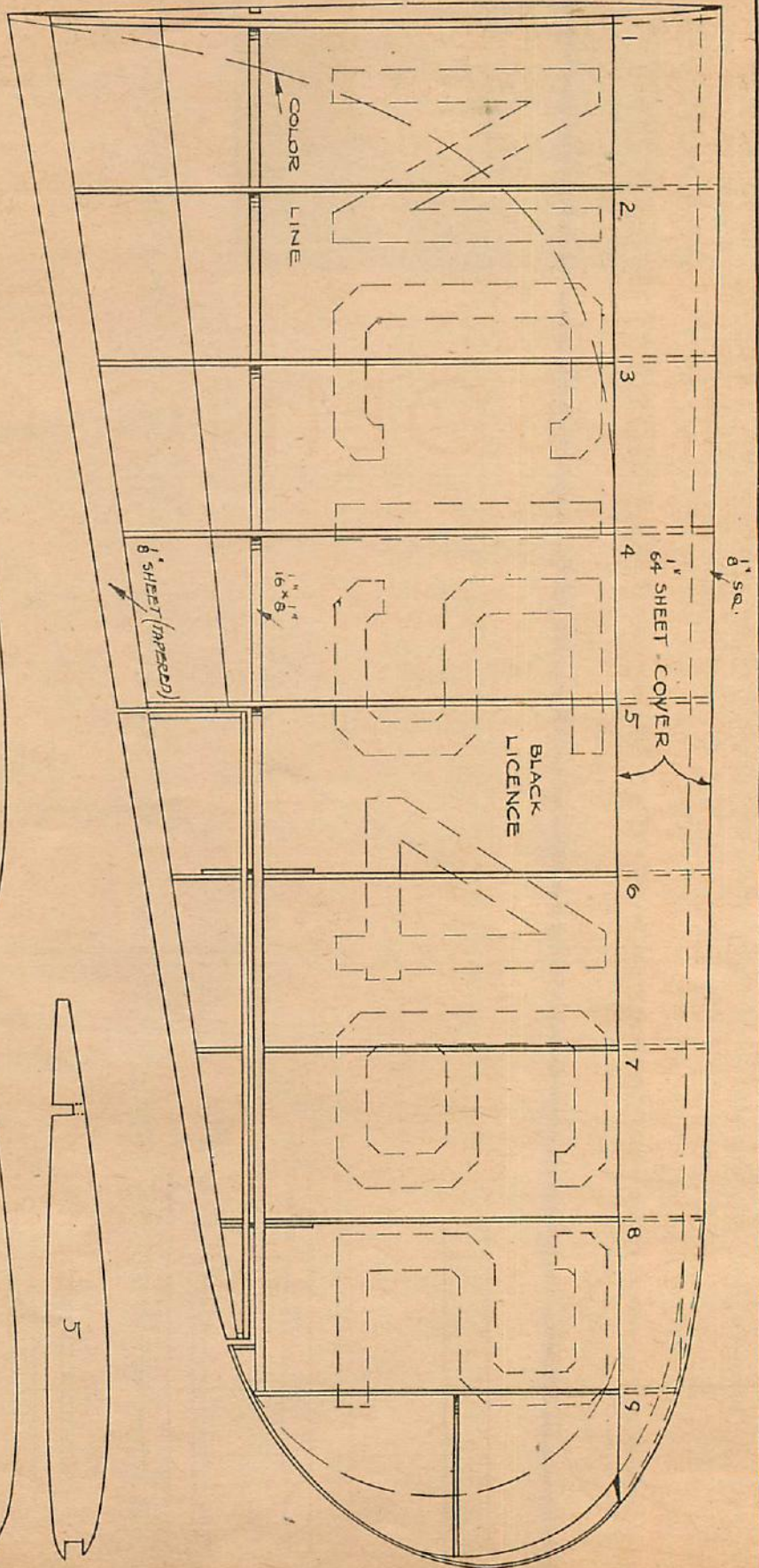
The structural design is revealed by these two photos of the uncovered model.





The telescopic landing gear is practical and simple to build.





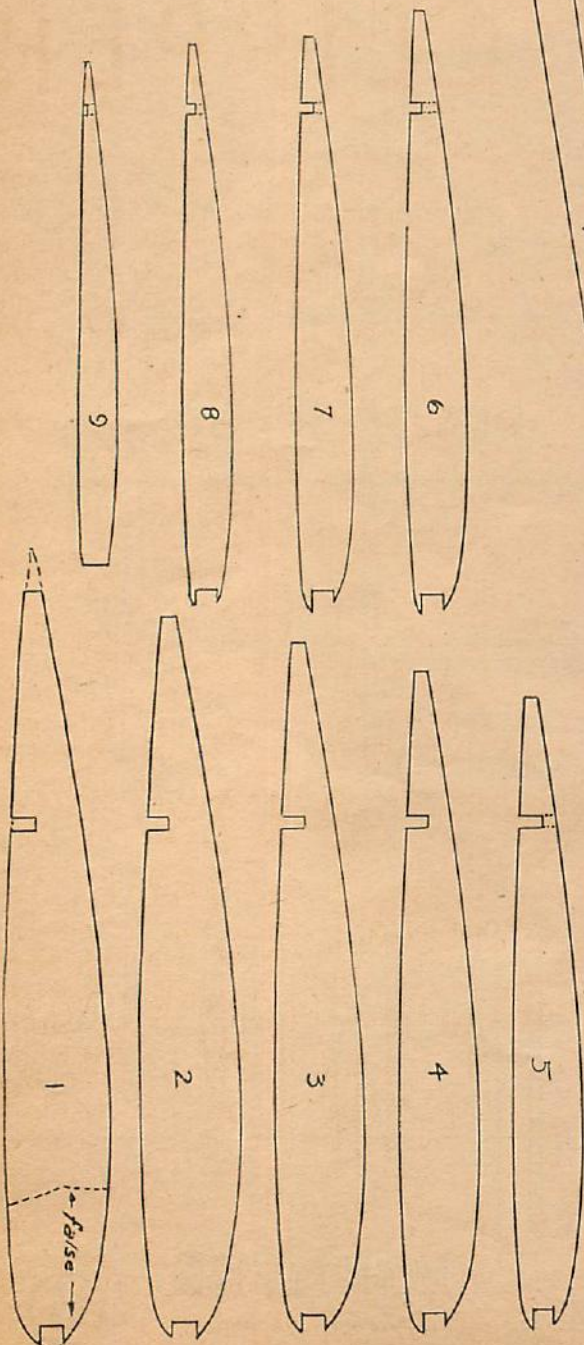
WINGS PATTERN

MAKE ONE LEFT, ONE RIGHT

RIB PATTERNS

Except for #1, cut 2 ea. from 32 sheet. From #1, cut 2 32 false ribs, 2 16 full length wing position ribs with no slots, and 2 16 ribs for the wings.

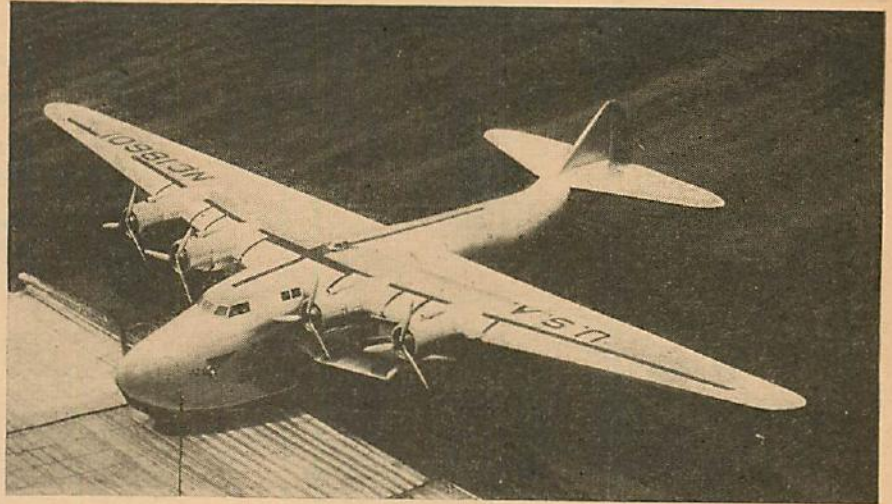
4



Authentic drawings of Pan American's Boeing-built, transoceanic Clippers. Complete directions for duplicating a beautiful model.

By Martin E. Dickinson

Model Builder for Boeing and Pan American



The BOEING CLIPPER

AS an indication of the desire of Pan-American Airways to increase the luxury of air-line travel, there is nearing completion in Seattle's Boeing Aircraft Co. plant a group of six giant ocean-flying boats. These huge all-metal craft give promise of being the greatest commercial airplanes in the world.

This latest Clipper for transoceanic air-line use comes as a natural successor to the now famous Martin and Sikorsky four-engined flying boats. The Boeing "314," six of which have been ordered for Pan-American Airways, will carry 72 passengers and a crew of eight in utmost comfort. The "314" will be the first commercial airplane to have two full passenger decks. Power will be provided by four of the new Wright "Twin Cyclone" R-2600's developing a total of more than 6,000 h.p. Gross weight of this ship will be somewhat over 42 tons!

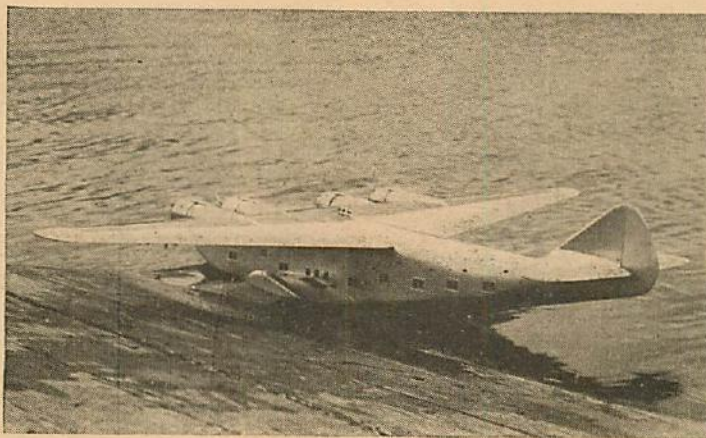
A complete description of the new Clipper is to be found on pages 24 and 25.

CONSTRUCTING THE MODEL

In making this ship start as on any other scale model, i. e., make the templates for all parts by tracing the various sections from the plans. Soft balsa is probably the best wood for carving, but if a better finish is desired soft pine will be found suitable. In carving the wing note that the airfoil has the same amount

of camber on the bottom surface as it has on the top. This symmetrical airfoil is a new feature found on all Boeing four-engined aircraft. Cut out the leading edge of the wing at the required places to take the engine nacelles. It is best to turn the entire cowlings and nacelle on a lathe if possible. But these parts may be easily shaped from square blocks. In constructing the hull follow the templates most carefully as a great deal of the grace and beauty of this model will be lost if the carving is inaccurate. Carve in all details—such as windows, doors, etc.—at this time. The navigator's turret should be carved from solid celluloid or from layers of thinner sheet material. The horizontal tail should be made in one piece and fitted to the top of the hull in the proper position. The vertical tail is glued directly onto the stabilizer. Plastic wood should be used for any filleting.

The model should be assembled before any painting is done. By so doing, any joints or cracks can easily be filled with plastic wood. Regular automobile primer, or clear dope, should be used to aid in filling up the pores of the wood so that a smooth final finish will result. Primer may be purchased from any good automotive supply house. Give the model a number of coats of fine silver paint, taking care to sand between every coat. The visibility. (Turn to page 88)

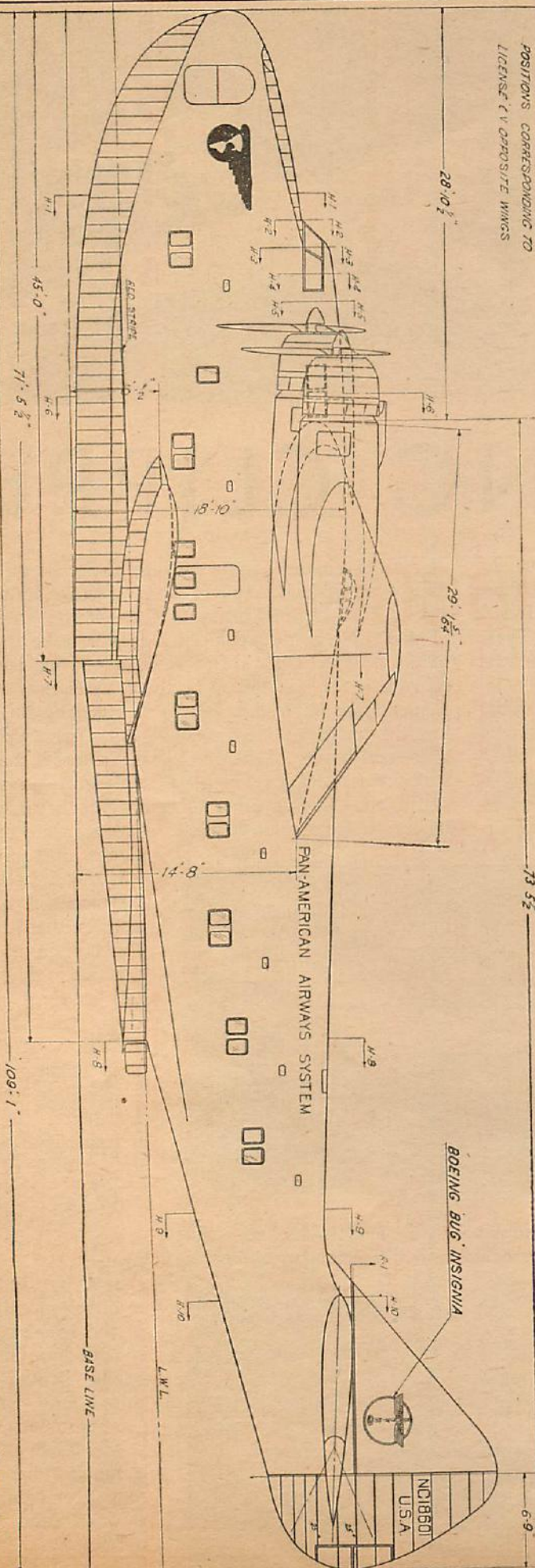
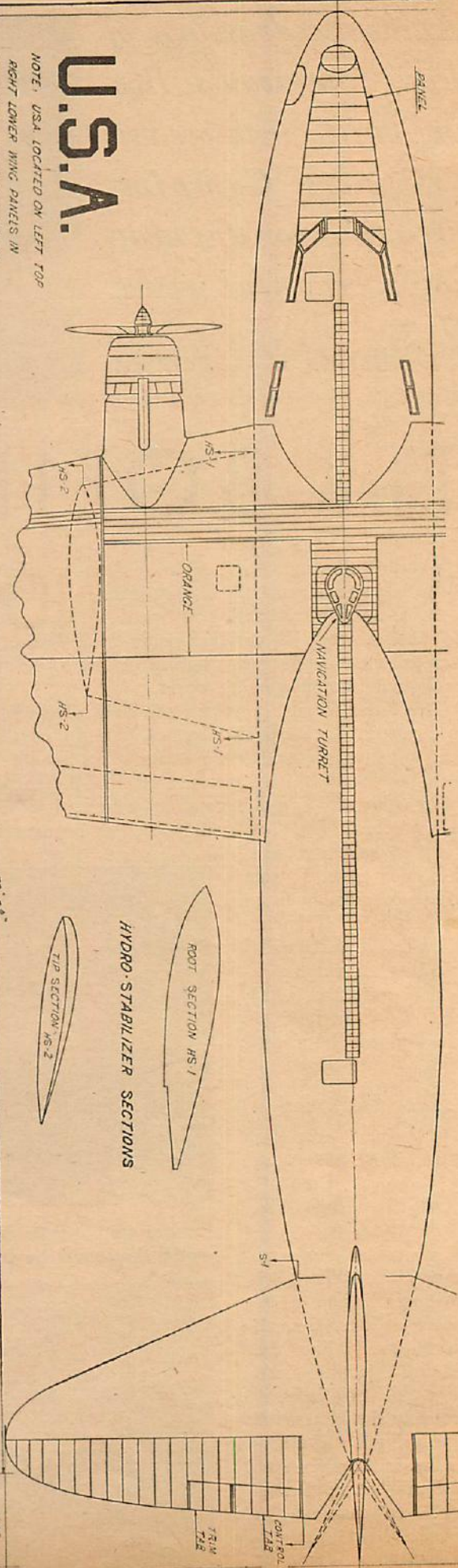


Pictures are not of the real ship, only the model—the finest solid model that could be presented to a discriminating audience.



U.S.A.

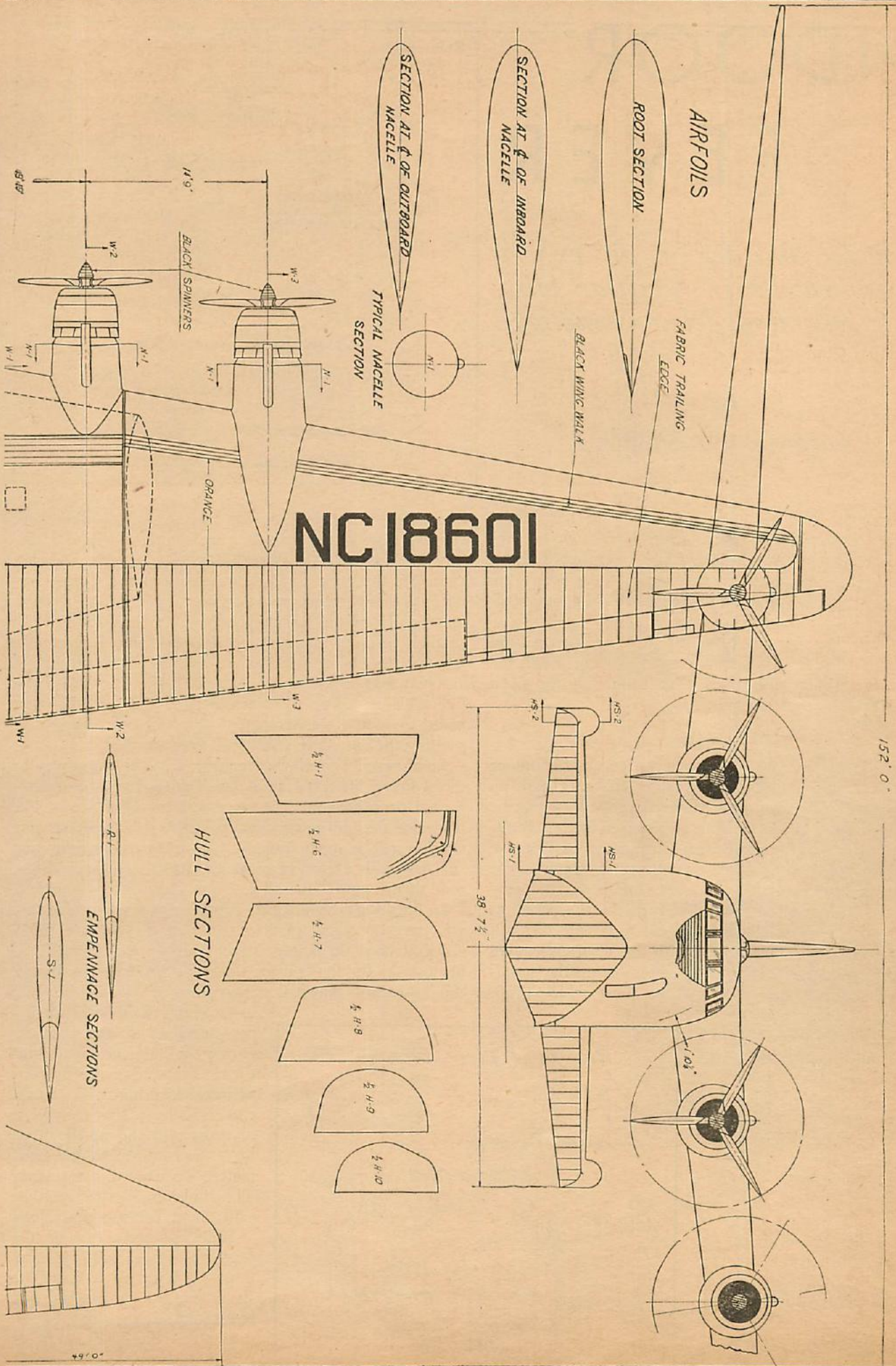
NOTE: USA LOCATED ON LEFT TOP
RIGHT LOWER WING PANELS IN
POSITIONS CORRESPONDING TO
LICENSEE TV OPPOSITE WINGS



MARTIN E. DICKINSON



P.A.A. BOEING CLIPPER #314
4 WRIGHT R-2600-A2 TWIN CYCLONES

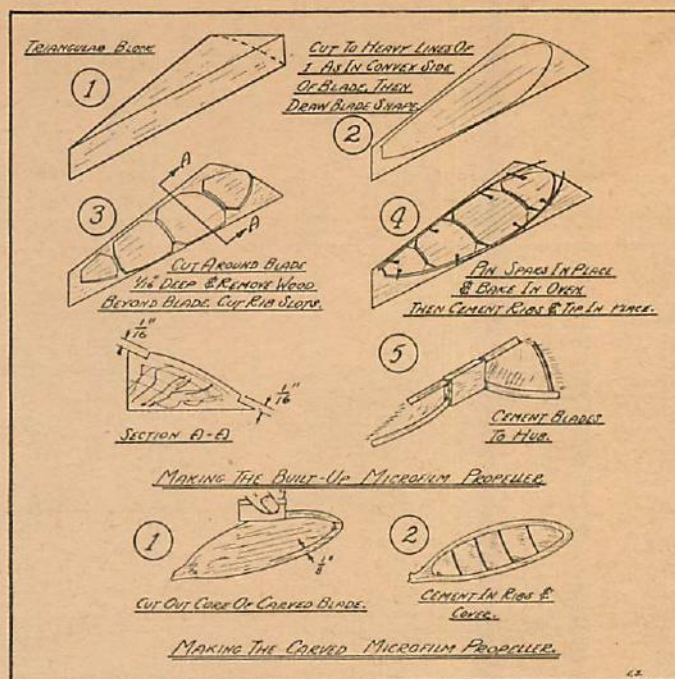


INDOOR FEVER

A model builder is an expert only when he is familiar with all phases of model construction.

By

Lawrence N. Smithline



THE most unhealthy time of the year has finally caught up with us again. Cold months breed "indooritis" and many a newcomer is brought down by the disease. However, it is a pleasant disease to the victim as it is a lot of fun and teaches much about aerodynamics.

In the novice stage of indooritis there are two painful symptoms. The first is poorly carved propellers and the second, "microfilm difficulty." The following are given as prescriptions to remedy them.

PROPELLERS

There are two basic ways to make successful indoor propellers. They may be carved from blocks, or built up and covered with microfilm. Carved propellers may be made from solid blocks or from semicarved forms. Built-up propellers may be made with ribs and spars just like a wing, or they may be made by cutting the center of the blades out from a carved propeller. Of the carved propellers, the semicarved one is likely to be the better as perfect pitch is insured (although not guaranteed). Of the built-up propellers, the one with the separate leading and trailing edge is likely to be better—from the standpoint of structure and weight—than those which originated from a carved propeller.

In carving a propeller, first draw—on the broad faces—the diagonal and parallel lines at the center for the hub. Cut down to these lines with either a knife or a jig saw and then smooth the surfaces. Carve the concave sides first. A sharp knife may be used until the leading and trailing edges of the propeller blades are almost reached. Then use a razor to put in the camber. Rough sandpaper is used first—in order to take out all of the ridges due to the razor—progressing to finer and finer paper till you

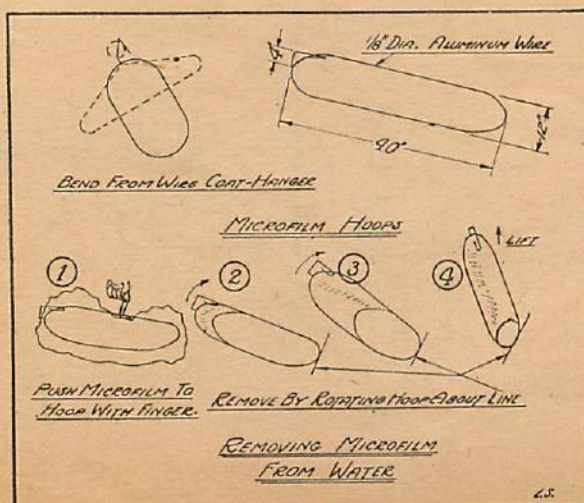
are polishing the blades with #10-O. Note that both concave sides of the propeller are completely finished before even starting the other sides. The convex sides are carved in the same way. A knife suffices for rough carving. As the work gets more delicate, proceed to the razor and finally to the varying degrees of sandpaper. (In sanding you must support the blade on your fingers. Do not put the blade on a surface as it will surely warp it and may even cause you to break it.) Cut the blade shape in one blade, make a paper template of it and cut the other blade to match the template. Finish the propeller by sanding the cut edges with #10-O sandpaper.

Semicarved propellers are carved in the same way as the ordinary kind, but, of course, both halves of the semicarved propeller must be cemented together first. The blades at the hub must overlap. On a 15" propeller this overlap will be approximately $\frac{1}{2}$ ". Cover the overlapping surfaces with a coat of cement. After they have dried, coat them again—liberally. Then clamp them together.

In finishing a semicarved propeller you will notice that you have no actual carving to do on the concave sides. All you need do is put in the camber and smooth the blades. As for the convex sides, the propeller is already thin enough so that it is unnecessary to use a knife. Just

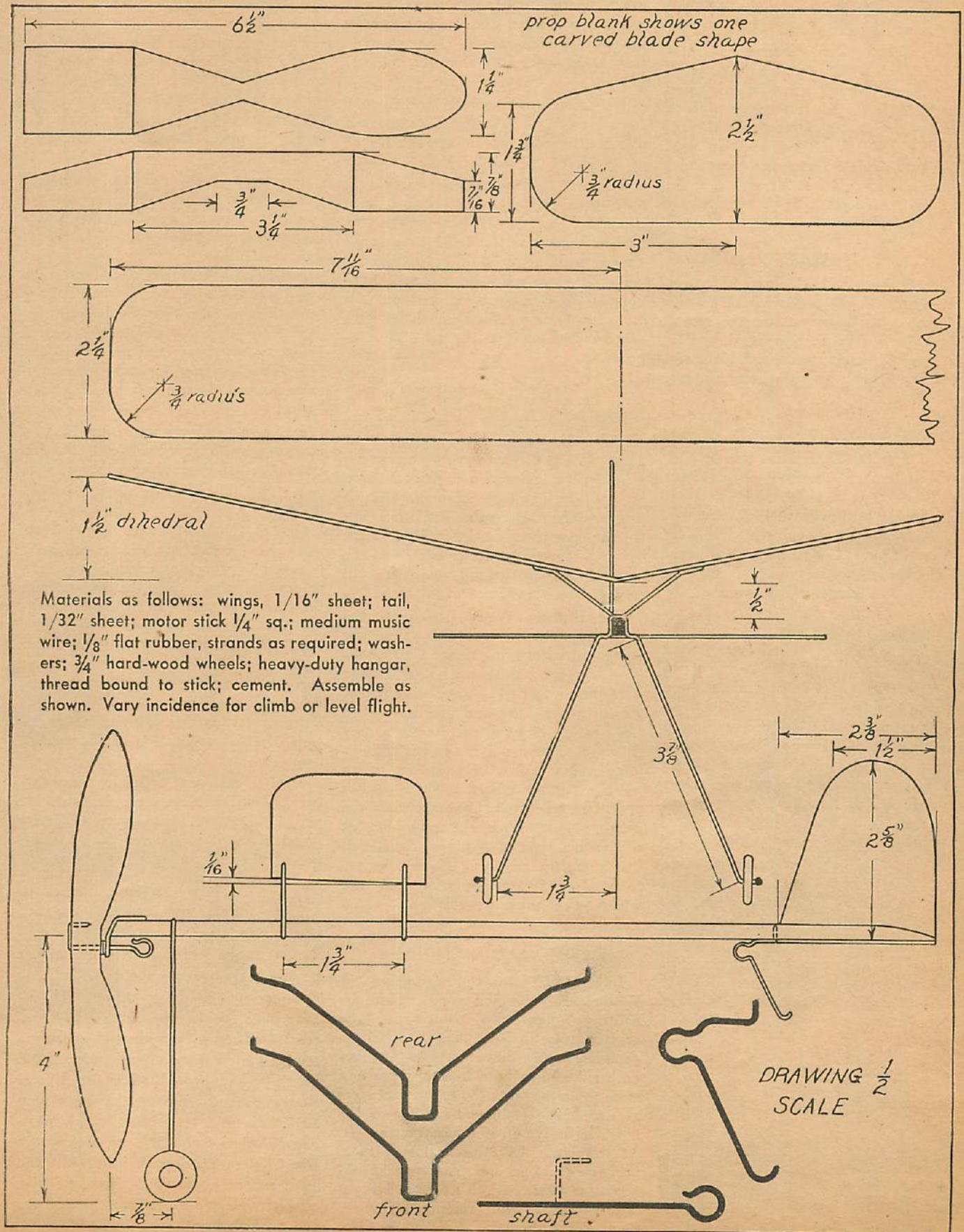
use a razor to put in your upper surfaces of the camber, trim in a hub and then sand them. From here you proceed as in the carving of the block. Cut a blade to shape, make a template of it and cut the other blade to conform to the template. Then sand the edges. This finishes all that need be said about carving propellers.

Built-up propellers of the separate spars and rib type must be built on a jig. The jig is made from a triangular block carved as shown in the drawings. The blade shape is cut into the (Turn to page 93)



Crashproof R.O.C.

An all-balsa model, simple to build and an excellent flier.



AIR PROGRESS

(Continued from page 4)

factories in England, France, Germany, Holland and the United States. The same company will also make the NA-16 two-seater military airplane which will be powered by the Wasp.

The German Junkers firm has completed a new 680 h.p. power plant which was seen in several new German planes entered in the Zurich International Meet. This engine is an inverted 60-degree, twelve-cylinder job designed to run on 87-octane fuel. There are two inlet valves and one exhaust for each cylinder and the power plant has a particularly small frontal area.

MILITARY

The Curtiss Hawk-75, a modification of the new Hawks ordered by the army air corps, has been put on the export market and may be purchased by foreign nations. Grumman amphibians and Seversky fighters are also being shipped abroad.

Nine were killed in a crash of a Dutch naval bomber in a rough sea between Java and Madura on October 13th. The plane involved was a Fokker sea bomber on a night flight between Batavia and Surabaya. Commander H. G. DeBruyne, naval air force chief of the Netherlands East Indies and technical chief of the naval air force, Uurbanus, was drowned with seven of the crew.

Airplanes crossing from Germany to Austria may do so only in designated sectors between sunrise and sunset and they must not fly at an altitude of more than 500 meters (about 1,640 feet) according to a recent order issued from Prague. It is believed that this is aimed at German air service planes which have been carrying out mysterious night flights and tactical operations in that area.

Eighteen machines of the improved Blenheim "Bolingbroke" type are to be built under license at the Montreal Fairchild plant. They will be used for coastal reconnaissance by the Royal Canadian Air Force.

There is a rumor that France will soon acquire a large number of Pratt & Whitney two-row radials, presumably of the Twin-Wasp type. This appears

to be a drastic step, for the United States is not supposed to release an engine for export until its own services are in possession of something new and better.

France is now testing the results of releasing dummies from the new 300 m.p.h. Morane fighters to see what will happen to a pilot who suddenly leaves his ship at high speeds. It is possible that they are considering the modern pursuit as a "rammer" type.

A Russian army machine recently flew from Moscow to Kharkov, a distance of about 650 miles, at an average height of 5½ miles or 29,500 feet.

The first German airplane carrying a quick-firing air cannon has just been completed by the Heinkel works. It will be known as the HE-112 and will have a cruising speed of 275 m.p.h. It will carry two quick-firing guns, probably of the Oerlikon type, in the wings and two heavy-caliber machine guns synchronized to fire through the propeller.

MISCELLANEOUS

Paul Mantz, former adviser to Amelia Earhart; Frank Clark, a veteran stunt flier; and Tex Rankin have been engaged to play stunt parts in a new aviation picture which will go before Paramount cameras about December 1st. The film so far has been titled "Men With Wings," something of a cavalcade of the air. More than two million dollars will be spent on this screen aerial opus.

The Bureau of Air Commerce has proposed new regulations imposing fewer restrictions on private fliers under good weather conditions, but add more stringent rules to govern instrument flying through fog and clouds. When the weather is good, private fliers may fly along or across civil airways without filing a flight plan or reporting to an airways traffic officer. These orders must be carried out, however, when the weather falls below the minimum at which this type of flying is considered safe along the airways. These rules are to be studied carefully before they are added to the present regulations.

THE WAR IN CHINA

In contrast to the campaign in Ethiopia and the civil war in Spain, air fighting appears to be playing the greater rôle in the present Chinese-Japanese war. Since early in October both sides have been hurling more and more squadrons into the various theaters of war. The Chinese have shown the most initiative in the use of aircraft. Their planes have done low attack, army-coöperation and photographic observation work as well as defensive patrols against the raiding Japanese bombers.

The Japanese efforts have been toward more and better bombing raids. A few two-seater squadrons using Kawasaki 88s have attempted minor forms of ground attack. While they seem to have more equipment than the defending Chinese, they do not seem to be able to carry out their duties as well as their enemies.

Practically every Chinese land attack in the Chapei area has been supported by low-flying Chinese air raiders. The raiders have done their work well, but the infantry troops have been unable to break through the heavily fortified Japanese lines.

Japanese pilots indicate more and more that they have not received the best of training. They continually mistake their positions and often bomb areas defended by their own troops. The series of "misunderstandings" concerning attacks on moving traffic along the Shanghai-Nanking road continues day after day. Three more British Embassy cars proceeding along the Minghong-Nanking highway were machine-gunned from the air on October 13th.

Japanese bombers continue to raid Nanking, with very little opposition from the Chinese although five were shot down on October 12th by Chinese pursuits.

One of the most interesting features of the air war between China and Japan is a new mystery anti-aircraft gun which is now being used by the Japanese in the Shanghai area. It is said that several of these new weapons which have been developed during the past few years in Tokyo are amazing in their accuracy and fire power. The new gun, it is said, is of larger caliber than most anti-aircraft weapons. But so far no details of the construction or fire control have been uncovered.

During August, China imported twenty-two American land planes valued at \$1,097,547. These were delivered direct. But it is believed that a number of Seversky fighters have been sold to China and shipped out by way of Argentina. During this same month American aircraft manufacturers exported \$5,158,818 worth of equipment to various countries, which was an 85 per cent increase over the month of July.

Vincent Schmidt, a 39-year-old ex-War pilot of Mineola, Long Island, recently arrived in Nanking where he attempted to join the Chinese air service. Schmidt had served with the United States Second Division in France in 1917. He also saw action in the Mexican Revolution in 1924. He fought for the Chinese at Shanghai in 1932 and again saw action in the Italian-Ethiopian conflict. He said he had just come from the Spanish front.

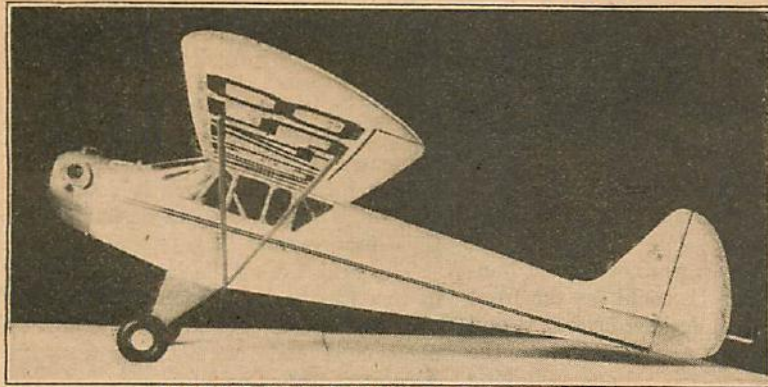


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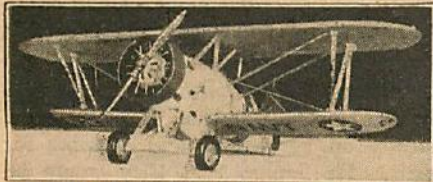
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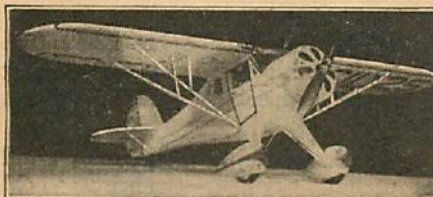
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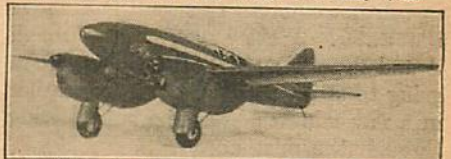
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HIGH OVER MAXEMBOURG

(Continued from page 36)

Field, giving their position and the weather for him to check against the forecast. At the same time Tony took a radio bearing to cross-check the position Bill gave him.

"Wind ten miles, thirty degrees," Bill told his men as they flashed along the coast of Nova Scotia over Halifax. "Get up to fourteen thousand. Best altitude." He checked their fuel consumption as their load lightened and ordered their speed up thirty miles an hour to get maximum efficiency.

"There's something more to it than just sitting there working the controls isn't there?" Rene said in his ear.

"Plenty," Bill said. "There is going to be more shortly. We're about to strike some soupy weather."

As Newfoundland loomed ahead fog came rolling in toward them—fog that swallowed them up completely. Bill checked his engine and flight instruments carefully, keeping a constant eye on them.

A wrench and a twist dropped the Lancer three hundred feet as he flipped his radio key and listened. The radio howled and scratched and he heard Rene Roebbling's voice trying to say something faintly.

"Switch to your interplane telephone," he shouted. Then to his men: "Hold your positions as closely as you can. Try to check back every fifteen minutes. I'll keep contact with Tony as long as I can."

"Is there any danger?" Rene said in his ear a moment later.

"Not a bit," Bill laughed. "I just got an exact triangulation fix from two steamships on the Atlantic and know our exact position and what we are running into. There will be plenty of rain, fog, and mist—but no danger. We'll run into three fronts."

"What is a front?" she asked.

"A cloud wall," Bill said. "There is always a wind shift just before we strike them. The first one we strike after we get out of this one we're now in will rise eighteen thousand feet above the water. We'll have to go through it and depend on radio bearings. We're going to strike a patch of clear weather in a few minutes. See the sun filtering through the mist ahead?"

"Yes," she said. "It's lovely!"

The next instant the silver nose of the Lancer burst into a great circle of sunshine with the blue sky above and a great spot of glassy-smooth water nine thousand feet below.

"We could easily land down there and be able to get off again," Bill said to her. "But a hundred miles from here the sea may be running high."

Bill threw his radio key as the five

Snorters came speeding out of the cloud bank behind him. "Close up your formation," he ordered. "We'll soon strike another front that reaches to eighteen thousand."

It was forty-five minutes when that great eighteen-thousand-foot cloud mass confronted them. For a moment Bill debated whether to run north for a hundred miles where he could see the front petering out. He decided against it and stuck the nose of the Lancer into the ominous black mass as rain came lashing in against the windshield. His eyes flitted to his artificial horizon. Rain, that was half hail, was beating down on them mercilessly. From the dials on the instrument panel came a ghostly, phosphorescent glow. His arms ached from fighting the controls to keep the big ship steady on her course. He wasn't trusting to his gyropilot now because of the bumps. He knew what a few flat spins could do to the nerves of a person unused to blind flying.

He began to talk to Rene Roebbling again to keep her mind off the storm.

"What are the bulky things on each side of you?" she asked.

"Machine guns, ammunition boxes—and the ammunition counters," Bill said grimly. "These trips here on the control column are the triggers. I can use the left one or the right one or both at one time, along with the one-inch cannon



Prince Michel.

that fires through the hollow propeller shaft. The thing in front of me is a telescopic sight."

"Gracious," she said. "I hope you don't have to use them."

"I'm hoping harder than you are," Bill said. "We never use them unless we are attacked."

There was a silence for a few minutes and then her voice came again. "Do you know," she said, "I think I'm going to take a nap."

"Good," Bill said. "Throw your radio key so I won't disturb you."

An hour later Shorty's voice came excitedly through Bill's earphones. "I think I've picked up a light through the mist," he said.

"Try and keep your nose on it," Bill said. "Get down to two thousand feet." He eased the control column of the Lancer forward and took it down in a long shallow dive. A light flashed ahead, then disappeared.

The next time it flashed Bill realized it was the flashing, intermittent beam of a lighthouse. He checked his instruments and made contact with Croydon Airport outside London.

"We're across St. George's Channel," he said to his men. "That light was on the south coast of Wales. Hold your course due east. We'll be over Cardiff and Bristol soon. It may clear before we're over Croydon."

They sped on above the English countryside, their red and green running lights clearly visible to one another now. The night was clearing fast. Their powerful engines droned on and on.

The dim night lights of London spread out ahead of them as Bill spoke into his microphone. "Follow me," he said.

Cutting south they picked up the steady beacons of Croydon, flashed above them and laid a course across the rolling South Downs toward the abandoned lighthouse at Beachy Head. The moon gleamed white and brilliant on the headlands of the Seven Sisters as they left the wall of England behind them and were over the menacing, choppy waves of the Channel.

Bill put his gyropilot at the controls. It was just a question of holding her steady on her course and allowing for drift. He figured that they would be over Madura, the capital of Maxembourg, in another hour.

"It's hard to believe," he said softly. It didn't seem possible that such a thing could be happening in the Twentieth Century.

All the world, he thought, has heard about Rene Roebbling—the heiress to old Mordecai Roebbling's fifty million dollars. He had seen her pictures in rotogravures and read articles about her. She was the kind of girl who took her responsibilities seriously. He remembered how her name had been on every one's lips when the world heard of her romance with Prince Michel of Maxembourg.

It seemed almost incredible to him now that he should be going to aid that romance.

He flipped his radio key as the light on the panel gleamed scarlet. "O. K.," he said. "Bill speaking."

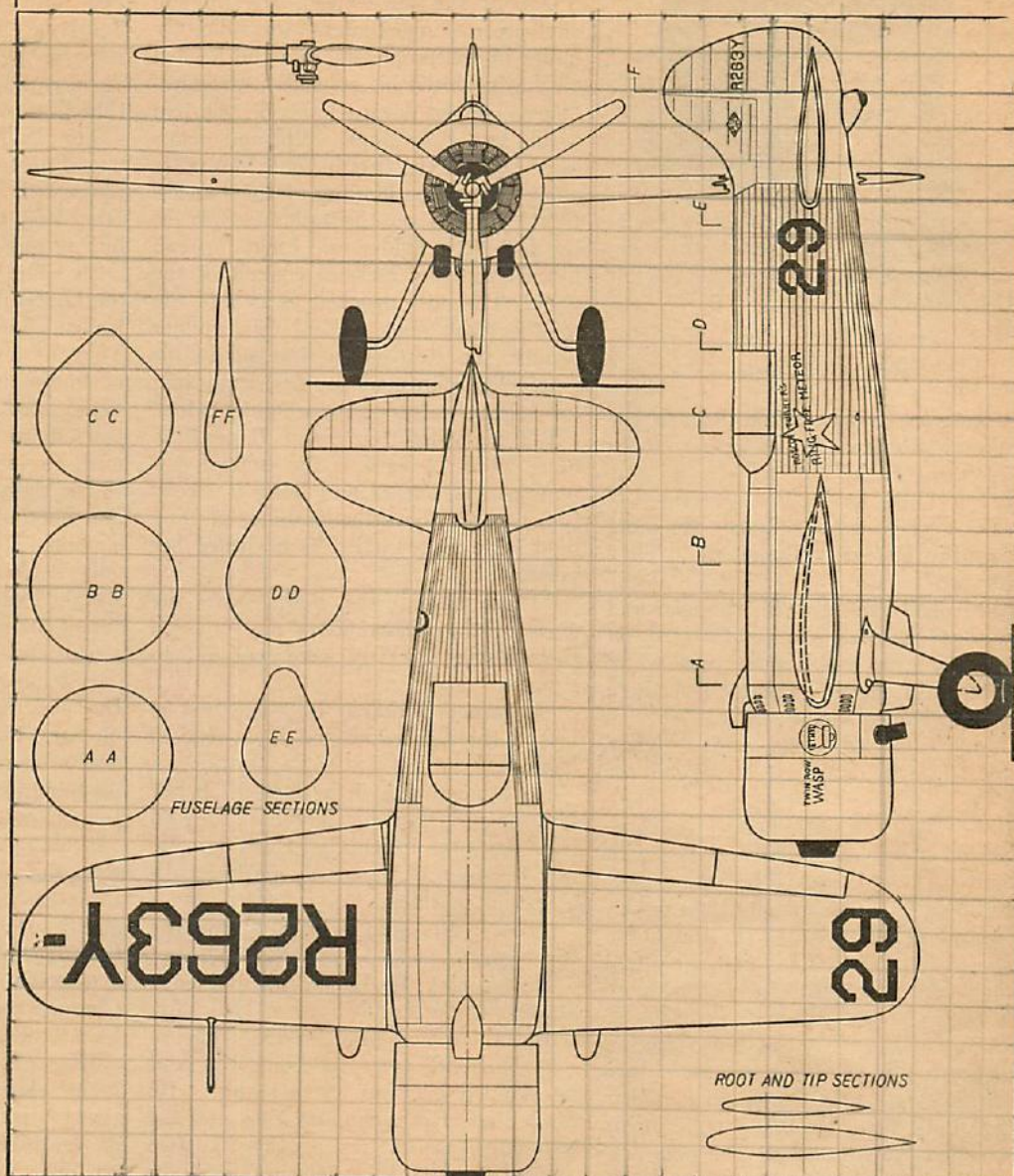
"There are two flights of about five planes each flying in 'V's six thousand feet above us," Shorty said in his ear.

THE TURNER RACER

 $3/16" = 1'$

By William Winter

Colonel Roscoe Turner's Meteor is a Brown-designed and Laird-completed racer. The engine is the 1,000 h.p., 14-cylinder Wasp. The ship placed third in the Thompson Trophy Race after Turner recircled a pylon. The estimated top speed is close to 400 m.p.h. To convert the model to the standard $1/4$ inch scale, draw vertical and horizontal lines $3/16$ inch apart across the drawing. Prepare a second sheet with $1/4$ inch spaced lines and fill in by counting squares.



"Shall I go up and take a look at them?"

"Leave 'em alone," Bill said. "We don't want any one to see our markings if we can avoid it. That's why I wanted to finish our hop at night."

"They're diving on us, Bill!" Red Gleason cut in. "Ten of 'em."

Bill kicked his right rudder and threw his control column slightly forward and to the right. As the Lancer banked to the right he stuck his fist against the moon and gazed upward. One look was enough. The first of the two formations was pulling out of a dive, only to shallow-dive again at a speed that would make their fire effective if they were going to use their guns.

He yanked the Lancer back on its course and spoke in the microphone. "Pour in the juice and climb!" he said to his men. "Look out they don't zoom

up underneath you when they come out of their dives. Get up to your ceilings. Turn on your oxygen at twenty thousand feet. We'll run away from them."

He jabbed the throttles of the Lancer open and hung the ship on its props. It didn't occur to him that those ten ships might be as fast as his own Snorters as he took the Lancer upstairs to take Rene Roebling out of danger.

V—BATTLE

"WHAT is it?" Bill heard Rene Roebling say, breathlessly. Her voice sounded only half awake. He knew that his sudden zoom had awakened her. He glanced at his altimeter and didn't wonder that she had been startled. They were going upstairs in a runaway comet.

"Nothing of any importance," Bill said to her. "Ten single-seaters just nosed down to look us over and I don't

want them to see our markings. We're going up above their ceiling and run away from them."

Suddenly, Bill stiffened and came upright in his seat. The night had become hideous with the chatter of machine guns and the high-pitched scream of diving motors. He looked back over his shoulder and saw that his Snorters were not running away. They were too busy trying to keep from being annihilated by the ten single-seat fighters that were swarming around them.

"Check in, Shorty!" Bill shouted into his microphone.

There was a moment of silence. Then Shorty's voice panted into his ear. "We couldn't get away from them, Bill," he said. "They're too fast. They're good for nearly four hundred m.p.h. at eighteen thousand. Their ceiling must be at least thirty-five thousand. They carry



Rene Roebing.

four guns each—two firing through the prop and two fixed on the wings. You'd better come back!"

"I can't!" Bill said. "I can't risk——"

"Yes, you can!" Rene Roebing snapped in his ear. "Forget me! They need you."

Bill looked back over his shoulder and saw that she was leaning forward on her safety strap and her face was white and tense in the moonlight. But there was no evidence of fear there.

"You must go," she said. "They wouldn't be in danger if it weren't for me."

Bill's mind was working with its characteristic speed as he hesitated for an instant. Then his mouth became a thin, hard line across his face and the muscles in his cheeks bunched. He fought to persuade himself that his first duty was to his men. But Bill's early training had been of the old school variety. It had been a stern code of the Victorian variety that was almost second nature with him. He held the Lancer on her course until Rene Roebing spoke in his ear again. This time her voice was desperate.

"Look, Mr. Barnes!" she screamed at him. "I'm going to jump if you don't go back!"

Bill swung around in his bucket seat and he could tell that she would do just what she had said. She had loosened her safety strap and had pushed back the overhead hatch and was climbing up on her seat. His blood froze in his veins as their eyes locked. There was no fear in her eyes—only desperation. All uncertainty left him. The fleeting thought came to him that Prince Michel was not such a fool to risk his throne for such a woman. Then he yelled into his microphone.

"You win, Toots!" he said. "Close that hatch, fasten your safety belt and keep singing and shouting so your eardrums won't burst. You asked for it!"

He chandelled the Lancer up and back in a climbing turn and stuck the nose down until he was in a vertical dive. A gale that was like nothing Rene

Roebing had ever experienced tore at the hatches of the big ship as Bill eased it into a steep inverted dive and half rolled it right side up.

One of the low-winged, streamlined, olive-green single-seaters was directly under his telescopic sights as he leveled off and centered his controls. His forefinger clamped down on the electric trip of his two Brownings. Fire and death leaped out of the two machine gun ports along the engine housing of the Lancer. Death danced on the tail assembly of the fast little fighter and crept forward toward the tiny inclosed cockpit of the pilot. The nose dropped away and the pilot's right foot kicked his rudder against the stop as he slumped in his seat. The ship made its first right spin toward the waters of the Channel below.

Bill had forgotten about Rene Roebing when he yanked the control column of the Lancer and hung it on its props to get above the slashing, snarling fight. He was startled as he heard her voice.

"Those ships," she said, "have the cross of the Maxembourg air force on their fuselage. They were sent out to stop us."

"I gathered that," Bill said as he kicked the Lancer around in a vertical bank.

He studied the little fighters below him for an instant and saw that they all bore the same insignia on the side. He saw that one of them was marked with a special marking.

"That," Bill said grimly, "would be the leader."

He brought the Lancer up and back at terrific speed and dived at that ship.

But the leader of those nine remaining ships had been watching Bill and he skidded his ship out of range. He leveled off after a climbing turn and the two ships raced at one another like two winged beasts. Bill's face was a study in concentrated fury as he nursed his gun trips. His fingers clamped down. His bullets drove into the monoplane's left wing and crept toward the inclosed cockpit. Then the pilot again eased his ship out of range.

"Some one taught that baby how to fight," Bill said between clenched teeth.

The ships streaked and tumbled through the air to get that advantage that would be the difference between life and death. They fired burst after burst without telling effect.

Bill's streaming face was knotted and grim as he talked to himself. He knew that he had made a tactical error in ordering his men to a higher altitude when he first saw the little fighters. He knew now that they were fully supercharged and were most effective at fifteen or eighteen thousand feet where their speed was terrific. And he knew the leader of the tiny monoplanes was a master. He was a natural fighter.

Bill's stomach tightened as he thought that all of them might be as good. If they were, his men were fighting against terrific odds. The single-seaters were as fast and as maneuverable as their Snorters. If the men at the controls were as good as their leader, they had an advantage that could mean but one thing.

The leader of the olive-green ships was slipping away from Bill's vicious attacks with an ability that was uncanny. His blood boiled as the man flashed by him at terrific speed.

He came up and over in a loop, rolled the Lancer level at the top as the enemy leader chandelled back to the attack. They were coming at one another again at frightening speed. But this time Bill anticipated the enemy's direction as he started to sideslip. He held his fire until the single-seater began to slip off to the right. Then he corrected his aim and his finger came down on his 37mm. cannon. The next instant he could see only a cloud of black smoke that was streaked with orange flame. Débris flew out of the smoke as the one-pound shells struck and detonated.

Bill hung the Lancer on its props as the gas tanks of the single-seater exploded. Flame licked through the air in every direction as the streamlined monoplane and its pilot went hurtling toward the earth.

Probing the air around him, Bill saw that the rest of the battle had drifted three or four miles off to the left. He and the leader of those single-seaters had been fighting alone. He saw another of the green ships fluttering toward the Channel as he swung around and went back to the aid of his men.

He went into that mass of snarling, raging ships with all the speed and fury the Lancer would give him. As three of the green ships darted out to pounce on him, he flipped over like a hawk diving on its prey and shot across the tail of the last ship. His burst of fire lasted but a split fraction of a second. But his aim was deadly. The nose of the ship came up, then dropped away into a dizzy spin and fell.

He saw Shorty Hassfurth follow a green ship as it pulled up steeply and went over in a half loop to roll right side up at the top. As Shorty came up behind it and came over on his back, he neutralized his controls and opened his throttle. Hanging head downward, he lined up the ship in his telescopic sights and tripped his guns. Fire and smoke belched from the green ship's engine housing as Shorty drew a jagged line from tail to hub.

Off to the right he saw Red Gleason's Snorter flash over in a dazzling inverted loop to throw a ship off his tail and come up under the tail of a green monoplane. The monoplane staggered like a thing mortally wounded as Red

tripped his guns—pouring lead into it. The monoplane came up until it almost stalled and then fell away in a vertical dive.

Then Bill saw something that brought his heart up between his teeth. The muscles in his face stood out like whipcord as he saw one of his own Snorters fluttering over and over. He jammed the stick of the Lancer forward and dived on the tail of a green ship that was trying to deal a deathblow to the plunging Snorter. A wisp of smoke curled above the head of the enemy pilot. Another and another bullet drove into the back of his neck as the ship reeled drunkenly with a dead man at the controls.

Bill saw the white, twisted face of young Sandy in the cockpit of the falling Snorter. Then he saw Sandy struggling up out of the whirling cockpit, fighting with all his strength to overcome the centrifugal force of the falling plane. He saw him get one leg and then an arm over the coaming—knew that he was lashing out desperately with his other leg to force himself out.

He rolled clear of the whirling wing and tail as he plunged into space. The pilot 'chute on his back fluttered out to drag the main 'chute after it. Bill circled in close to see if he was wounded.

Sandy raised one hand above his head and Bill saw his mouth open and close. He threw the switch on his radio panel and shouted Shorty's name into the microphone.

"Get down here fast and follow Sandy down!" he said. "He bailed out and the surface is choppy."

A moment later as Shorty took his place beside the falling Sandy, Bill whipped the Lancer upward again. There was hate and rage and murder in his heart.

The pilots of those green ships thought some flaming monster from another world had fallen among them as Bill came back. His blue eyes were gleaming with a mad recklessness as he attacked with a berserk fury that would not be denied. He took his rage out on the four remaining low-winged monoplanes that were trying to deal death to Red and Cy Hawkins and Bev Bates.

That was when the pilots of those four remaining ships realized that enough was too much. The faces of the pilots were white and terror-stricken as they peeled off and raced to safety.

"Let 'em go!" Bill snarled into his microphone as his men flipped their tails in the air and started to follow. "Get down beside Shorty. He's making a landing to pick up Sandy."

"Is the kid, O. K., Bill?" Red Gleason asked.

"He'd better be!" Bill said. "I don't think he's wounded."

"Are you sure?" Rene Roebeling said in his ear. "I'll never forgive myself if he is."

But Bill wasn't listening. He was standing almost upright on his rudder bars as he took the Lancer toward the choppy waters of the Channel at almost terminal velocity.

Sandy was climbing into the gunner's cockpit of Shorty's Snorter when Bill set the Lancer down on the waters of the Channel.

"Is he all right, Shorty?" Bill asked anxiously.

"I'm all right, Bill," Sandy himself said a moment later. "I was worried for a couple of minutes when I couldn't get out of my cockpit. I'm sorry I lost my Snorter."

"You couldn't help that, kid," Bill said. "You can get off all right, Shorty?"

"Sure," Shorty said. "What's the altitude for the rest of the hop?"

"Twelve thousand," Bill said. "I'll take the peak of a 'V' again."

Spume crashed over the bow of the Lancer as he lifted it off the water.

Then he thought of Rene Roebing. "Are you all right?" he asked her.

"Yes," she gasped. "I've just got my breath after that dive. What a life you lead!"

"Tell her that was all in fun, Bill," Sandy cut in. "Some day we'll put on a real show for her."

"I'll watch from the ground," Rene Roebing said.

VI—CONSPIRACY

"YOU are sure those were Maxembourg army planes?" Bill asked Rene Roebing after he had taken his bearings and given his men their course.

"I am certain," she said. "I have ridden in them, or ones like them."

"Does their attack give you any ideas?" Bill asked.

"I am even more worried about Michel," she said. "It could never have happened unless he is being held a prisoner some place. The premier, Max Jarquin, may have ordered them out to stop you through General Huberto, minister of defense. They are both disloyal to Michel."

"We'll find out about those things soon," Bill said grimly. He checked his bearings carefully and told his men to close up their formation as the first of the great length of beacons flashed on

will send out ships to escort you in if you wish them."

"No, no," Bill said. "Tell him to give me the ceiling and the speed and direction of the wind and we'll do the rest."

"Right," Bill said after she had translated the Madura operator's reply. "I think I can see their beacons now. Where is the field and how long a run do we have?"

"The field is right in the center of the city," Miss Roebing said. "It is part of the old palace grounds. I think the run is about thirty-five hundred feet in each direction. The city itself is surrounded by low-lying hills."

"Right," Bill said again. His eyes scanned his instrument panel as he listened to the low, steady hum of the beam in his ears. "I see their floodlights now."

Beneath them, at the bottom of a natural saucer, spread out the dim, dark outlines of the small city of Madura, the capital of Maxembourg. Far away in every direction lights blinked in the farm houses and barns in the valley around the city.

Then, as Bill led his men lower and lower, the city itself began to take form. Wide boulevards that were dotted with lights led from the outskirts of the city to the main plaza in front of the tur-

Lancer up to the apron, locked his brakes and killed his engines.

He pushed back his overhead hatch, stood up and watched his men come in and blast their ships to a position on the line beside him. He spoke to Rene Roebing but she shook her head and touched her ears to tell him that she could not hear. Then she spoke rapidly to him. "The little committee that is standing over by the dispatch tower waiting for you men to all land," she said, "is headed by General Huberto, minister of defense. He is an enemy of Michel's. He is in command of the army and the police and has a secret police organization that is not supposed to be in existence. He is dangerous. Watch him constantly. I do not understand why he is here representing Michel."

"You're going to be all right?" Bill asked her.

"Oh, I'll be all right," she said. "Everything is all right on the surface up to now. I see my chaperoning aunt and my maid and chauffeur waiting for me. My messages got through to them. The premier will not dare to interfere with me until they have disposed of Michel. They're coming."

Bill climbed down from the forward cockpit of the Lancer and helped Rene Roebing alight as the little knot of gold

"Each man carries his own luggage in his own ship," Bill said. "You will take care of that?"

"What about me, Bill?" Sandy asked. "I don't even have another pair of drawers."

He thought he was speaking quietly so that no one could hear. But Rene Roebing heard him and laughed. "I'll send you some things in the morning, Sandy," she said. "You want to keep your eyes open so that you will be around to use them."

The words drummed through Bill's consciousness almost unheard as she said them. Then they began to beat like the rat-a-tat-tat of a machine gun. She was telling him to keep his eyes open that night—that perhaps Huberto was leading him into a trap. Then they were saying good night and Bill and his men were ushered into a long, low limousine that whisked them toward the great towering chateau at the other end of the field.

Bill and his men stood within the paneled, high-ceilinged room of the chateau that had been the palace of the rulers of Maxembourg for ten centuries. Through the windows they could see the high-gabled houses with their lace-capped heads and Gothic windows lining the dark streets outside. And they could almost hear the tread of men in armor across the floors.

Far off in the hills they could see the glow of shepherds' fires and down the valley the moon danced across slowly drifting clouds. Shorty Hassfurth and young Sandy were standing side by side gazing out into the night when Sandy spoke. He spoke with a hushed intensity that startled Shorty at first. "Gosh, Shorty!" he said. "Isn't this romance for you? Look at the moonlight out there playing across the arched portal. It reminds me of—gosh, I don't know what. What does it make you think of?"

"Me?" the hard-bitten Shorty said. "It makes me think of something to eat."

"Nuts!" Sandy said. "The only place you can find any romance is in a dish of sauerkraut. You—"

He stopped speaking as Shorty's elbow nudged into his ribs and he turned to follow Shorty's gaze.

Standing in a doorway—not the door through which they had come into the room, but another one—stood a well-built, handsome man of about thirty. He was dressed in a brightly colored uniform of one of the prince's regiments and they could tell by the cord of gold attached to his left shoulder that he was a staff officer.

He closed the door silently behind him, clicked his heels and bowed from the waist. There was an air of stealth

about him and yet a courageous and frank bearing. There was fear in his eyes though he did not seem to be afraid. There was something dashing and debonair about him as though he might have stepped from the pages of an old-world novel of a hundred years ago.

Bill and his men watched him in fascination as a smile flashed across his lips and he began to speak in precise Oxford English.

"Mr. Barnes," he said, and his eyes swept all of them, "I am Colonel Ricardo, equerry to his majesty, Prince Michel. I serve him in coming to you from Miss Roebing."

He suddenly moved across the room on the toes of his black, shining boots toward the arched door that led into a hallway. He moved with the speed and agility of a cat, stopping to gaze up and down the hallway. Then he moved back to a position beside the door through which he had entered the room.

"Will one of you please stand close to that doorway and listen?" he said. "Be ready to warn me if you hear footsteps. If I am found here"—he made a motion with a forefinger across his throat—"my life will be worth nothing. Miss Roebing has asked me to come and tell you the true situation and to warn you that Huberto may lead you to

CROSS WINDS

1	S	L	O	T	S	6	S	O	L	O	S	11
10	G	C	H	R	I	S	T	M	A	S	1	
14	U	S	16	M	O	Z	E	11	I	A	H	R
19	A	I	R	A	D	V	E	N	T	U	R	E
24	D	R	A	G	25	O	R	26	G	O	R	E
27	R	E	V	E	A	L	29	I	R	O	N	E
31	U	N	E	32	N	U	R	S	E	33	O	U
34	P	I	S	T	O	N	36	I	N	T	O	N
38	L	A	39	I	N	T	E	N	D	S	41	T
42	A	N	43	E	A	G	E	45	P	R	O	A
48	N	O	47	O	R	S	O	49	E	B		
50	E	A	S	I	L	Y	53	S	P	R	A	W
56	S	T	E	E	D	57	T	E	P	E	E	

ACROSS

- 1—Wing openings for smoothing air flow
6—Flies a plane alone
11—The 25th of December
14—First person plural, objective

- 16—Abbreviation of the "Show Me" State
17—Included

- 18—Lower chamber of Congress, abbreviated
19—Member of foremost aviation club

- 24—Effect of air resistance on a moving body
25—Combining form for "mountain"

- 26—One segment of fabric in balloon envelope
27—Disclose

- 29—Handcuffed
31—One, in French
32—Tend carefully
33—Owed
34—Engine part moved by fuel explosion
36—Chant
38—Sixth musical syllable
39—Purposes
41—Chemical symbol for thulium
42—First name of Mrs. Lindbergh
44—Length of existence
45—Swift-sailing outrigger canoe
47—Else
48—In such manner
50—Comfortably
53—Stretch out
56—Horse
57—Indian tent

DOWN

- 2—Printer's direction for small letters, abbreviated
3—Measure of electrical resistance
4—Walked upon
5—Seventh musical syllable
6—Abbreviation for a city thoroughfare
7—Leave out
8—Downy growth
9—Earth ridge
10—Four-winged aircraft
12—Prophet
13—Beyond redemption
15—Sea cow
18—Up to this time
20—Talks wildly
21—Willful
22—Loudness
23—Repetitious musical composition
28—Soon
30—Torn
35—Fasten
37—Recipe abbreviation for teaspoon
40—Abbreviation meaning "for example"
43—Forepart of aircraft
46—Harvest
47—Ancient
49—Make a choice
51—Present
52—Abbreviation meaning "that is"
54—Concerning
55—Ourselves

Answers for December

A	P	R	O	N	R	O	M	E	O		
E	L	M	I	R	A	E	V	E	N	L	Y
A	T	M	A	I	L	L	E	T	E	A	
G	A	P	L	A	Y	E	R	S	A	W	
L	I	A	R	D	E	N	A	N	T	E	
E	R	R	O	R	S	T	A	X	I	E	
	A	V	A				N	I	P		
A	S	S	E	N	T	S	T	A	P	L	E
R	O	O	D		R	A	T	L	E	A	R
G	A	L	C	A	R	E	T	D	G	A	
O	R	V	I	C	K	E	R	S	O	S	
N	E	G	A	T	E	R	O	S	C	O	E
	D	O	T	E	S	S	T	E	R	N	

a place where seemingly you are guests but actually you will be prisoners. You must watch every move. Are you armed?"

"No," Bill said. "But Huberto won't dare—"

Colonel Ricardo held up his hand and his teeth flashed. "He will dare anything," he said. "Remember you are a long way from home and it would not be difficult for him to prove that you were plotting against our government. Huberto is only the tool of Max Jarquin, the premier. He is only carrying out Jarquin's orders. Even your lives are in danger. Jarquin ordered those ten fighters out against you. He believed they would stop you. That is why there is so much delay now. They expected to eliminate both you and Miss Roebling at the same time. Instead you eliminated Major Pasquale, the crack flier of our air force, and several of his men. That is well. He was a snake working with them."

"What," Bill asked, "is the situation? Why hasn't Prince Michel seen us immediately? Under the circumstances he should—"

"No one knows where he is," Ricardo said. His face was tense now and he was almost breathing his words. "He has disappeared completely. The people believe he is mountain climbing in the north. One or two bulletins have been issued by Jarquin. The people are uneasy and worried. They cannot understand what is going on. Jarquin has been trying to poison their minds against Michel. The press is under his control and he has used that in a subtle way. But he has had emissaries working throughout the country, spreading mouth to mouth poison. They have been telling the people that Michel is selling the country while he spends his time in debauchery. Some of them are beginning to grumble. But most of them love him. They cannot understand how he can have changed from a man who had only their interests at heart into the thing Jarquin paints. And Jarquin cleverly blames the change on Rene Roebling."

"The low louse!" Sandy exploded.

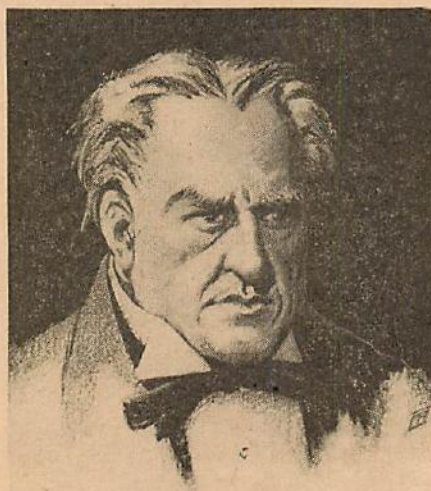
"Exactly," Ricardo said. "A louse."

"You cannot get in touch with Prince Michel?" Bill asked. "There must be some way to find him."

"There must be a way," Ricardo said, "and it must be found soon. We have been working desperately, we few who are without authority to oppose them. We are all in constant danger from Huberto's secret police. Jarquin is working everything up to the climax that will take place two days from now, on the morning of the 10th at high noon. He is slipping troops into the city in readiness. We must find Michel before that time!"

"Just what is Jarquin going to do?" Bill asked.

"Unless we can find Michel and free him," Ricardo said, "at high noon on the 10th Jarquin will appear on the balcony of the chateau and announce Michel's abdication. The people will be informed the night before what he is going to do. He will declare the 10th a holiday. When he announces the abdication of Michel, Michel's younger brother, Casimir, will appear on the balcony. It will be announced that he will succeed to the throne and Jarquin will depend on his agents to work the people up to a state where they will accept him with open arms. There will be a period of celebration and the people will be prepared for the actual coronation with such generosity and splendor that they will not realize what has



Max Jarquin

happened until Jarquin is in complete control of the country. Then, sir, he will sell it out!"

"But what about Michel?" Bill asked. "What will they do with him? They won't dare murder him. He can deny Jarquin and tell the truth."

"He'll have no opportunity," Ricardo said. "He will be sneaked out of the country. They will seal his lips in some way. Once Casimir has been recognized and his abdication announced, Jarquin will use the army to enforce his will if he believes it necessary. It will mean a guerrilla civil war for a time. But Jarquin will win. We must have Michel back here by noon of the 10th."

"You have no idea where we can find him?" Bill asked.

"I have agents scouring in every direction," Ricardo said. "They were clever in the way they kidnaped him. They did it from under our very noses. It is Miss Roebling's idea that Jarquin will hold you and your men prisoners, detain you here in the chateau until after these things are over. Then you will be powerless to do anything."

"But what can I do," Bill asked, "if you can't locate Michel?"

"Nothing," Ricardo said. "Unless you are willing to join me in the only move that can save the country if we can't find Michel."

"And that would be?" Bill asked softly. He was weighing the man and his words carefully. A strange tenseness had settled down on the room.

Bill, watching Ricardo, knew that here was the kind of man he had read about—the kind of man who would give his life for his king with a laugh on his lips, backed against the wall, his blade dripping blood, fighting until his laughter turned to agonized sobs and he died. The spirit that Ricardo had for his prince crept into Bill's blood.

"My scheme," Ricardo said, "is madness. But madness often wins. If we can work out some ruse so that you and your men can retain your freedom for the next twenty-four hours it will be simple. Your planes are ready to fly? They were not too much damaged in your encounter?"

"They're ready to go," Bill said. "What is your idea?"

"To kidnap Jarquin!" Ricardo said, and his teeth flashed in a laugh. "That is the last thing they will expect. If there is no Jarquin, there is no commander, no government. They will be helpless and it will give us more time to find Michel."

"What ruse," he said, "can we devise to keep us free to act?"

"Ah!" Ricardo said. "Now I know why you are held in such high esteem in your own country. You will join me?"

"We're in!" Shorty said, and there was a sparkle in his eyes.

"And so am I, my friends!" a voice said from the arched doorway.

Framed in the doorway was General Ludwig Huberto, minister of defense, and a half dozen of his secret police in their belted uniforms, heavy automatics hanging from their hands.

Ricardo's eyes flitted across their faces and then stopped as he looked at Bev Bates with an expression of hurt regret.

"You have failed me," he said to Bev. "You did not listen for their footsteps."

"I—I—" Bev began and his eyes were almost panic-stricken.

"Enough of that!" Huberto thundered. "You are all plotters against the government of Maxembourg."

For one brief moment Bill wondered if Ricardo had betrayed him. In the next instant he knew that his doubts of Ricardo were unfounded.

He saw Ricardo's right hand flash across his breast and draw the rapier that hung at his side from its scabbard. At the same instant he leaped for the doorway, straight into those six guns. From his lips came a shout that

beat against the walls of the musty old room.

Huberto's mouth came half open as Ricardo bounded into the air and screamed his shout of defiance. Then, it ended in a strangled gasp as the rapier plunged deep into his midriff and he staggered backward.

Six guns spoke as one as Ricardo loosed the handle of his rapier and bounded into the hallway. But he had pushed the first man to spoil the aim of all of them.

The guns blazed again and then his laughter came floating back to their ears as he rounded a corner.

VII—PRISONERS

AN officer, who appeared from nowhere, barked orders at the frightened, white-faced secret police of Huberto. They rammed their automatics into Bill and his men and backed them against a wall.

"Keep your heads!" Bill snapped. "Don't open your mouths and keep your fists quiet. They're nervous. If you make the slightest resistance they'll kill you."

Two doctors bent over the dying Huberto as officers and police milled about the room, shouting orders, cursing, asking questions.

"It looks as though," Cy Hawkins drawled, "this is the time we led with our chin."

Then the confusion evaporated as quickly as it had appeared. Officers, soldiers, police, even the two doctors came sharply to attention as a guard called out something above the babble.

An enormous man with iron-gray hair, shaggy eyebrows and a forehead that swept straight up and back loomed in the archway. His head was set so close to his massive shoulders that he had the appearance of having no neck. His gray-green eyes were as expressionless as the eyes of a cat as they traveled over the room and the people in it. They seemed not to see the people except as patterns that were a part of the room.

Bill knew that here was Max Jarquin, the premier of Maxembourg, the man who was scheming to make himself a dictator. The man exuded a combination of high intelligence and absolute ruthlessness. He saw all people, not as human beings, but as pawns that were a part of the destiny he would control.

He spoke to the two doctors and Bill could tell by the way they spread their hands and answered that Huberto was dead. Jarquin ordered them to take Huberto away and clear the room. Then he came in and sat down in a huge teak chair that was placed against a wall. He sat with his head bowed for a moment. Then he slowly raised it and his eyes traveled from Bill's feet to his eyes and rested there. He studied what

he saw there as a scientist might study a specimen. His eyes gleamed brightly beneath his shaggy brows but they did not change expression.

"I should have you executed," he said slowly to Bill, although he seemed to be talking to himself. "I would be justified in having you all executed. But that would make trouble for me. You are all illegal entrants into the country. You are plotters against the government."

He made the statements flatly as though the things he said were facts that would bear no contradiction. Bill knew there was no use in telling him Rene Roebbling had papers signed by Prince Michel.

"How did that man Ricardo get here and what did he tell you?" Jarquin suddenly thundered at him.

"He came through the door behind me," Bill said. "He had no time to tell me what he wanted. Huberto and his men appeared before we had an opportunity to talk." He knew that only Huberto had understood what Ricardo had said to him and Huberto was dead.

"If I confine you here in the chateau and promise you a safe escort to the border within the next week, will you give me your word you will make no further attempt to act or communicate with any one outside?" Jarquin asked. "No," Bill said.

Jarquin continued to gaze at him with expressionless eyes. But Bill knew that his life and the lives of his men were being weighed behind those eyes.

"You have the lives of Huberto, Major Pasquale, and six of our best fliers scored against you, Barnes," Jarquin said. "I can't instantaneously decide whether it would be better to eradicate you and your men now to balance the account or let you live. I am not interested in whether you live or die—only the wisest thing for me."

Again Bill read behind that imperturbable mask and knew that only the presence of Rene Roebbling in Maxembourg kept Jarquin from shooting them down like so many clay pigeons. He remained silent.

"All right, Barnes," Jarquin finally said. He actually smiled as he said it. "I'll put you where you won't have any opportunity to do anything but count rats. You or your life is of no importance whatsoever to me."

He barked orders at the officer commanding the police who surrounded them and pushed himself to his feet. Bill could see that he had already forgotten him as he went out of the room.

Bill and his men were herded together like so many cattle by twenty or thirty of Huberto's secret police after handcuffs had been snapped on their wrists.

Bill tried to photograph the building in his mind as they were driven down



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a series of musty stone steps deep into the bowels of the earth. But he could see practically nothing in the dim light afforded by the electric torches their guards carried. Little rivulets of water oozed through crevices in the rocks.

At the bottom of the steps the guards threw open an iron-studded door that opened into an evil-smelling room, partly carved out of solid rock. The floor was covered with moss and lichens. There was but one small grilled opening that gave off the damp stench of a sewer.

Bill made motions with his hand toward his mouth and pretended to be masticating food. The guard nodded and the officer in command told them they would be given food and water.

Not even the horrible silence and darkness of the place could keep them awake after they had discussed their situation and eaten the food that was given them. They decided that their only chance lay in Rene Roebing's aid.

"Don't worry," Bill said. "She'll get us out of here. If she doesn't Jarquin won't dare hold us after he has pulled off his coup of day after to-morrow."

It was ten o'clock in the morning before they were all awakened by a guard who brought them food and coffee. He put the stuff down and stood over them while they ate it, a drawn automatic in his hand.

When they had finished, another guard came in to clear the stuff away. He stacked all of the stuff in piles on a tray and then he spoke to the armed guard. The armed guard half turned his body away to reach for the clay jug that had held their drinking water.

As he straightened up, the guard who had been stacking the tin plates brought his fist up from the floor and hit him flush on the jaw. The man sailed backward, hit his head against the stone wall and collapsed.

"Ricardo!" Bill said.

"The same. We've got to work fast. We have only twenty-five hours. I came back to help you because it is my fault that you are here. And you can still help me. I have found Michel!"

All those things he said while Bill and his men gaped at him.

"You escaped," Red Gleason said.

"They," Ricardo said scornfully, "could not catch me. I lost them and then went out and made contact with my men last night. One of them has located Michel. He was flown to a small island off the coast of Turkey in the Aegean Sea. We will need your Lancer to get him."

"And how do we get the Lancer?" Bill asked.

"I have fixed that," Ricardo said. "We fight our way out. I have a half dozen automatics hidden on the stairs above. In the courtyard is a fast car with my men in it. If we can fight

our way through to the car we can get to the hangars."

"Cold motors," Bill said. "We'd never get away before they got to us."

"Your motors are now being warmed up on the apron," Ricardo said, and there was something of a boast in his voice. "I do not think they will try too hard to stop you. They will think they are letting you escape and that will be the last of you—until Jarquin hears. He will know better."

"But—" Bill began.

"There is no time to talk," Ricardo said. "The officer of the guard may come to investigate any time. We must move fast. We must depend on the element of surprise. There are two guards to overcome before we reach the courtyard. I will lead the way. When we throw open the door into the courtyard you must begin to shout—shout and shoot two shots from your automatics. That will make confusion. I will lead the way to the waiting car and we will be half way to the hangars before they realize what has happened."

"They'll be waiting for us with machine guns when we get there," Shorty said.

"The machine guns from one of your planes will be covering the hangars and the guards there," Ricardo said proudly. "I have arranged it that way."

"Where do we go?" Bill snapped.

"I go with you in the Lancer to get Michel," Ricardo said. "One more of your ships must come with us to bring him back. The other three will go to a private field that is not far away. Two of my men will ride with you to show you the way."

"All right," Bill said. "Let's get this straight. You climb in the after cockpit of the Lancer. Shorty, you follow us in your Snorter. Sandy, you ride Red's after cockpit and Ricardo's two friends



The Brown-Young Experimental.

will ride with Bev and Cy. We'll split as soon as we get off the ground. That ought to confuse them a little. You're sure," he said to Ricardo, "you can locate this island in the Aegean Sea? We've got to think of fuel."

"I have been there hundreds of times," Ricardo said. "It is the property of Prince Michel. It is very smart of Jarquin to think of hiding him there. Are you ready?"

"We're ready," Bill growled. "Where are those automatics?"

"Come! I lead!" Ricardo said and he

was on the stairs and going up them like a scared rabbit with Bill and his men strung out behind him.

Twice they stopped while Ricardo slipped quietly ahead to garrote an unsuspecting guard. Then they came to the little blockhouse at the top of the long spiral stairs and Ricardo dug a half dozen automatics out from under a pile of ropes and gear.

"Remember! Shoot and shout!" he said. Then he threw the door wide and went bounding out into the sunlight.

Little knots of soldiers and officers stood talking about the courtyard. A guard with a rifle on his shoulder paced a second floor terrace. Sixty yards away from the door stood a long, green open car with the motor running and a man at the wheel. Another guard half dozed against a door on the ground floor.

"Y-o-o-o-eeee!" he screamed as he bounded into the courtyard, stopped, took aim with his automatic and fired. The guard on the terrace suddenly collapsed across his own rifle as Ricardo's bullet tore into his chest. He hit the second guard in the leg as he came out of his sleep. His rifle clattered on the flagstone and he began to scream with pain.

"Yo-o-o-o-eee!" Bill's men took up the cry. Their faces were flaming red as they filled their lungs with air again and knocked up the dust at the feet of the loitering guards and soldiers.

But suddenly they were loitering no longer. They were dashing, falling over one another to reach a place of safety. Heads popped out of doors and disappeared as quickly as they had appeared.

"It is the revolution!" a guard belated and others took up the cry.

Ricardo and Bill and his men did not bother with the running board of the long, green car. They all leaped over the side and were crouched down in the back as a fusillade of bullets wailed over their heads. The driver threw the car in gear and the tires screamed.

"Pour it on!" Ricardo screamed at the driver as the car rocked from side to side.

He brought it up on the apron at a speed that made it seem they would go straight on through the hangars. But just before he threw on his hand brake he cut the front wheels to the right so that his tires would bite. For one perilous moment it teetered over, then righted itself and they were pouring over the side.

The Silver Lancer and four Snorters were idling on the line.

"Work fast!" Bill screamed. He could see two armored cars racing across the field from the chateau and he knew that they must get off the ground before they were within shooting range.

He saw his men scurry over the sides

of their ships, waited until he was sure they were all at the controls, and Ricardo's allies were in the gunners' cockpits. Then he dove into the forward cockpit of the Lancer. He watched Bev and Red and Cy Hawkins take their ships down the runway and kick them into the air with the speed and precision of a well-drilled troop of horses. He waited with his heart in his mouth while Shorty blasted his Snorter around and followed them into the air.

"*En avant!*" Ricardo screamed at Bill. The Lancer went down the runway like a silver streak of light as the two armored cars came to a swirling halt and trained their guns on it.

With the touch of a master Bill eased the stick forward ever so little to bring the tail up. Then he yanked her off the runway and hung her on her props as the three thousand horses in her nose thundered their full-throated roar.

A moment later Bill showed Ricardo how to pull out the spring reel and use his microphone and how to plug in his earphones in the helmet he gave him.

"What instructions shall I give the three Snorters that are to wait for us on the private field?" he asked.

"Just tell them to sit down there and wait until they have orders from you," Ricardo said. "You will probably need them on the way back with Michel. We may have to fight our way through."

Bill flipped his radio switch and made contact with his men and gave them Ricardo's instructions. "We'll be back here before noon to-morrow," he told them. "Stick close to your ships—one man in a forward cockpit all the time to pick up a radio message. Good luck! Shorty, you take a position alongside me. Fifteen thousand feet, speed three hundred and fifty. Keep your eyes open."

"Bill!" Sandy said in his ear. "They are rolling a dozen ships out on the apron back there."

"Let 'em roll," Bill said. "They can't intercept us now."

VIII—TO THE RESCUE

AT fifteen thousand feet Bill checked his instruments carefully and took his bearings. He laid the nose of the Lancer on the heel of Italy and passed a map back to Ricardo and asked him to mark their destination on it.

"It's no easy task to find a small island," he said to Ricardo. "Is there a larger island near by we can shoot at?"

"Yes," Ricardo said. "Shoot for the island of Rhodes. Dalmah is about a hundred miles northeast of Rhodes. It is a tiny place Prince Michel uses for a base when he is cruising and fishing."

"We can land there?" Bill asked.

"Yes," Ricardo said. "It is coral and sand. I have landed one of our fighters there."

"What about Jarquin's men?" Bill

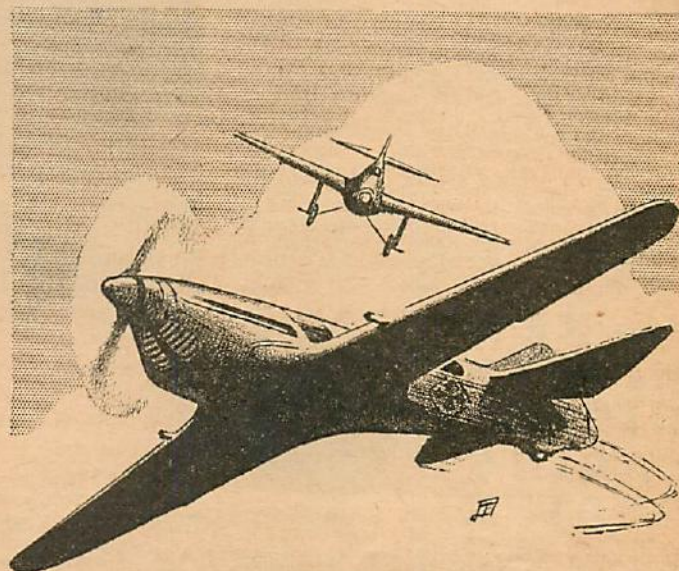
asked. "Will he have much of a guard there?"

"I'm afraid," Ricardo said, "it will be too strong for us. But we can try."

"Yes," Bill said, "we can try. But will we ever get away again?"

"That," Ricardo said blithely, "is doubtful. Jarquin is not a man to leave things to chance. He has probably anticipated just what is going to happen and will be ready. We must outsmart them in some way. It is going to be very, very difficult and very, very dangerous. If you do not care to take a desperate chance, you had better turn back now. You are free and you have

They eased out of their power dive at fifteen hundred feet and then stuck their noses down again—



taken desperate risks already. Miss Roebbling would not blame you if you turned back. She is resigned to Michel's abdication although she knows it will be the end of life for him."

Bill grunted and said, "Have you marked the island on that chart?"

"Not yet," Ricardo said. "You are going on?"

"I'm going on," Bill said grimly. "If Prince Michel is anything like yourself, Ricardo, I'd feel like a louse if I let him down."

"Ah!" Ricardo said. "And they say you Americans cannot make pretty speeches! So be it, Barnes. We will take—what do you call it?—Monsieur Jarquin apart."

The sun was sinking low toward the horizon to the west when the Lancer and Shorty's Snorter sped across the heel of Italy and over the Ionian Sea to the tip of Greece. The Cyclades flashed under their wing tips and then the Dodecanese Archipelago as Bill laid the nose of the Lancer on the isle of Rodi.

They circled once above the harbor from which rose the ancient turrets and ramparts that so successfully checked Islam's ghostly multitudes when the eight nations pledged themselves to bleed and die to turn back the Turkish tide.

"Drop down to five hundred feet," he said to Shorty. "Ricardo says he can identify the place from the air if I can hit it on the nose."

Five minutes later they sighted a small cluster of islands and Ricardo sang, "I think we are close. Bear off from the coast about five miles."

"There!" he cried in a few moments. "The island with the long white strip of beach and the buildings. The beach is the runway."

"And four ships are coming off it!" Shorty shouted. "Four of those low-winged, olive-green, single-seaters, Bill.

They're coming up to intercept us. Shall I dive on them?"

"Wait!" Ricardo shouted. "They may be going to run away. Prince Michel may be in one of them."

"O. K.," Shorty growled, "and get our ears pinned back!"

Bill brought the Lancer around in a sweeping bank while he watched those four fast little single-seaters being whipped off the long white beach and into the air. He saw their pilots take them upward in tight spirals until they had five thousand feet under them. Then they leveled off to form a stepped-up column. For an instant it looked as though they were going to head toward the Turkish mainland. Then they came around in a tight vertical bank and stuck their noses downward.

The still air above the placid Aegean was filled with the scream of a million banshees as the props of those four single-seaters wailed in protest. Down and down and down they plunged with their noses pointed at the Silver Lancer and the Snorter.

"Chandelle up and back to the right!" Bill screamed at Shorty. "I'll go to the left and we'll have them between a crossfire when they come out of their dive."

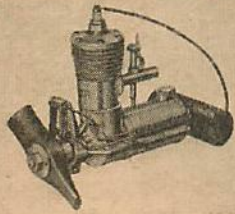
"If we don't get a bullet in the noggin," Shorty growled.

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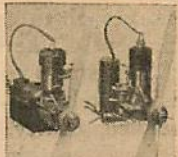
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"Do you know how to use that swivel gun back there?" Bill asked Ricardo.

"I can try," Ricardo said, and there was a laugh in his voice.

The four little single-seaters eased out of their power dive at fifteen hundred feet and then stuck their noses down again with all of their guns vomiting lead and death.

Bill could feel their bullets drumming into the tail of the Lancer as he brought it up and around in a flashing chandelle to reverse his direction of flight. He saw Shorty's Snorter stagger like a thing mortally wounded as it nosed up until it almost stalled in the other direction. Then he saw the nose drop and they had the four single-seaters between them as they nosed up out of their dives.

Bill's fingers clamped down on his gun trips when he was only two hundred yards above and behind the last ship. His bullets tore into it as it came under his telescopic sight. They drew a pencil line down the top of the fuselage until they reached the open cockpit. There they drove into the back of the man whose hand was wrapped around the controls.

He died before he knew what manner of thing had hit him. His ship skidded off to the left and stuck its nose downward. It plunged toward the Aegean Sea with its wings folded back—like a gannet diving for fish.

As tracers began to cut through the tip of Shorty's right wing, he fed juice to his engines and pulled the control column back into his stomach. The sleek bullet-shaped Snorter pointed its nose at the sky and came over on its back as the four single-seaters raced beneath it. Shorty's face was grim and terrible as he whipped over on the tail of one of the olive-green ships. His fingers pressed down on his gun trips.

Lead and tracers tore through the tail assembly of the single-seater and drew a line to its nose. It whipped upward and then fell off into a spin.

Bill caught a third ship with his 37mm. cannon as it started a barrel roll to get out of range. A great cloud of black smoke and orange flame shot high into the heavens as his explosive shells detonated on its engine block.

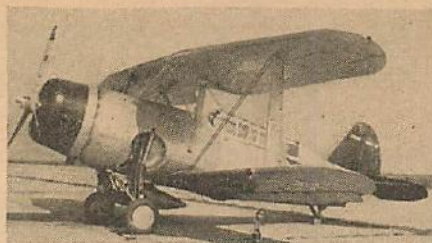
"Whew!" Ricardo whistled in Bill's ear. "Three are down and one is running for his life. We can go in now. But we will have to fight. They know that we are coming."

"Nice going, Shorty," Bill said into his microphone. "You go in first. Watch it, because you can't head due into the wind."

"I'll watch it," Shorty said. "What do we do when we get there?"

"Get the submachine gun out of your locker the minute you lock your brakes," Bill said. "Ricardo says we'll have to fight."

Shorty came around in a vertical bank



The Curtiss SBC-3

and stuck his Snorter down toward the beach, keeping the nose headed into the wind and seemingly pointed toward the sea while his landing wheels were lying parallel to the beach. At the last moment he fishtailed to reduce his speed and took the run into the cross wind as though it wasn't one of the most difficult things in the world to do.

An instant later Bill was down beside him. They ran their ships down the beach until they were only a couple of hundred yards away from the little cluster of buildings on the ridge along the center.

Bill and Shorty went over the sides of their ships together to get into the lockers that carried their emergency equipment. Bullets whipped up the sand all about them as they dug out two submachine guns, ammunition and a high-powered rifle that Bill gave to Ricardo.

Suddenly the desultory rifle fire that had first greeted them was joined by the rat-tat-tat of a machine gun. They threw themselves down behind the tall grass and hugged the sand with their stomachs while bullets whined over their heads.

"It will be completely dark in a few minutes," Bill said. "Then we can slip in. You fire a single shot from your automatic, Ricardo, when you think it is time for us to charge the place."

"A single shot," Ricardo repeated. "You must be careful."

"Listen," Shorty said. "We're always careful. That's why we're here."

"You joke, eh?" Ricardo said, and he crept away in the gathering darkness.

Bill waited until he saw bursts of flame from the house before he turned his machine gun loose. Then he fired a half dozen rounds at a time, hoping to make a lucky hit.

Shorty had taken the high-powered rifle from Ricardo and was lying flat on his stomach waiting for a form to dart in front of the dim candlelight inside the coral house. He cursed softly as he missed his sixth opportunity.

"You must be gettin' old Mr. Hass-further," he growled to himself. "Let's rush that joint and tear it apart," he said aloud to Bill.

"Wait until we get a single shot from Ricardo," Bill said. "We don't know how many men there are inside or how many guns they have."

"I would say two machine guns and three or four rifles."

"It only takes one machine gun bullet to stop you," Bill pointed out.

"They can't shoot," Shorty said. "If they could they'd have driven us out of here long ago, or killed us."

"You sound pretty tough."

"I'm not tough," Shorty growled. "I'm hungry and I'm tired. Do you suppose this Prince Mike is here?"

"We'll know before long," Bill said. He clamped down on the trigger of the machine gun to answer a burst of fire from the house.

Each time Bill or Shorty fired they immediately rolled over and over in the grass to escape the return fire that was directed at the spot where their guns had spouted telltale fire.

Suddenly, both of the machine guns inside the house began to chatter at once and between the bursts of fire they could hear the hoarse shouts of the men inside.

"Let's work up closer," Shorty said. "It sounds as though they were fighting among themselves."

A horrible scream that died away in a gasping wail came to their ears and then they heard the deep bark of a single shot from Ricardo's automatic.

"Let's go!" Bill shouted, and he leaped to his feet with the machine gun carried in both hands in front of him as he raced toward the house. Shorty passed him in three strides, carrying the lighter rifle, and raced straight at the front door.

As Shorty reached the door and jammed the butt of his rifle against it, the whole world seemed to blow up in his face. The rifle was torn from his hands as he was thrown backward a dozen feet against Bill. They both sprawled on their backs at the edge of the terrace as three or four shouting men leaped out of the door.

Behind them was a madman with only a rapier in his hand. As one of the men crumpled, Shorty bounded to his feet and drew the thing that was half rapier and half cutlass from the scabbard at his side. In that brief instant, while the figure in the doorway hesitated, Shorty remembered the shout of defiance that had come from Ricardo's lips as he ran Huberto through.

A bellow came from his lips as he lowered the blade and charged at the man in the doorway. The man's mouth dropped open and his blade dropped as Shorty lunged.

Then a howl of pain came from Shorty's lips as another form streaked into the light and brought the flat side of a sword down on his wrist. The rapier in his hand clanged to the terrace as Ricardo's handsome face loomed before his eyes.

"You would kill my prince!" Ricardo screamed. "It is Michel!"

Bill pushed his way between the cursing Shorty and the spouting Ricardo. After a moment Ricardo had calmed down sufficiently to speak English again. Prince Michel leaned on his blade as he chuckled at Ricardo's excitement and Shorty's anger.

Then he extended his hand to Bill Barnes. "You are Barnes," he said. "What I have is at your service, sir!"

They sat down in a room in which the forms of four men were sprawled in grotesque positions on the floor. The walls and windows were punctured with hundreds of bullet holes. The whole place was a shambles.

"Let's drop all the formality," Prince Michel said as Shorty fumbled with a form of address. "I'm Michel, or Mike if you wish, to you."

"What was all the firing inside just



The Howard DGA-8, on floats.

before you gave the signal to charge?" Bill asked Ricardo.

"It was Mike," Ricardo said. "He broke away from his jailer and got one of their machine guns and turned it on them. When he ran out of bullets he grabbed a rapier and went after them single-handed. There are only two of them left alive."

"What about my ships?" Bill asked quickly. "Are they apt to damage them? Can they fly them?"

"No," Michael said. "If we leave them alone they'll hide out until we are gone. When can we go? What," he said, turning to Ricardo, "is the situation?"

Ricardo told him briefly in a few words.

"At noon to-morrow," Michel said slowly. "When can we get away from here?"

"Not before dawn," Bill said. "The tide is coming in over the beach and it is too dark to chance a take-off with such a short run."

"We can reach Madura before noon if we leave at dawn?" Michel asked.

"Easily, if we don't run into trouble," Bill said.

"We will make it!" Ricardo said.

Michel gave him a slow, understanding smile. "We will make it if your efforts avail, my friend," he said.

IX—COMBAT

THE twin props of the Lancer and Snorter became silver disks of light in the false dawn as Bill Barnes and Shorty

gunned their Diesels. They did not know what damage might have been done by bullets the night before and they both said a silent prayer as they studied their dials and indicators.

The sun was just coming out of the sea to the east when Prince Michel climbed into the gunner's cockpit of Shorty's Snorter and Ricardo slid into the rear cockpit of the Lancer.

The faces of all four of them were lined and tired as they settled down for what they all knew would be a desperate attempt to win through. They knew that a thousand and one dangers faced them before they could attain their goal.

Bill flipped his radio switch and spoke into his microphone. "All right, Shorty," he said. "Pour it in. Get up to twelve thousand. NNE. I'll give you your true course when we get up there. Are you ready to go?"

"Ready, to go!" Shorty said. His hand flipped above his head in farewell as he told Michel to fasten his safety belt and fed juice to his engines. He took the Snorter down that hard-packed beach in a minimum run and kicked it into the air with characteristic abandon. He took it upstairs in short, tight spirals while Bill took the Lancer off the beach at terrific speed and hung it on its props.

He switched to his port wing fuel tank and chanted Shorty's call letters.

"How are you riding, fellah?" he asked.

"Sweet, Bill," Shorty said. "I can dimly see the northern tip of the Adriatic. After we're over Venezia we're practically there."

"Practically," Bill said, "but not entirely. Keep your eyes unbuttoned. I —"

He stopped speaking as the far-away roar of airplane motors crept into his ears above the roar of his own Diesels. He thumbed the sun, but could see nothing. He looked up and back and probed the air all around him. He cocked his head to the right and then the left and listened.

"There are ships around us some place," he said to Shorty. "Do you hear them?"

"I just picked 'em up," Shorty said. "I think they're in those clouds above us on the starboard side. It's getting louder and coming closer. Do you think we'd better get more altitude—"

He stopped speaking and shouted as two 'V' formations of rugged little olive-green fighters dived out of a solid mass of cumulus clouds a thousand feet overhead, their engines screaming.

"Break out that flexible gun!" Bill roared at Ricardo. "Watch 'em, Shorty!"

Ricardo whirled his chair around and pulled the .30-caliber Browning toward him and ran it across its track as large drops of perspiration ran into his eyes.

He held the palms of his hands against his ears and gulped like a fish to lessen the pressure on his eardrums as Bill stuck the nose of the Lancer down toward the waters of the Adriatic. The olive-green fighters seemed to be motionless in their downward plunge so great was the speed of the Lancer.

Down and down Bill plunged until the blood rushing to his head made it feel like an inflated balloon and he knew he must pull out or he would "black out."

As he eased the nose of the Lancer up Shorty's voice sounded in his ears and its tone chilled his blood. He glanced up and back and saw that Shorty had not followed him as he had expected. Instead he had stuck the nose of his Snorter up in a climbing turn. Five of the olive-green ships had pulled out of their shallow dive to follow him. They had him engulfed in the center of a Lufberry circle taking the vortex of their concentrated fire.

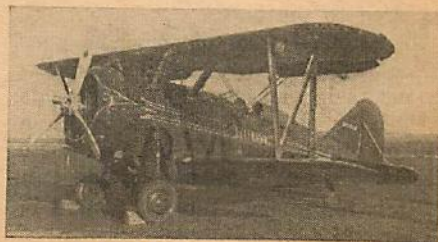
"They'll get me if you don't come up fast, Bill!" he shouted, his voice high-pitched and tense. "They have almost as much speed as I have."

"Hold it, fellah," Bill said. "Don't let 'em tighten their circle. I'm coming!"

He yanked the control column of the Lancer back into his stomach and hung the Lancer on its two three-bladed props as the second group of five green fighters screamed by him. He went upstairs in an almost vertical climb while he watched those five ships preparing to annihilate Shorty and Prince Michel.

He watched with anguished eyes as it seemed there was no escape from that trap for Shorty. He cursed deep down in his throat as he watched Shorty desperately trying to find a way out. He tried to get even more speed out of the Lancer as he saw Shorty come up and over in a flashing Immelmann. A grin separated his grim lips as he saw Shorty tear that little circle of five ships apart with his chattering guns. He saw Shorty flash across the tail of one of the green ships and get it under his hair sights. His burst of fire lasted just long enough. The green ship staggered away from his deadly aim. The nose dropped and it plunged toward the sea.

The other four ships broke their circle as Shorty slipped away from the center. They tried to reform it as they moved toward him in a semicircle. But again



The Grumman Gulfhawk.

he threw them off with a series of Immelmans that left them dizzy.

"Shorty!" Bill shouted. "Shorty!" "Go ahead! Go ahead!" Shorty chanted and his voice was calm and steady.

"Peel off!" Bill ordered. "Get upstairs and lay your nose on Madura. I'll be up there in a couple of seconds to keep them off your tail. Go like everything, fellah. Get Prince Mike back there before noon. I'll take care of these babies."

"There are nine of them left, Bill!" Shorty protested. "They'll—"

"They'll nothing!" Bill snapped. "I said peel off. It's up to you to get Prince Mike back safely in the chateau before noon. Make contact with Bev and Red and Cy and tell 'em where I'm in trouble. Do you get it?"

"O. K.," Shorty said. "I get it but I do it under protest."

Bill didn't answer because one of the green ships had come up under his tail. He heard the tat-tat-tat of its machine guns, followed by the fire of another and another. He pulled the Lancer over on its back and stuck the nose down in an inverted dive as all nine of the green fighters closed in on him from every direction. He pulled the nose up and rolled the Lancer right side up and whipped back in a flashing chandelle.

Then he was among them, whipping the Lancer through the sky with the mad abandon of a tiger gone berserk. He was here and there and everywhere as they dived and zoomed and rolled to get out of his flaming path. As a green ship came under his sights he raked it with a withering fire that brought the pilot up in his seat with his arms swinging. The ship slipped off to the right and began a fluttering descent toward the waters of the Adriatic.

He gunned the Lancer again and came over on the tail of another ship. His line of tracers curled above the head of the pilot. His bullets sped forward from the tail and drove into the engine block. Little wisps of smoke and then fire spurted out of the engine housing.

Bill eased the throttles of the Lancer open another notch and took it through the air with the speed and fury of a flaming meteor. He saw his powerful .50-caliber bullets tracing designs on the sides of the green ships, but his speed was too great for accurate shooting. He was content to keep them busy while Shorty became a mere speck and disappeared to the north.

He switched from his machine guns to his 37mm. cannon and literally blew the next ship that came under his sights out of the air. It disintegrated in a puff of smoke and Bill saw that there were but six of the single-seaters left.

"It is too much!" Ricardo panted in his ear. "I am exhausted."

"Keep 'em off my tail!" Bill snapped

back at him. "They have orders to get us or not come back."

The six remaining ships managed to get him inside a circle as he eased off for an instant, trying to get his breath. They got him within the vortex of their fire while they tried to keep out of range of his automatic cannon. Each time he tried to break the circle a ship darted out with its four fixed guns vomiting lead and death to drive him back.

"Keep that tail gun in action!" he shouted at Ricardo in quick, agonized gasps. His hand was wrapped around the control column like a band of steel. He was using the last of his strength and cunning to keep those six ships from carving a death's head on the Lancer.

The next instant he got another green ship under his cannon sights and tore it into a thousand pieces. At the same moment Ricardo caught one of the single-seaters that was diving in from above with a stream of lead from his .30-caliber Browning. The whimpering prop of the green ship wailed its protest as the bullets tore into it and cut it to pieces. The nose dropped and it began to spin toward its watery grave in the Adriatic.

"Hold it!" Bill said as calmly as he could. "I think they've had almost enough."

But the four single-seaters that were left were there to obey their orders. They came darting in, spewing fire and lead and death as they seemed to pull new strength out of nowhere. For one terrible instant Bill faltered as he saw the fury of their new attack.

The pilots of the four green fighters sensed that he was near the breaking point and they began to crowd him closer and closer. They darted in from every side, taking chances they would not have taken a few moments before.

Bill watched them in a daze. The seconds seemed to be hours. It seemed to him that he had been fighting through all eternity. In his half stupor he was a man trying to sleep and those green fighters were green bottle flies that were pecking at him to disturb his sleep. It was Ricardo's scream that brought him out of his lethargy. It was high-pitched and horrible in his ears. He shuddered as it ended in a sucking gasp.

He looked back over his shoulder and saw that Ricardo was slumped down over his gun and blood was dripping from a red line along his temple.

The next instant the pilots of those green ships thought some flaming monster from another world had fallen among them. Bill's blue eyes were gleaming with a mad recklessness as he attacked with a last burst of fury. He was cursing steadily as he took his rage out on those four green ships. He liter-

ally tore one of them to bits with both his .50-caliber guns and his cannon. The Lancer trembled and bucked under the recoil of his three guns.

Then, Bill's blood froze in his veins as one of the twin Diesels in the nose of the Lancer began to suck and miss. He hauled the stick back as he switched to another fuel tank. Both of his motors began to cough and the hair crept up along the base of his scalp. He switched to a small emergency tank and the twin Diesels began their full-throated roar again.

He hung the big ship on its two three-bladed props as the three green fighters sensed that something was wrong and came charging in for the kill. He could feel the Lancer tremble as their bullets drove through her skin and then the world became a black void.

X—MADURA

ALL night long a ring of jeweled lights had sparkled on the hillsides surrounding the little city of Madura. Lights that were huge bonfires built by herdsmen to celebrate what some people whispered would be a new succession to the throne of Maxembourg.

Word had been spread throughout the principality that to-day was to be a day of feasting and laughter. From miles down the valley came the constant dingdong, dingdong—some loud, some faint, some only a tinkle on the light morning breeze.

Along the streets running into the courtyard of the chateau, the high-gabled houses were a veritable rainbow of color. Each window sill flaunted a box of brilliant geraniums and nasturtiums, making a kaleidoscope of the pastel houses. White-barred, blood-red flags of Maxembourg stretched across the fronts of the houses and whipped from poles.

A constant stream of country and city people dressed in gorgeous old-time Maxembourg costumes crowded through the narrow arch of the gray and forbidding pile of stone that was the ancient chateau of the rulers of Maxembourg. Above the old gate were the arms of the Swells—a black hawk on a gules shield, surmounted by a crown and held by two men in armor, battle axes in their hands.

There was laughter on the lips of the children and some of the country people. But most of the crowd was still and not a little sullen. Police and soldiers moved among them everywhere, breaking up little knots if too many men composed them—keeping the people on the move, not giving them a chance to talk.

But men muttered deep down in their throats and here and there the eyes of a woman were wet. They were thinking of their prince and of the stories that had come to their ears.

"This man, Jarquin, the premier. Bah!" they said and spat.

At two minutes of twelve the clarion notes of a trumpet rose above the shrill voices of the people packed within the courtyard and along the streets leading to it. From afar came the faint notes of an approaching band. A company of brightly uniformed foot soldiers lined the courtyard. A platoon stood along the walls of the great balcony that overlooked the courtyard.

The people in the courtyard were silent as the cabinet of Prince Michel appeared on the balcony with young Prince Casimir before them. They knew that now the things that had come to their ears were true. A soft, sullen murmur ran through the crowd.

Prince Michel's name was on their lips. For the first time they doubted him. He had let them down. The murmur became a dull roar as Max Jarquin, the premier of Maxembourg, appeared behind the young prince. There were tears in the eyes of hardy old herdsman now. This, they told themselves, is the end of all that is good. It is the end of Maxembourg.

Jarquin moved to the edge of the balcony and put up his hand as though to still the people. But they were still before he made the gesture because most of them were gulping their despair. They were tense in their concentration on the thing that was about to happen to them. The very silence was ominous and terrible. Officers' eyes darted around the crowd, waiting, watching.

As Jarquin opened his mouth to speak the horrible silence was broken—but not by the people in the courtyard. It was broken by the flying wedge that came charging across the balcony.

One instant Jarquin was standing there ready to speak the words that would bring despair to the hearts of the people below. The next instant he was in the center of a mass of milling soldiers and police and Prince Michel stood where Jarquin had stood.

For one instant the people gaped, not believing their eyes. Then they went mad!

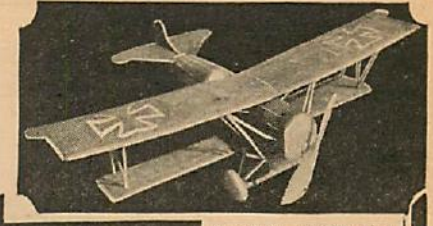
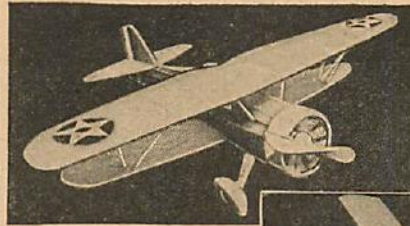
A roar that was like the cascading of a great waterfall filled the courtyard and seemed to shake the very foundation of the ancient chateau. Men and women and children laughed and screamed until their faces were purple and their throats were raw. The cheering went back down the streets as the cry went out of the courtyard in waves of joyousness.

"Long live Prince Michel! Long live Prince Michel!"

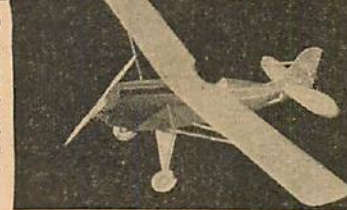
Over and over the words rolled out through the multitude to carom off the old towers and ramparts and resound again.

Then another cry, a cry that started

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3/32x1 8, 5c
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1x1 5c; 1x2 8c
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WHEELS per pr.
Breh Balsa Celu 5" 4c
5" 10c
6" 15c
7" 20c
8" 25c
10" 35c
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12x16 15c

CLEAR CEMENT
5c per oz.; large bottle, 8c; 1/2 pt. 15c

PROPELLERS
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RUBBER
1/16 sq. .25 ft. 5c
1/16 sq. .15 ft. 5c
1/16 sq. .10 ft. 5c
1/16 sq. .05 ft. 5c
1/16 sq. .02 ft. 5c

RUBBER LUBRICANT
Large bottle 10c

PROP BLOCKS
3/4 x 3/4 x 5 6-5c
3/4 x 3/4 x 6 6-5c
3/4 x 1 x 7 4-5c
3/4 x 1 x 8 3-5c
3/4 x 1 1/2 x 10 3c ea.
3/4 x 1 1/2 x 12 3c ea.
1x1 1/2 x 12 4c ea.
1x1 1/2 x 15 7c ea.

NOSE BLOCKS
1x3x1 1c
2x2x1 2c
3x3x1 3c
3x3x2 8c
3x3x3 10c

CLEAR DOPE
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COLORED DOPE
5c per oz.; Large bottle 10c

SHEET ALUM.
1/16 in. 6x6 5c
1/16 in. 6x8 5c
1/16 in. 6x10 5c
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RUBBER LUBRICANT
Large bottle 10c

PROP BLOCKS
3/4 x 3/4 x 5 6-5c
3/4 x 3/4 x 6 6-5c
3/4 x 1 x 7 4-5c
3/4 x 1 x 8 3-5c
3/4 x 1 1/2 x 10 3c ea.
3/4 x 1 1/2 x 12 3c ea.
1x1 1/2 x 12 4c ea.
1x1 1/2 x 15 7c ea.

NOSE BLOCKS
1x3x1 1c
2x2x1 2c
3x3x1 3c
3x3x2 8c
3x3x3 10c

CLEAR DOPE
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RUBBER LUBRICANT
Large bottle 10c

PROP BLOCKS
3/4 x 3/4 x 5 6-5c
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1x1 1/2 x 15 7c ea.

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3x3x2 8c
3x3x3 10c

CLEAR DOPE
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LIGHT PLANES

(Continued from page 17)

Something must be done about this if we are to encourage the ordinary man to fly. He must be assured of a safe landing ground where there is plenty of room to correct the inevitable error. He must be shown his plane under the best and most suitable conditions. He must be taught to fly under conditions most suitable for the first twenty or thirty hours at least. We who have been through all this know and understand that feeling of what is known as "air-blindness" which harasses the beginner. He seldom realizes there are other ships in the air.

The beginner himself senses all this, too, long before he ever signs up for a course. He is a stout fellow who, realizing it all, gamely goes into it determined to pass. Unfortunately, this type is not general. Most of us are perfectly normal human beings who react to the appreciation of danger—or let's call it the realization of the demand for a certain grade of technical skill. This is what is demanded on the part of both the pupil and the instructor when instruction is attempted in these congested areas.

It is not the fault of the schools. They have, as we have said, an economic problem to face. Competition in the school business is very keen. They have to count their dollars and we can understand why they put up their hangars and classrooms at large flying fields. Then again, there is the advertising value of being on a recognized airport. All these things do help the school owners and perhaps enable them to provide better instruction and equipment. But unfortunately it also makes the beginner take his first few air hours amid harrowing circumstances.

If we can find fault with the system and air our views, we should also be able to suggest a remedy. There are several ways out, of course. But the most logi-

cal is to attempt to get the government to improve many of the "emergency fields" along the recognized air routes.

Here our student could be introduced to his mount under ideal circumstances. He could be taken aloft for his first flight and shown the surrounding territory and have it explained to him, that *should* an emergency arise, he would have no trouble in selecting another suitable stretch of ground where he could get down with no trouble.

In crowded areas an instructor must devote much of the air time to keeping his pupil, and himself, out of the paths of commercial traffic.

Such conditions would never be tolerated in the services. Their training is carried out by men who are trained instructors and in planes that are specially designed for training. Primary trainers are painted a bright yellow and they have the right of way over all other air traffic above the service schools. The fields are set miles away from large cities and there are several fields in each area where each phase of training is carried out. Moreover, these men are carefully selected for their physical standards and nervous reactions. Compared to the civilian student, they are absolutely babied through their first twenty hours of flight training.

These suggested changes cannot be made in a short time. The schools cannot afford it and they should not be expected to bear the full load of the expense themselves. The manufacturers can help by presenting the facts to the Bureau of Air Commerce and members of flying clubs can work through the usual channels and see that suitable fields are provided for the beginners. There must be more flying clubs, however, before the force of their requirements can be established. Private fliers must band together and let the manufacturers know what they want. There must be a medium of exchange, a publication of some kind to tie all these loose ends up. We of Air Trails again repeat that we are more than willing to accept that responsibility if we can get the coöperation of those who are members of flying clubs or wish to become members of flying clubs.

There is more to this emergency-field business than meets the eye. We expect to go further into it in subsequent issues. But in the meantime we'd appreciate your expression of an opinion on this matter.

Give the beginners a quiet and reassuring place to take their first few hours and you will have done more toward building up a public confidence in flight than all the lectures and high-pressure ballyhoo you or I can put on paper.

CLUB NEWS

The Taylor Aircraft Co. of Lockhaven, Pennsylvania, has launched into exten-

sive preparations for a winter tour of "Cub" owners to the 10th Miami All-American Air Maneuvers which will be held in Miami, Florida, starting December 2nd. Last year some forty owners of "Cub" sport planes took part in a similar flight. This year approximately 100 planes are expected to take part in this event. Numerous prizes will be awarded for outstanding performance.

A feat which illustrates the fine maneuverability of light planes has been recently brought to our attention. At the National Air Races held in Cleveland this year, Mike Murphy—of Kokomo, Indiana—took off his "Cub" from the back of a small automobile, performed a few maneuvers, and then landed back on the car!

The Ryan Aeronautical Corp. has introduced an all-metal three-place cabin plane into the small-plane field. Considerable emphasis has been laid to making the cabin comfortable. A sliding hatch forms the front and sides of the front part of the cabin, eliminating the necessity of stooping when getting in or out.

The Mexican government has just closed a contract with the Ryan Co. for an unnamed number of Ryan military training planes. They will closely follow the stock model Ryan ST and will be powered with 150 h.p. Menascos.

Miss Evelyn Hudson recently established a new feminine solo refueling record for Class C airplanes when she remained in the air for 33 hours and 9 minutes in an Aeronca C-3 cabin plane. The event took place at the Annual Air Show at Modesto, California.

Lou Furlong of Clarion, Pennsylvania, learned recently that there is nothing more tempting to cows than dope-covered fabric. Lou had left his plane in a cattle shed as an emergency hangar. When he returned, he found that the cows had completely annihilated the fuselage of his Taylor-Young plane.

The Arrow Aircraft Corp., of Lincoln, Nebraska, informs us of an increasing movement toward the developing of roadside airports throughout the country. It will require the wholehearted support of all interested in flying to bring this about, but will be well worth the while.

I have received so many requests for the addresses of light-plane manufacturers, that I think the following list may be of service to our readers.

Porterfield Aircraft Corp., 25th and Charlotte, Kansas City, Missouri.

Arrow Aircraft & Motor Corp., Lincoln, Nebraska.



Miss Evelyn Hudson flew for 33 hrs. and 9 min. in her Aeronca.

HEATHE HAPPILY SOLVES YOUR XMAS GIFT PROBLEM

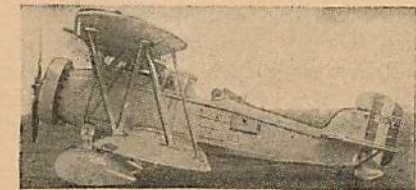
Every red-blooded, he-boy thrills to the sport and pleasure of Model Airplane building and flying. Imagine the genuine satisfaction of constructing an exact scale model of some of the most famous airplanes made. FATHERS—MOTHERS—what better gift for a boy is there? FELLOWS—Get these planes for your friends, and relatives—and by all means do not forget yourselves. HEATHE is proud to present these outstanding models in the field—and the most for your money in each price range. Send your orders NOW—for "A package of happiness" for the coming year.



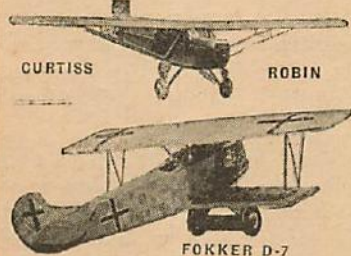
WILL ROGERS-WILEY POST LOCKHEED



MONOCOUPÉ 90A



HELL DIVER



CURTISS

ROBIN

FOKKER D-7

SELECT A BARGAIN ASSORTMENT and Save Money!

- | | |
|------------------------|--------|
| 1—\$1 Kit (plus post.) | \$1.20 |
| 2—50c Kits " " | 1.30 |
| 3—35c " " " | 1.05 |
| 2—10c " " " | .30 |

Total value \$3.85

Special for Xmas only with a surprise Gift FREE.

KITS CONTAIN:

Complete materials to build the model: carved props; copyrighted plans; simplified instructions; printed balsa; cement, dope; colored paper; and extra stock of all parts. You've got a thrill coming when you build one of these HEATHE MODEL AIRPLANES.

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|--------------------------|--------------------|
| 36" POST-ROGERS LOCKHEED | \$1.50 |
| | (plus 25c postage) |
| 36" MONOCOUPÉ "145" | \$1.25 |
| | (plus 25c postage) |

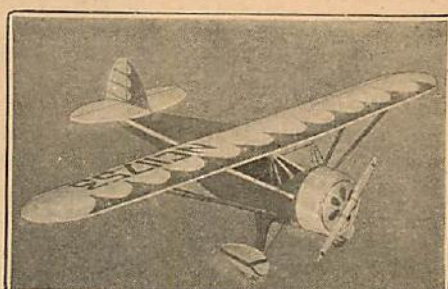
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|---------------------------------|--------------------|
| 24" "Super Detail" Scale Models | \$1.00 each |
| | (plus 20c postage) |
| 1. SPAD | 4. ALBATROSS |
| 2. HELL DIVER | 5. CURTISS SWIFT |
| 3. STINSON RELIANT | 6. DOUGLAS |

- | | |
|-----------------------|--------------------|
| 48" CURTISS ROBIN | \$1.00 |
| | (plus 20c postage) |
| 36" POST'S WINNIE MAE | \$1.00 |
| | (plus 20c postage) |
| 36" SOPWITH CAMEL | \$1.00 |
| | (plus 20c postage) |

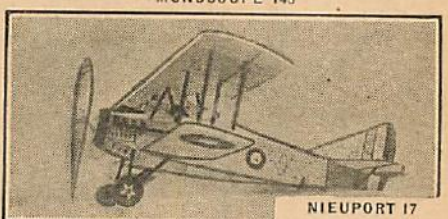
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|-------------------------|--------------------|
| 3/4" SCALE MODEL FLYERS | 50c each |
| | (plus 10c postage) |
| 1. MONOCOUPÉ | 4. MISTER MULLIGAN |
| 2. WACO | 5. MACCHI-CASTOLDI |
| 3. CURTISS SEAHAWK | 6. STINSON |

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|----------------------|-------------------|
| "Extra Value" FLYERS | 25c each |
| | (plus 5c postage) |
| 1. CESSNA | 4. MONOCOUPÉ |
| 2. FAIRCHILD 45 | 5. REARWIN |
| 3. COMMANDER | 6. RYAN ST. |
| | 7. FOKKER D-7 |

- | | |
|----------------------|-------------------|
| 12" BOAT MODELS | 25c each |
| | (plus 5c postage) |
| 1. ENTERPRISE | 4. FLYING CLOUD |
| 2. R.M.S. QUEEN MARY | 5. NORMANDIE |
| 3. "OLD IRONSIDES" | 6. SETH PARKER |



MONOCOUPÉ 145



NIEUPORT 17



MACCHI-CASTOLDI

XMAS SPECIAL

With every \$3.00 Kit Order FREE POSTAGE in U. S. A.—and a FREE valuable surprise XMAS GIFT—sure to please every boy!

FREE

with every Kit Order "3 E-Z STEPS TO MODEL BUILDING" A valuable folder which tells you how to go about building a model plane. Free with every order.

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|----------------|-----------------|
| 10c FLYERS 10" | BRISTOL FIGHTER |
| HELL DIVER | BOEING F4B |
| MONOCOUPÉ | HOWARD IRE |
| BEECHCRAFT | HAWK P&E |
| SPAD | |

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| 10c SOLID PLANES 8" | HUGHES RACER |
| GRUMMAN | MR. MULLIGAN |
| GOSHAWK | WACO Y-O-C |
| BEECHCRAFT | BERLINER JOYCE POST SEAPLANE |

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|--------------------|----------------|
| 10c 8" BOAT MODELS | FLYING CLOUD |
| ENTERPRISE | NORMANDIE |
| OLD IRONSIDES | RMS QUEEN MARY |
| SETH PARKER | |

Add 5c for postage on each kit ordered.

HEATHE OFFERS A COMPLETE SERVICE!

1. TRADE IN YOUR OLD MOTOR, in buying a new one.
2. Send for Big Bargain USED MOTOR LIST.
3. Send for Complete Catalogs GAS AND RUBBER SUP-

- PLIES, and FREE PREMIUM OFFERS.
4. Look in December issue this magazine for prices on rubber and gas supplies.

ALL ORDERS SHIPPED BEFORE CHRISTMAS AND IN SPECIAL HOLIDAY WRAPPINGS!

HEATHE MODEL AIRPLANE CO.,

438 EAST 98th ST., DEPT. B
BROOKLYN, N. Y.

Horace Keane Aircraft Corp., 45 West 45th Street, New York City. (Plant at Keyport, New Jersey.)

Aeronautical Corp. of America, Lunken Airport, Cincinnati, Ohio.

Heath Aviation Co., Benton Harbor, Michigan.

Taylor Aircraft Co., Lock Haven, Pennsylvania.

Waterman Arrowplane Corp., 1560 Fifth Street, Santa Monica, California.

Rose Airplane Corp., 4327 North Harlem Avenue, Chicago, Illinois.

Monocoupe Corp., Robertson, Missouri.

Welch Aircraft Industries, South Bend, Indiana.

American Eagle-Lincoln, Kansas City, Missouri.

Kinner Airplane & Motor Corp., Glendale, California.

Taylorcraft Aviation Co., Alliance, Ohio.

Captain Cunningham of Battery A, 252 D, Coast Artillery in Wilmington, North Carolina, writes and tells us that he and several of the members are putting in quite a lot of flying time on a "Cub," Kinner Bird and Davis. They are thinking of buying a new plane some time in the near future.

The Aeronautical Corp. of America in Cincinnati, Ohio, pioneers in light airplanes, have introduced their new KC to sell with the lowest-priced planes on the market. The KC is powered with the Continental A-40-4 motor or the new

A-40-5, equipped with dual ignition. The standard equipment is very up-to-date—the old-fashioned sticks being replaced by two burnished aluminum control wheels.

The landing gear, especially designed for long service, is of the tripod type with oleo shock strut in each side.

A ten-gallon gas tank provides a cruising range of about 250 miles.

Letters still come pouring in from readers wanting to know whether or not there are flying clubs in their vicinity. I would appreciate it if the secretaries of all the clubs in the country would write in to me so that we could have a complete record. I am sure that the benefits derived from this would be mutual.

WHAT I'VE LEARNED ABOUT GLIDING

(Continued from page 23)

Plans	\$35.
Materials	200.
Winch and	50.
Trailer	50.
Instruments	65.

\$400.

Many will claim these figures are high and many will say they're low. I say they're the average found through my experience in buying and building a number of ships. It doesn't pay to go too much under these amounts. Gliders cost money and it's better to lay it out first than to pay double later on because of stinting. I've seen perfect gliders ruined through being packed on poor trailers or damaged when trailers broke loose from the car towing them. And I've seen fellows with excellent ships having to watch wonderful soaring days float by unenjoyed because they didn't have a winch.

The instruments mentioned above are also an important part of your equipment, but I'll discuss them later. First, let's get out and take to the air.

Where to operate a glider? There are several standard locations and those I'm about to suggest have been well tried and proven. Many glider pilots will haul their ships directly to an airport and fly them there. This is fine, providing you live near an airport and the officials have no objections. If an airport is unavailable and if you own a winch, you can use an ordinary field that's neither as big nor as perfect as an airport. Don't get me wrong. Pick a field with as few obstructions as possible on it or near it. In case of wires, large trees, cross ditches or the like, hunt for better ground. If you're unsuccessful, remove as many of the obstacles as you are able and clearly mark the rest. Trees can be gotten rid of by first cutting the roots and then pulling them down, thus eliminating stumps as the result of the ordinary method. Ditches can be planked over, and should be for at least a hundred feet where they cross your runway.

Hang white or red flags on any wires and place others on top of each pole holding them. If there's a fairly free field adjoining the one you're preparing, a good idea is to clear a path between the two and anchor your winch in the far field. This permits a longer amount of rope to be used and consequently means longer and safer take-offs. Try to land in about the same place each time. This saves considerable ground work. Attach a small parachute on the tow rope so that when you release the tow rope, the parachute opens and lowers the latter without its falling wild—another time-

saver. Use good rope only and renew it whenever it starts to break.

There are other places even better than fields for training purposes. These may be more convenient and accessible. The average glider can easily be adapted with a pontoon, or floats for operating off water. If the floats are properly built with a "step," a boat like a Chris-Craft has no trouble towing a ship aloft. With a rope-reel attachment in the boat, the glider can gradually be fed rope as it climbs and thus gain lots of altitude. Training over water is perhaps the safest way possible and an endless amount of fun. In the case of lakes having steep mountains or cliffs at their shores, you may also add some ridge soaring to your repertoire, simply by towing parallel to the declivities and then cutting loose in the up-draft they create.

Another big possibility is in winter when lakes and rivers are frozen over. First select the best stretch of ice and place a peach basket, painted red, above any fish holes, cracks or bad spots. Mark out a runway and keep towing off the same place each time. Winch-towing is more desirable here, though auto-tow is almost as good if you spread a path of sand or ashes for about a hundred yards to get traction. If the ice is covered with hard, crusty snow you needn't consider making your own traction, as this is ideal for launching by car. Chains are not required unless the snow is over six inches deep.

Gliding, you see, is an all-year-round sport. Even if you live near water that doesn't freeze in the winter you can use a good beach to get your ship aloft. Many beaches have sand dunes large enough to kick up wonderful thermals for soaring, though this is an aspect of the warm months.

As soon as members of a club have gone through their basic training and secured the necessary pilot licenses, they will be anxious to soar. At this point they will be glad to own a utility glider, since it won't be necessary to buy a new ship—as would be the case if they started with a primary. And don't think a two-place job, with both seats filled, can't go places and do things. In the 1936 contest Jay Buxton's job, carrying

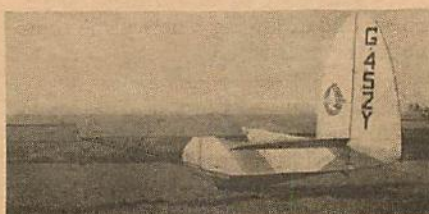
two people, soared almost 6,000 feet on one flight and stayed aloft nine hours on another!

The easiest kind of soaring is ridge soaring, and care should be taken in choosing a site. The biggest factor to consider is wind. From where does it most often blow? Is the prevailing wind in your section from a different quarter during fall and winter than in spring and summer, or is it the same all year? If the wind comes from the northwest, find a mountain that runs perpendicular to this direction, or northeast and southwest. If the wind usually blows from the south, pick a ridge running east and west. The ideal mountain is one that faces in two or more directions, or one curving semicircle fashion so that it cups winds several ways.

After locating your mountain the next step is to find suitable fields with accessible roads, both on top of the ridge and in the valley below. Select two or three of the best ones within easy gliding distance there in that valley and mark them with a white cross or ring (made of cheese cloth and held down by rocks). It's wise first to secure permission from the farmer or land owner, since this often saves costly charges and makes for better feeling. If you expect to alight on these fields often, clear them as outlined previously.

The take-off field on the top or side of the mountain is important, but need not be as large as your landing grounds. (One big enough both to launch from and return to may be ideal, though difficult to find and unnecessary for successful soaring.) A field 100 by 300 feet is sufficient for shock-cord take-off, provided the long way faces the valley and has no trees in front of it. If there are trees, clear them till they are at least level with the field's down edge.

Launching by shock-cord is simple, but should be practiced on flat land before being done from a mountain. The vital factors to learn are how much cord your ship needs and how to stretch it, and the ability to keep level and low on take-offs instead of jumping quickly into the air—which generally means a stall from the sudden pull. The best method of stretching a shock-cord is by using a car. The car should be at least 100 feet ahead of the glider. (300 feet when practicing on level ground.) The average single-place utility requires about 100 feet of $\frac{5}{8}$ " cord, twice that being needed for a two-place job and sailplanes. Inspect the entire length before each launching for cuts or breaks. Don't forget, either, that a shock-cord is as dangerous as an airplane propeller.



The Airhoppers' Franklin.

When overstretched, they've been known to injure people plenty.

Of course, if you can find an especially large field on the mountain, a winch or straight auto-towing can be employed. Don't, however, be too anxious to use such a field to land back upon. It's not as easy as it looks.

In taking off don't zoom up and stall, but fly level and low into the lift. The moment you feel the wind lifting the entire ship you can safely turn and fly parallel with the mountain. Then when you wish to turn and proceed in the opposite direction, *always* do so away from the mountain and *never* toward it. If at first you can't find the lift, zigzag back and forth from the ridge till you locate it. Just how close to the mountain the line of lift will be depends on the speed and course of the wind and the contour of the mountain. And remember, it varies even after you start flying, so if you lose it for a bit don't just head for your landing field in the valley below. (Take care, though, to keep that field in view at all times, and never wander beyond an easy glide from it.)

If for some reason your ship stalls, don't get panicky and forget your training. Merely drop your nose and head toward the valley, following the contour of the mountain—if very low—until you are sure of your flying speed and control, then level out into a normal glide again. Never just sit there in a stall and wait for more wind to happen along and keep you aloft. Flying speed must still be maintained. Maybe you've heard it before but I'll repeat it: Keep your nose below the horizon at all times and you won't get into trouble.

Ordinary ridge soaring does not call for instruments, though even here they're a help. But in order to advance to thermal soaring a few of them are absolutely necessary. The main one is a variometer, which shows the rate of climb graduated in feet per second and gives you that information no matter how slight the climb. A satisfactory variometer costs about \$30. A statoscope indicates ascent or descent, through the movement of colored liquid in a glass tube, and can be home-made with glass-tubing, gas-gauge liquid and a thermos bottle.

An altimeter will help a pilot to judge distance and glide. These range greatly in price; a second-hand one can be bought for less than \$10. An airspeed indicator manufactured especially for gliders will cost around \$30. A bank-and-turn indicator is a big aid to check and improve your skill. An inclinometer and stop watch are also valuable when spiraling in a thermal current.


With a compass and the above-listed instruments a glider pilot is well equipped for real soaring. They have been named in the order of their importance. If a club possesses all of them

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and owns a winch capable of getting a ship up 1,000 feet or so, its members need not go to the mountains for their soaring. They can catch thermals right over their own field. And if they're unable to find thermals at this altitude, they may secure the necessary permit from the department of commerce and be airplane-towed further "upstairs," where they can cut loose under clouds and enjoy soaring almost any summer day.

Airplane-towing, by the way, is neither difficult nor dangerous, provided certain rules are observed. It's not a stunt, but a safe and practicable aid to gliding and soaring—one that makes it unnecessary to cater to special terrain and winds. New rules and regulations are being prepared by the department of commerce to further this method of launching, especially at glider meets.

I think soaring is more fun than any other kind of flying and the best sport I know of. It has speed, thrills and beauty, and is not limited by seasons. If you decide to take it up, I'd advise you to follow along the modern lines suggested in this article. Then you won't be disappointed or waste your money.

Building a glider may sound like an awful job and one for experts only. Such is not the case. Really difficult work—welding and machine work on fittings—can be jobbed out. But ninety per cent of the construction can easily be done by the average person. Doing the building yourself gives a greater appreciation of how to handle a ship. And the undertaking will unite a club, as well as weed out the shirkers and half-interested members who often disrupt an organization later on.

Good luck!

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NEVER THE TWO SHALL MIX

(Continued from page 14)

seen him do. If anything happens, I won't know how to pull out."

"Hold it!" Larry shouted again. "Now listen, kid. I'm going to tell you how to bring it in."

"No! No, Larry!" she screamed again. "I couldn't do it."

"I know what you've been through," Larry said and he spoke quietly now.

Thoughts were racing through his mind like lightning.

"You've got plenty of fuel?" he asked her.

"Yes," she answered. "The gauge says half full. You've got to hurry, Larry."

"I'll hurry, kid," he said. "You just hold her the way she is. Just keep circling. Don't alter the angle of your rudder or ailerons. Just hold her as she is. I'm coming up in another plane. We'll hold a course twenty or thirty feet above you. Don't pay any attention to us. Just hold her steady. Is that fire extinguisher still handy?"

"Do you want me to hit him again?" she asked.

"When we get him on the ground," Larry said grimly. "Don't hit him unless he seems to be coming around. I want you to have it ready to break a starboard window after I get down on the wing of your ship. I'll come down a rope ladder and then swing from the top of your wing into the cabin."

"Oh, Larry! Can you do it?" she sobbed.

"I can try, kid," Larry said. "Just hold her steady and I'll do the rest. I'm going to cut off now."

Larry slapped the headphones down on a table and pushed his way out of the room without answering any of the questions that were thrown at him. He ran out on the apron and scanned the half dozen planes that were lined up there. He saw a two-place, open-cockpit, high-winged monoplane with its prop idling and shouted at the man who was climbing over the side.

"Hold it a few minutes, Jones," he shouted. "I'm going with you."

He ran into Hangar No. 1 and dug into a big chest that held various kinds of gear. He was looking for the rope ladder that some of the members of the club had used when they staged an aerial circus the early part of the summer.

He dug the ladder out of the bottom of the box and told two mechanics to lash one end into the after cockpit of the yellow monoplane on the apron.

When he went out on the apron again Mr. A. E. G. Meade-Jones, a small man with an English accent and a constantly startled expression, said, "I say, old fellow, I don't know anything about this blooming business. I—"

"You will in a few minutes," Larry said.

"Now listen," he said to the nervous Meade-Jones before they climbed into the open cockpits of the yellow ship. "What I want you to do is get above that ship, just enough so I can get down the ladder and onto the wing. You'll have to handle your controls while you're looking over the side. Don't get too low because she might strike a bump and rip hell out of us. Just hold her steady. Do you think you can do it?"

"I'll do my best," he said.

"Let's go!" Larry said. His face was grim and determined and he was more than a little frightened. But he didn't show it. He climbed into the after cockpit of the yellow ship and saw that it had dual controls. He leaned forward and shouted in Meade-Jones' ear, "I'll take her up and circle above it a couple of times to show you what I want."

He released the wheel brakes and poured fuel into the powerful power plant. As the plane began to wobble across the turf he glanced back over his shoulder at the wind sock atop the hangar roof. He kicked his right rudder to bring it around into the wind and pushed the throttle open. Half way down the field he eased the stick forward to bring the tail up. Then he brought it back and whipped it into the air. He took the ship upstairs in tight, fast spirals until he was well above the red-and-black Stebling.

He eased the nose down until only a few feet separated the two ships and held it there. Then he eased out the rope ladder until it dangled only a couple of feet above the black-and-red ship. And he saw one thing that gave him a little added hope—he wouldn't have to slip over the edge of the wing to get down on a strut and in the window. The front windshield of the Stebling was slanted back so that the pilot could see overhead. If he could get down on the wing safely and could stay there long enough to kick in the windshield, he would be all right.

Phyllis turned her eyes upward as he pulled a little ahead of the Stebling and they were red and terror-stricken.

"Hold her steady, kid!" he shouted. She didn't hear what he said but she, too, managed to smile and nod her head.

"All right, tea biscuits!" Larry shouted at Meade-Jones.

He put one leg over the side of the cockpit, then the other and hooked them into the ladder. The hundred-mile gale that was rushing by him almost tore his arms from their sockets. He stuck his head down and began to descend the swaying ladder while Meade-Jones fought desperately to keep the ship on an even keel.

His weight straightened the ladder but the bottom whipped out from under his

feet. He had to struggle for every rung. His arms began to ache until it seemed he must let go before he reached the last rung. The red-and-black ship was still four feet beneath him. He knew that he must hang from the last rung and try to get a foothold on the roof of the monoplane's cabin before he let go and dropped down on his stomach.

Then he had the tips of his toes on the top of the cabin roof as the two ships held a steady pace one above the other. He was about to let go of the ladder and try to fall forward when the yellow ship slid off on one wing and his feet were dangling in the air three thousand feet above the ground. He wrapped his hands around the rope sides of the ladder and clung for what seemed like all eternity—his arms growing numb.

Then his feet were dangling just above the roof of the cabin again and he entreated Meade-Jones with his eyes to drop a little lower. Meade-Jones answered his prayer by settling the yellow ship down a full three feet.

Larry went down on his knees, then on his stomach before he let go of the ladder and spread-eagled himself out on the roof of the cabin. He laid his cheek flat on the lacquered surface as the wind tried to tear his head off. He began to inch forward a little bit at a time to get his fingers fastened around the leading edge of the wing because he had nothing to cling to. For an instant he felt weak and faint as the starboard wing dropped. The ship rolled to the left as Phyllis threw over the stick to correct the drop.

Larry knew that he must get down in the cabin at the controls before she slipped him off into space. He pulled himself forward until his head was over the leading edge and he could see in the windshield and into the cabin.

He saw Riley pulling himself up off the runway behind Phyllis—murder in his eyes.

Larry reached back, pulled out the hammer he had stuck in his hip pocket and smashed at the windshield. He hacked away at the glass until he had a hole large enough to get through. For a moment he considered swinging himself around and going through the hole feet first. But when he saw Riley push himself up off his knees to his feet he changed his mind. He eased himself still farther forward and stuck his head and shoulders into the hole and dropped head first through it. He landed on the controls, on Phyllis Montgomery's lap, then on the seat beside her. He felt the big ship stagger as his body jammed the control column forward and to the left.

He pushed himself up and was grabbing at the dual controls when he felt something else. He felt Riley's fist smash into the side of his face and he was back in Phyllis' lap again.

He lashed out with both feet when Riley loomed above him.

The ship careened and dived while they swung blows at one another. Then it lunged crazily to throw them off their feet and into a corner.

"Smack him with that fire extinguisher again," Larry gasped.

He saw her feet and ankles moving toward them, there was a crash and Riley slumped in his arms. He pushed him away and scrambled forward to the controls as the ship plunged toward the earth at terrific speed.

Sweat dripped from his forehead as he eased the nose up.

Larry looked at Phyllis out of the corner of his eyes and saw that she was dabbing at her face with a powder puff while she tried to stop her tears.

"I hope you've had a lot of fun today," he said.

"Oh, Larry, don't! I can't stand any more. I think I'm going to faint."

"Go ahead," Larry said. "But you better go back and fall beside your drunken friend."

"He—he's no friend of mine," she said. "I hate him. I only came here with him because I'd see you."

"Yeah, Toots. You acted as though you were just dying to see me every time. You treated me as though I was one of the pictures."

"You said you'd get in touch with me after that house party at Jerry Squires," she said. "And you never did. I was mad."

"I was broke, kid," Larry said. "I'm still broke and maybe I always will be."

"That wouldn't make any difference to me, Larry."

The thrill Larry got from the way she said it made him know it wouldn't make any difference. A girl couldn't be lying and make you feel like that. He was reaching for her hand when something struck him in the back of the neck. He looked up and there was Riley again. "Take the controls for a minute," Larry said to Phyllis and got to his feet.

Riley was swaying on his feet but that didn't make any difference to Larry. He measured him with his left hand and then he let him have one square on the button with his right. Riley went back where he had come from.

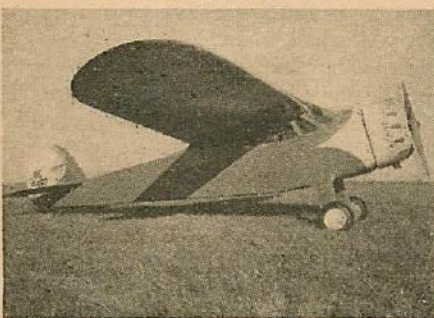
"Maybe that'll be the last necessary lesson in teaching him that you can't mix alcohol and airplanes," Larry said as he took the controls. "We're going in for a landing now. Do you have anything more to say?"

She looked at him for a moment, then hid her face in her powder puff again as she said, "I think I love you, Larry."

That was when Larry kissed her.

SPEED WINGS

(Continued from page 54)



The Cessna C34.

PROPELLERS

Carve a wooden-type prop from a 3/4x1x7" block for flying purposes. Sand and dope it several times to obtain a glossy finish, but also balance it well. Assemble the prop, washers, nose plug and shaft.

COVERING AND ASSEMBLY

Cover the fuselage from B to G with red tissue. Carefully continue the red above and below the color line forward of B with yellow or cream tissue completing the forward portion. Cover the wing panels and tail surfaces with yellow or cream and carefully add red tissue to all leading edges as shown by the color lines. Cover the cowl with yellow or cream and the wings with red. Cover the landing gear struts with red and the outer disks of the wheels yellow or cream. The only liquid color used

is black ink for the motor, tires, license and details.

To apply the tissue on the framework use dope thinned to half the original consistency.

Now cement all the parts to the fuselage with pins to hold the parts in their proper places until set. Spray the covering with water, which will tighten the tissue when dry. When thoroughly dry, dope the model completely with the thinned dope and then add all the markings. Finish the covering from G to the trailing edge of the rudder and fit the celluloid windows.

Only four strands of 1/8" flat rubber are enough for the motor. Tie the rubber with about two inches of slack and lubricate it.

Test the model in tall grass until the proper adjustments are assured and then fly it in areas free from obstructions.

MATERIAL LIST

Blocks	Miscellaneous
1 1 1/2x2x2"	1/2 oz. tube cement
1 3/4x1x7"	1 oz. clear dope
2 1/2x1 1/8x1 1/8"	1/2 oz. thinner
Sheet	2 sheets colored tissue
1 1/4x2x4"	1 wide bamboo strip
1 1/8x2x9"	(to split)
1 1/2x2x18"	18" #12 music wire
1 1/8x2x6"	4" 1/8" aluminum tube
1 1/64x2x18"	1" 3/32" aluminum tube
Strips	1" 1/16" aluminum tube
6 3/32 sq.x18"	Cleaned photo negative
2 1/8 sq.x18"	6 1/8" washers
2 1/8x1/8x18"	48" 1/8" flat rubber
4 1/8x1/8x18"	

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9 G's and Pull Out

(Continued from page 10)

Occasionally, I flash an eye outside to orient myself, watch the ground to see it enlarge up rapidly, although there is no sensation of high speed.

After two or three miles of this, I pulled out about at 7,000 to 8,000 feet. Everything was O. K. The wings were still on as I headed her upward at a forty-five-degree angle before leveling off. Then, a few minutes later, I landed and gave the ship over to the willing hands of the ground crew.

INSPECTION DEPARTMENT FLIGHT TEST REPORT

Model.....	Mfrs. No.....	License No.....	Date.....
Engine.....	No.....	Propeller.....	No.....
Flying Time.....	Weather.....	Di.....	Pitch.....
R. P. M. Ground-Idling.....	Oil Press Idling.....	Full Throttle.....	
Oil Temp. at Take Off.....	Max.....	Fuel Pressure O. K.....	
Full Throttle R. P. M.....	Left.....	Right.....	In Air.....
Does Motor Idle O. K. on Ground?		In Glide?	
Is Primer O. K.?	Starter?	Cabin Heater?	Pyrene?
Is Gas Flow O. K. from Left Tank?		Right Tank?	Center Tank?
Running Lights O. K.?	Mooring?	Landing?	
Brakes and Brake Pedal Adjustment?		Taxiing O. K.?	
Is Compass Swung?		All Instruments O. K.?	
All Controls (Flying and Engine) O. K.?			
Is Rigging O. K.?			
Is There Vibration of Engine?	Propeller?	Cowling?	
Wings?	Ailerons?	Tail?	Doors?
Load Carried on Test: Gas..... gal.	Oil..... gal.	Pilot.....	
Other Load.....			
Air Speed Reading: At full throttle.....	At 1625 r. p. m.....		
Unstick.....	sec. Climb 1st Min.....	ft.....	
Are Pontons Dry After Flight?	Are Anchor, Rope and Lines O. K.?		
Remarks:			

(Sign)

Test Pilot.

On one of the first dives at Dahlgren, an aileron flutter began with the stick jerking out of my hand, then battering my knees. I pulled the airplane out of the dive by throwing my arm in front of the stick, pressing backward on it while it slammed across the cockpit. On inspection, after I had landed, a bolt was found missing from an aileron hinge. Probably a cotter key had come out or had been forgotten. Just a very small item which could have spelled disaster.

As our flying progressed, the landing gear began to show a trick of its own. On a rough field, due to insufficient snubbing action in the shock-absorbing struts, the fittings on the longerons would tear loose. Then the airplane

would lay over on a wing tip while the shock strut would punch through the side of the fuselage to miss one of my shins by about an inch. The correction of this difficulty was to triple the strength of the fitting and correct the shock struts for snubbing action, which also improved the ground handling of the airplane.

On the pull out from another test dive, I heard a loud explosion. Most of the fabric had blown off the upper wing and the sun was shining brightly through the wing ribs. Since the airplane could still be handled in the air at high speed and with power on, there seemed to be some hope for landing it. I had made several

The flight testing of a commercial plane, although entailing little danger, is a meticulous procedure as attested to by this test-report blank.

parachute jumps before but had not enjoyed them, so I resolved to get back on the ground by airplane—if possible.

First I unloaded the 1,000-pound bomb into the river, where it would be out of the way. Then it was necessary to land about 100 miles per hour on the two wheels. The airplane bounced like a Mexican jumping bean for a short while, then settled and rolled on three points as it should. Thus I had evaded the embarrassment of a parachute jump. It was also probably better for the company, since they still had a good airplane left which they could hope to sell to the navy. As for stitching on fabric, they did a much better job of it the next time.

Regarding the pay a test pilot gets.

It is usually between \$1,500 and \$5,000 for the complete tests which may probably take between two weeks to two months to complete—during most of which time the airplane is under the tender care of a staff of mechanics. Perhaps these prices sound high but they are only a fraction of one per cent of the total amount involved in the contracts. When the test pilot is torn apart, that is permanent for him. But the company can always build a new airplane and correct any previous errors. Also, the work is not steady. There is plenty of time between jobs, when we can worry where the next one's coming from.

Beyond that, a test pilot needs a grim sense of humor. He should enjoy dropping two or three miles at a terrific clip, and try not to worry too much. He should love to listen to the howl of the breeze past the wires and struts and the deafening racket from the propeller which will shake a rooftop ten miles away. That unearthly din from the long dives is caused by the propeller blades traveling much faster than the speed of sound. Then they actually leave behind them a vacuum with two continuous walls of air to slam against each other. Also, a test pilot must learn to smile about his crashes—even when the doctors are repairing him.

It is sometimes embarrassing to receive fan mail from ambitious youngsters who ask, "What can I do to become a test pilot?" The best answer I know of is to advise them not even to try. After all, there is so much other work to be done in aviation and there are so many other easier professions to follow. However, if they still insist, the first important step should be to graduate as an aeronautical engineer from any one of a number of good universities before even trying to learn how to fly.

Our navy goes in for harder testing than any other organization anywhere and, as a result, is getting some of the finest airplanes in the world. When they purchased eighty-one of the Great Lakes dive-bombers, nothing at all had been left to guesswork. To-day, on board our aircraft carriers and in service with the Marines, these airplanes play an important part in our national defense. The lessons learned from a tough test job are a valuable addition to aviation.

All questions referring to the construction of the Clipper model should be addressed to the Air Trails Model Staff.



The completed model is as majestic as the real ship.

BOEING CLIPPER

(Continued from page 59)

panel on the upper wing surface is of international orange and extends from tip to tip. Its outline can be taken from the drawings and photos of the model. The black wing walks should be applied with the aid of masking tape to give a smoother, straighter edge. The bottom of the hull and sponsons are shiny Dulux yacht black, while the antiglare panel on the nose is a dull black.

The license numbers, and other insignia, may be cut from the plan and pasted on at the proper locations. The silver outlines on the navigator's turret should be painted before gluing to top of wing in proper position.

In closing, I would like to warn the modeler against hurrying to complete this ship. The adage "haste makes waste" is remarkably true when applied to the model builder. Be sure to allow plenty of time between coats of paint, taking care to sand each coat carefully so as not to have a gummy surface.

Air Adventurers

(Continued from page 29)

Miss Betty Jean Brunner, an Air Adventurer of the fair sex, brings up a very touchy problem. Miss Brunner wants to be an air pilot and go into commercial aviation in a big way. Her friends have laughed at her and almost convinced her that she would have no chance as an air-line transport pilot. Others have attempted to prove to her that aviation is not safe.

We can understand Betty Jean's predicament. We went through all that years ago—long before they thought of the parachute as a safety factor. But don't let them discourage you. In the first place there is a wide field for the woman pilot. Look at the dozens of high-salaried women in aviation—not only on the ground, but in the air. There will be little chance, I fear, as a regular transport pilot. But the field is wide-open for the skilled woman pilot. She makes a splendid saleswoman and her opinions concerning interiors and general cabin comforts are now an important feature just as they are in the automobile industry. The industry is catering to the feminine taste in air travel and women will find important jobs everywhere—once they learn to fly. Many noted women pilots are successful distributors of aircraft all over the world. You go to it, Betty Jean. All the Air Adventurers are with you.

Harold Ferguson of Kenora, Ontario, comes through with several good ideas for those who are interested in aviation photography. "Do not try to take all of the plane in your picture," he explains. "Try for some new and unique view such as a dead frontal or a trick-angle shot. These are often more interesting than a straight shot of the same ship we have seen over and over again."

Every now and then we get a letter concerning a stamp collection. This time it's Bob Hubert of St. Helens, Oregon, who recently passed his typographer's test. He suggests that we allow him to submit a stamp feature every month—and we presume he means air-mail stamps—for our readers. Bob, we are happy to state, is out to make a job for himself and is to be complimented on his ambition. But we cannot know just how much actual interest there is in the subject unless some of our readers let us know. It's an idea, anyway.

William Badoff of 1454 43rd Street, New York City is interested in photography and wants to connect up with some other readers—preferably those out on the Coast. He has sent us a print of the Howard DGA-8 to show what he can do.

Ted Owen of Toronto, another photograph fan, sends us a picture of the British B. A. Eagle which belongs to

1938 AIR TRAILS ANNUAL



96

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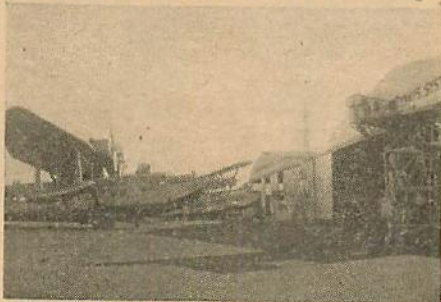
STATE _____

the Toronto Flying Club. Ted is confident that we have never published this picture before, and says he has every copy of Air Trails since the June issue of 1935. Well, if he has read them as closely as he claims, he should know. We're publishing his Eagle just to show what the Toronto crowd is flying these days.

We can always rely on plenty of tips for improving our magazine. Many of them we try to carry out if our mechanical set-up permits. Vernon M. Schlake of St. Louis wants us to enlarge

Air Trails Gallery to about four pages and to triple up on Cross Winds, the crossword puzzle feature. Then he wants use to put borders on the pictures in This Winged World and a section devoted to designs submitted by our members and other readers. Well, there's just a sample of what we get when we ask for advice. And, yes, a few more model planes designed around gull-wing ships.

Well, that's all until next month.



Above—B. A. Eagle snapped by Air Adventurer Ted Owen of Toronto. Left—Pan American Florida base, by William Kip, Coconut Grove, Florida.

Model Matters

(Continued from page 46)

Appearance

1. Thomas Schisano, Brooklyn, N. Y. Greyhound
2. Jack Conine, Philadelphia, Pa. Own Design
3. Joseph M. Raspante, Brooklyn, N. Y. Buccaneer

Lucky Time Endurance

1. Joseph Clohocy, Philadelphia, Pa. Zephyr
2. T. Hintze, Bronx, N. Y. Buccaneer

Lucky Time—Timer

1. Stanley Friedenreich, Bronx, N. Y. Cabin Monoplane
2. A. Swasey, Upper Darby, Pa. Flying Quaker

Major Award

1. Jack Conine, Philadelphia, Pa. Red Zephyr (modified)
2. William Effinger, Brooklyn, N. Y. Cavalier

Special Award

Club traveling the greatest distance and represented by more than one member: The Nativity Gas Model Club, Scranton, Pa.

GLIDING

(Continued from page 21)

the instructor on the ground communicates with the student in the air through prearranged signals, is nowise as satisfactory in comparison.

Introduced through the efforts of Mr. Ben Shupack of the Airhoppers Gliding Club and aided by the Radio Transceiver Laboratories of Richmond Hill, New York, who revamped one of their portable five-meter receiving sets to eliminate excessive battery drain, the radio was installed in the club's Franklin utility. A five-meter transmitter and a loud-speaker unit, employed in preference to earphones, completed the equipment.

Tests made with this set proved highly successful. All using it were greatly pleased with the clarity of reception. A student with no previous experience was able to get up into the air and make good flights after less than ten tows, which is exceptionally short for a beginner. This student reported that hearing Instructor Arthur Hoffman's voice beside him furnished enough confidence to completely allay any fears arising from thoughts of being alone in the ship. "I just forgot Mr. Hoffman was way down on the ground talking into a microphone," he said. "Seemed he was right at my shoulder."

Others who tried this method and praised it highly were Lewin B. Barringer, Malcolm Schenot, Arthur Hoffman, John Breck—who accomplished excellent 360° turns though just starting to learn them—and Jack Brookhart, who executed spins and wingovers in the Franklin upon radio orders given from the field.

There is no doubt in our mind that this new way of instructing is the most important contribution made so far to American gliding. To our knowledge it has been used nowhere else in the world. It will simplify training work and render it 100% safe. We may say with pride that again America has shown its progressiveness to the world in achieving such an important addition to the safety of soaring.

WHY WE NEED NEW LAWS FOR LICENSING GLIDER PILOTS

Advancement in gliding and soaring during the last few years has progressed to such an extent that the laws governing the licensing of pilots have become not only inadequate but a source of danger. This was particularly noticeable at the last Elmira contest. The few mishaps that occurred, none fatal, fortunately, could be traced directly to the laws now in existence.

According to present rules, an inexperienced pilot can obtain a Commercial Glider Pilot's license and therefore be

permitted to participate in any contest, so simple are the requirements to pass the flight test. These requirements consist merely of the ability to make landings, a series of gentle and moderate banks, and 360° turns. For a non-commercial license the 360° turn is not even required. No mention at all is made of the amount of previous experience necessary, as is true for power-plane men. This means that a student who has just mastered his 360° turns can apply for and, after passing the very simple flight test, receive a Commercial Glider Pilot's license allowing him to instruct others. In most cases his personal flying experience is so limited that morally he is not qualified to instruct, although the possession of the license permits him to do so.

Realizing how inimical these regulations are to the future of the gliding movement, officials and pilots at the Elmira meet set about drawing up a new set. Coöperating with representatives of the Bureau of Air Commerce, they have evolved the following laws, which have been sent to Washington for official action.

NONCOMMERCIAL GLIDER PILOT'S LICENSE

1. Minimum age of fifteen years.
2. A mild, reasonably priced physical examination by a Bureau of Air Commerce doctor.
3. Written test on Air Traffic rules.
4. At least 100 flights, 25 of which must have included 360° turns, and all of which must be entered in a log book properly notarized. At least five of the 360° turns must have been made within the thirty days prior to application for license.
5. Flight test shall consist of one straight flight with normal landing within the airport, an 180° turn

and downwind landing in wind not over 10 miles per hour, and 360° turns right and left with precision landing within 200 feet of a designated mark.

COMMERCIAL GLIDER PILOT'S LICENSE

1. Minimum age of eighteen years.
2. Same physical examination as for private airplane pilots.
3. Written test on Air Traffic rules and Glider Operation manual.
4. Minimum of 250 flights, including 360° turns. Five hours can be substituted for fifty of these flights. One hour of soaring can take the place of ten 360° turns. Applicant must also have had at least one hour of light-plane instruction in recovery from stalls and spins and must have a statement to this effect from the instructor.
5. Same flight test as for noncommercial except that there will be, in addition, a precision landing of not more than 100 feet beyond a designated line. A minimum of four flights, two of which include a right and left turn in the same flight.

If these requirements seem quite a bit stricter than the old ones, let us examine the reasons for their being. The necessity of a written test on Air Traffic regulations is obvious when you remember that nowadays at contests as many as twenty sailplanes and gliders may be in the air at the same time, and ignorance of these rules may easily lead to collision.

The particular emphasis on 360° turns was made because in soaring flight the pilot is continuously spiraling in the up-current and the tighter the turn, the more benefit received from the up-draft; hence the ability to execute a correct 360° turn is very important.

Precision landings are required for the reason that when the lift dies from an up-current the pilot, seeking another one unsuccessfully, is often forced to fly so low he must land on the nearest available field, which is apt to be quite small. Ninety per cent of landings during soaring flights are made on such fields and you can't afford to blunder. Accuracy is also necessary for down-wind landings. At the end of his flight, due to loss of altitude or because of obstructions around the field, a pilot frequently is unable to land into the wind and must have a sure hand setting his ship on the ground.

The greatest single hazard of gliding and soaring is the spin. The rule requiring at least one hour instruction in light planes in recovery from stalls and spins was drawn up to eradicate this danger. A majority of the accidents have been due to the pilot not realizing he was in stall or mistaking a spin for



Airhoppers Club members look over Air Trails.

a spiral, or vice versa during a turn. Recovery from them can be taught only in a dual-control ship under the tutelage of an experienced instructor. As there are very few two-place gliders, light planes were designated instead.

At first glance these new regulations may appear to be "tough"—almost as much so as those for the licensing of power-plane pilots. Well, the fact remains that gliders and sailplanes in flight are governed by the same physical laws as powered aircraft. Pilots for both should be as well prepared as possible to operate them.

CLUB NEWS

A new glider club, the Falcon Glider Club of Pittsburgh, has been organized under the sponsorship of the Polish Falcons of America. There are fifteen active members. Meeting place and headquarters are located at 97 South 18th Street, S. S. Pittsburgh, Pennsylvania. For the present, membership is open to those of Polish extraction over sixteen years of age. The club received its initial impetus the early part of August under the capable guidance of Victor Sydlowski, glider pilot and instructor, holder of a Silver "C" license, from Poland. At present the group is using a primary type glider, the "Blackbird" modified or the "Wrona" Bis built in Poland by one of their many gliding and glider-building groups. The total weight of the ship alone is 80 kilos, or approximately 180 pounds. A shock cord is used for launching. For pilot ground training, the club is using the glider arranged on a pivot stand permitting simulation of flight conditions, with the slipstream of an airplane motor providing the air conditions. Gus Haller, prominent Pittsburgh glider pilot, has been lending his able assistance at various times to further the success of the club.

We are indebted for the above news to Edward Pilchowski and John Tracz, both of Pittsburgh.

The Franklin Institute of Philadelphia, located on the Benjamin Franklin Parkway at 20th Street, is exhibiting scale models depicting the advance made in various gliding and soaring ships. There is an excellent model of the Bowlus-duPont glider, as well as a full-size sailplane owned by Percy Pierce, president of the Aero Club of Pennsylvania.

Members of the Airhoppers Gliding and Soaring Club of Astoria, New York, are spending practically every week-end flying at their Wurtsboro field. On September 26th conditions were so favorable that Herman Kursawe obtained his "C" license by soaring for twenty-six minutes over the airport.

That same day members of the North Jersey Soaring Association put in an hour of soaring each at their site on Mt.

Peters, Warwick, New York. Among these were Chet Decker, Pete Bonotaux, and Felix Chardon.

The Metropolitan Soaring Association meet was held October 9th-12th at Wurtsboro, New York. Though weather conditions were most unfavorable, nine ships and about thirty pilots participated. Clubs present: Airhoppers Gliding and Soaring Club with a Franklin, a Prueffling and a Cadet; North Jersey Soaring Association with a Franklin; Wings Soaring Club with their Gullwing Franklin and Wistar Brown's Goeppingen Wolf; and the Clark Glider School of East Hartford, Connecticut, with a Mead Challenger and a Cadet. The Schweitzer brothers were also on deck, their ship being one of their all-metal SGU-2s.

Only six of these ships actually took part in the meet. A total of 219 flights were made—the longest, 12 minutes, 6 seconds, achieved by Lew Barringer in the Gullwing Franklin. Albert Rosse took second honors by staying aloft 6 minutes, 30 seconds in the Franklin, while Emil Lehecka rated third with 3 minutes, 15 seconds in the Schweitzer SGU-2. The highlight of the entire meet was the demonstration by Ben Shupack, Airhoppers member, of the new method for instructing students by radio.

Emil Lehecka is acting as chief instructor for the Edwards Flying Service at Flushing Airport, Flushing, New York.

James Gough of the Northern California Soaring Association broke the local endurance record when he soared for 2 hours, 20 minutes in a Pegasus sailplane over Livermore Valley, California.

At the Annual Competitions of the British Gliding Association, twelve pilots won their Silver "C" certificates, raising the total number of these in Great Britain to twenty-six. One pilot gained his in just two flights. First prize went to Phillip Wills, flying a Hjordis sailplane; second prize was won by Bluseberry, handling a Rhönsperber.

NEW WORLD RECORDS

Distance: Rastorguyev, Russian pilot, distance from Moscow to Saratov, 360 miles.
Altitude: Steinig, Germany, in a Rhönsperber at Grunau, Silesia, 19,685 feet.
Duration: Ernst Jachtman, Germany, in a Grunau Baby II, soared along the coast of the Isle of Sylt in the North Sea for 40 hours, 55 minutes.

Jonas Pyragius of Lithuania, who joined us for the Eighth National Contest at Elmira, writes that he is making arrangements to pay us another visit in 1938. The Lithuanian government is

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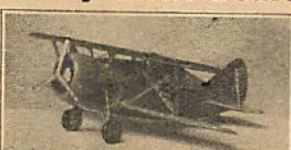
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working on reciprocal recognition of licenses with the United States.

According to report, Poland is experimenting with a 10 h.p. portable gasoline engine for use in towing gliders to an altitude, the motor to be released and lowered to tow another glider.

Lewin B. Barringer, general manager of the Soaring Society of America, sends us the following excellent write-up of the Wings Soaring Club.

"The Wings Soaring Club was organized June 1, 1937, at a meeting held at Wings Field, Ambler, Pennsylvania. Among those who became charter members were former students of my gliding school conducted at Wings Field during 1930-31. At that time I had a total of sixty-three students ranging from a young girl of fourteen to a business man of sixty-five. The new club was limited to fifteen charter members and the following officers were elected: Lewin B. Barringer, president; Samuel T. Freeman, 2nd, vice-president; Percy Pierce, secretary; W. Edward Chamberlain, treasurer.

"Sam Freeman was a former student of mine and has been a glider pilot for seven years. He is a member of a large auctioneering house.

"Percy Pierce is president of the Aero Club of Pennsylvania, a 'C' pilot, and has been building and flying gliders since 1909.

"Dr. Chamberlain is head of the X-ray department of Temple University and Medical College and had his first taste of flying in a Montgomery hangtype

glider near San Francisco in 1909. His son, Owen, now a freshman at college, is also a member.

"Other members represent a variety of occupations including printing, insurance, banking, and law. There are two women members—Mrs. Alfred L. Wolf, whose husband is the lawyer who drew up our by-laws and has been an active airplane pilot for nine years, and Mrs. Barringer, who passed her tests for an 'A' license this summer.

"Although a number of the members have made excellent progress, and the club now includes one Silver 'C' pilot, three 'C' pilots, two 'B' pilots and one 'A' pilot, the best record was that made by Eliot F. Noyes, the young architect who was with me on the expedition in Persia. In just three days' instruction, with no previous experience, he qualified for his 'B.' During the eight days of the Mid-West Contest which followed, he put in a total of 10 hours, 25 minutes of soaring, including a flight of 5 hours, 15 minutes qualifying him for the first leg of his Silver 'C.'

"A great deal of the club's success can be attributed to the excellent performance and safe flying qualities of the Stevens-Franklin glider which we purchased from the Placek brothers, who had built the special gull-wings from plans designed by the gliding group at the Stevens Institute of Technology on a standard Franklin utility fuselage. These wings were properly stress-analyzed and the ship is licensed. In addition to our rule to have only licensed equipment and pilots, we carry

personal liability and property damage on the glider. Our towing equipment consists of a 1932 Ford V-8 and we use only the approved D. L. V. release on the rear of the car.

"An idea of the activity of the club can be judged from the fact that since its start less than five months ago, it has been to soaring expeditions, meets, and contests at Elmira, New York; Empire, Michigan; Mantaloking, New Jersey; and Ellenville, New York. At Elmira we scored 320 points, finishing fifth in the group performances of the National Soaring Contest.

"Two sailplanes owned by individual members are also in the club. The first is my Minimoa high-performance sailplane and the second is the Wolf intermediate sailplane owned by T. Wistar Brown, who won his 'C' this year at Elmira.

"The only handicap to our operations and the reason why we are not doing much now is that I am the instructor and my time is, unfortunately, very limited with running the S. S. A. and editing 'Soaring.' You will be interested to know that one reason for my organizing the club was to try out in actual practice some of the problems of club operation so that I would be in a position to advise groups all over the country who wish to form gliding clubs.

"Our Stevens-Franklin has put in over forty hours of varied flying since we bought it and we soon expect to put it up for a general going-over in line with our policy to keep all of our equipment in good condition at all times."

Atlantic Clipper

(Continued from page 25)

Meanwhile, American designers have not been idle. Sometime during the spring of 1938, Pan American Airways will commence tests on their newest overseas transport. This huge ocean-going flying boat has been christened the *Atlantic Clipper*, and six of the type have been ordered from the Boeing Aircraft Co. With a gross weight of 86,000 lbs., it is double the size of the Sikorsky forty-two and half again as large as Glenn Martin's *China Clipper*.

The Boeing 314 is a high-wing, full cantilever monoplane flying boat of metal construction, powered with four 1,500 h.p. double-row, 14-cylinder Wright-Cyclone engines. The gracefully tapering wings of the airliner measure 152 feet from tip to tip and are thick enough to accommodate a full-length passageway through which mechanics may enter the engine nacelles and effect repairs and adjustments during flight. The engines are inclosed in streamlined cowlings embodying all the latest developments—including air-control flaps. The three-bladed metal

propellers are of the constant-speed variety and are equipped with hub decelerators and slinger-rings.

Measuring 109 feet from stem to stern, the sleek silver hull accommodates two full flight decks. A capacious anchor and gear room occupies the main bow section. It is provided with a large, watertight cargo-door on the port side through which heavy express may be passed to the hold below. A short metal ladder ascends to a mooring platform and hatch in the extreme bow and another longer one leads aft to the control bridge. This compartment has been entirely lined with black to eliminate glare. Two pilots are seated abreast behind duplicate sets of instruments and controls.

Behind the bridge is a large space divided into a navigating room, radio shack, flight engineer's quarters and captain's office. Just aft of this is stowage space for mail and express. A set of steps in the center of the compartment leads to a transparent turret atop the wing through which the navigating officer makes his celestial observations. Back of the cargo hold are sleeping quarters for the crew and a large luggage compartment.

Passenger accommodations occupy the entire lower deck. They consist of a large dining and reading lounge, galley, two luxuriously equipped dressing rooms and seven day and night compartments. The rearmost of these is a private deluxe cabin corresponding to a ship's bridal suite. The *Atlantic Clipper* will accommodate seventy-two passengers on day flights as well as a crew of eight. At night, upper and lower berths are provided for forty.

The Clipper will have modern furniture, especially designed for it. Weight is kept down by the use of duralumin, light-weight, sound-absorbing fabrics and plastic windowpanes. It is understood that the new flying boat will have a speed range up to 200 m.p.h. and a cruising radius of almost 5,000 miles. About 5,000 gallons of fuel will be carried within the wings and sponsons from which it is raised to the engines by powerful electric pumps. Beneath the passenger deck, a series of watertight compartments extends the length of the hull.

Transoceanic flight will tell just how efficient the new Boeing 314 proves to be. Judging by the figures above, she is ahead of anything in existence.

INDOOR FEVER

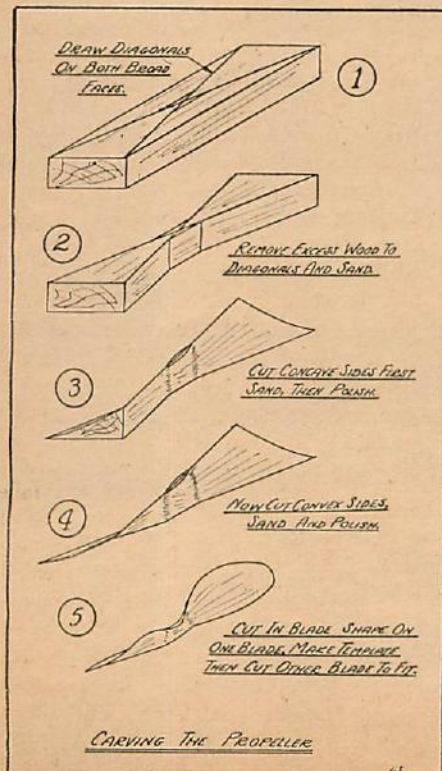
(Continued from page 62)

surface about $\frac{1}{16}$ " deep and all excess wood outside of the blade is cut away. Cut slots for the ribs and "V" the ends so that the cement will not hold to the jig. Soak the leading and trailing edge prepared for the propeller in hot water and pin them in place on the jig. Then put the jig (with the spars attached) in a hot oven till the spars are browned slightly. Remove the jig from the oven, cement the ribs and tip in place. Take the blade off and make another exactly the same. (The spars and ribs should be as nearly matched as you can possibly make them in order to have the propeller balance.) Make a hub from a piece of $\frac{1}{16}$ " sheet balsa about $\frac{3}{8}$ " long to fit the blades. Cement the blades to the hub and then cover the blades with film. Built-up propellers weigh about $\frac{1}{3}$ the weight of carved propellers and appear to be nearly as efficient.

The carved type of microfilm propeller is made by taking an already carved prop and removing the core of the blades with a razor. On a 15" propeller a border of $\frac{1}{8}$ " is left all around. Ribs are cemented in and the blades are then covered. This type is heavier than the built-up type but cuts the weight of the carved propeller in half. However, its advantage over the built-up type is the certainty that it will not lose its pitch.

MICROFILM

Making microfilm and covering a ship with it is by far easier than using paper. Novices will never know the tedious hours that had to be spent in covering a



wing in the old days. Removing wrinkles in tissue models—the greatest thorn in model builders' sides at the time—are now removed from microfilm in two seconds with a bit of heat applied at the proper place.

The first question asked by novices is, "What is the formula for a good solution?" Experience shows the best solution to be the following: .6 oz. *flexible* collodion, .3 oz. amyl acetate, .15 oz. ethyl acetate, 8 drops of castor oil and enough cement to make 2 oz. of solution. The process of making a sheet is as follows: Put 2" of water at room temperature into the bathtub. Lay a large wire hoop (see the drawing) on the bottom of the tub and pour $\frac{3}{4}$ teaspoon of solution on the surface of the water. Make sure that no solution goes below the surface. After it has dried, lift the hoop to the surface of the water and push all the excess film to the edge of the hoop. Then lift the hoop—in a rotating motion about the far end—from the handle as shown in the drawing. In this way the least stress is put on the film, as only part of it at a time is being removed from the

water—thus cutting down on the tendency to break. After the sheet has been removed, hang it up to dry.

Our next job is covering which is so simple as to be beyond words. Support the hoop at the ends (with the film still on it) across the backs of two chairs. Then coat the wing frame (if wing frame it is) with saliva and merely lay it on the sheet of film. Give the saliva half an hour to dry. Turn the hoop over and lay it on a flat surface. Cut the excess film from the wing by running a long stick, which has been dipped in acetone, $\frac{1}{8}$ " from the edge of the wing frame. The acetone will dissolve the film where it touches, leaving the wing frame covered with the minimum of work. If you want dihedral, crack the spars at the desired points, put in your dihedral and recement the spars. After the cement has dried, pass a hot wire about $\frac{1}{2}$ " below the wrinkles at the dihedral and presto! a perfectly covered wing with the least amount of trouble and worry. Propellers, tails, rudders, anything, can be covered just as easily with as little work as the wing.

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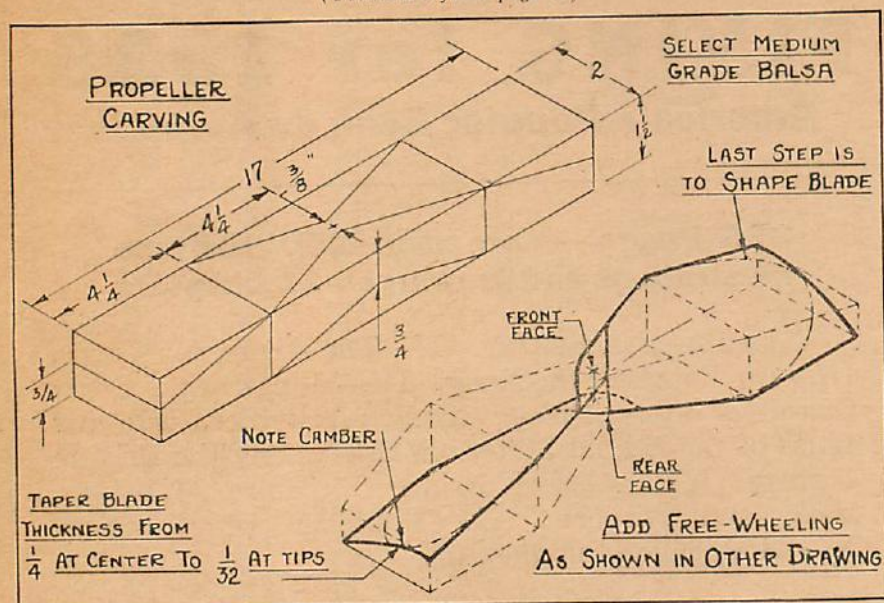
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WAKEFIELD ELIMINATION WINNER

(Continued from page 50)



boom is attached by four #2 clothing snaps cemented to the four corners of the boom plug. The rear hook is efficiently designed. It is bent from a .045" sheet of dural. A $\frac{1}{16}$ " diameter hole is drilled in the forward part to receive the "S" hook. The rear part is bent into two prongs which bear against the inside of the boom plug.

WING, ELEVATOR AND RUDDER

Description of this part of the construction will be confined to their mounting and adjustment on the model. Actual construction is conventional throughout and the drawings will supply the necessary information.

The same rib shape is used in both rudder and elevator. The rudder is cemented rigidly atop the elevator with the cambered side to the left (looking at the model from the rear). The elevator is mounted with the cambered portion underneath and the rear edge is elevated about $\frac{1}{4}$ " above the rear tip of the tail boom. This adjustment will vary slightly, depending on the individual modeler's tastes and the adjustment of the wing.

The wing itself is given negative incidence. ($\frac{1}{8}$ to $\frac{3}{8}$ " block under the trailing edge.) Rubber bands are used to attach it to the fuselage. The elevator-rudder unit is cemented firmly to the tail boom.

PROPELLER AND FREE-WHEELING

The dimensions of the propeller block are $1\frac{1}{2} \times 2 \times 17$ " of medium weight balsa. The method of shaping the block has been illustrated and follows closely the generally accepted technique. Fish used a slight amount of both down- and right-thrust.

The free-wheeling device is one feature of the model which attracted much favorable attention both at the Nationals in Detroit and at the Wakefield in England. It was brought out by Fish back in 1936. Although it is slightly more difficult to construct, it is well worth the trouble because of its reliability and the convenience it offers when changing propellers.

A bicycle spoke (.080 diameter—hard steel) is used for the propeller shaft. Rubber is not attached directly to the shaft but is first attached to an "S"

hook which in turn is inserted through the hole drilled in the end of the shaft. Another hole is drilled in the front of the shaft. Use hard steel drill #55. A steel wire pin of .038 diameter fits through this hole and is the most important part of the free-wheeler. This wire pin engages a brass plate cemented to the front face of the propeller. This plate is cut with a wedge-shaped end which engages the pin when turning in one direction, and allows it to slip free when free-wheeling.

The position of the propeller is further secured by soldering a washer to the shaft after the hook has been bent in the rear end. The actual length of the shank need be only $\frac{1}{4}$ " beyond the inside face of the nosing. In the sketches, this shank is shown considerably longer—for clearness.

Careful attention must be given to bending "S" hooks when powerful motors are used. $\frac{1}{16}$ " steel wire will make a reliable fitting. Bend the hook to $\frac{3}{4}$ " diameter with an amply proportioned shank. When you transfer a fully wound motor from the winder to the rear hook of the tail boom, you'll find these large "S" hooks mighty convenient. Bend two hooks—for both ends of the motor. And as a further precaution, cover them with rubber tubing.

POWER

The model flies on 18, 20, 22, or 24 strands of rubber. Use $\frac{3}{16}$ " flat brown rubber. The motor length is 36". The number of strands can be varied, depending on the rate of climb desired. Fish advises caution when using 24 strands. A motor of this size really takes the model skyward.

WEIGHT

Fuselage	1.12 ounces
Wing98 "
Tail Assembly.....	.73 "
Propeller65 "
Landing Gear.....	.52 "
Nose Block.....	.28 "
Rubber	3.72 "
Total.....	8.00 ounces

EUROPEAN MODELING

(Continued from page 52)

covered with orange tissue and trimmed with red, white, and blue chevrons. A large letter F was used as a rudder trimming.

OTHER WAKEFIELD ENTRIES

German modelers use only the material that is native to their country. Their models were powered with synthetic rubber which cut down their performance. And for the same reason, balsa wood is not used in model construction. Their

models did not have the strength and the light weight of those built from balsa. They overcame these handicaps to place high in the final results.

An interesting German entry was a large white and black job built with a lifting fuselage. The tail was mounted high above the rear of the fuselage. Dihedral was used in the elevator. The fuselage was about 8" wide at the maximum point. The wing was built in two pieces, extending outward from each side

of the fuselage. This model did not perform consistently well. It seemed a trifle unstable and proved sensitive to adjustments.

One of the Belgian planes hit a low thermal and even though it was stalling considerably, it turned in a four-minute flight. But on the whole, their models were nicely designed and well-streamlined. The propellers were small and depended on the duration of the rubber motor. Two of them had balsa-covered fuselages with center wings fastened by sleeves. The relative tail area was about 30 per cent of the wing. Lift-

ing elevators were used in most of the designs.

The most surprising planes in the contest were those from Sweden. These models had almost no dihedral, used square-tipped wings and boxtype fuselages. Yet they developed a climb equal to our own models. After the take-off the models rose in one straight, long sweep to about 200 feet, turned tailwind and continued climbing steadily. They used heavy motors and small propellers.

The only Norwegian entry was flown by Eric Olsen. It was a beautiful job with a gull wing and a fully streamlined fuselage. The 20" propeller was geared to several lengths of rubber to produce a really long propeller run. The model glided nicely and would have placed considerably higher had it not stalled under the first burst of power on the take-off. After this disastrous first stall it recovered and climbed to a nice height. But the first loss of power and altitude was too much of a handicap.

by C. S. Rushbrooke was a beautifully finished model and an excellent flier. The fuselage was of a rectangular cross section covered with sheet balsa. The model had a 20" propeller with ample motor to give it a steep climb. It glided perfectly after the power flight. Had the thermals given it a help, it most certainly would have finished near the top.

The only French plane of unusual design was flown by Andre Blanchot. He used a tractor-pusher combination with propellers front and rear. Each propeller was connected to a separate motor. The wings were square-tipped but well-finished. The design was more interesting than effective since his 3 flight average was :43.6.

The English ships were almost identical to the better streamlined jobs we see in America. All of them surprised us with their quick getaway and snappy performance. We had pictured the English models as being rather sluggish and slow climbing.



The Wakefield winner.

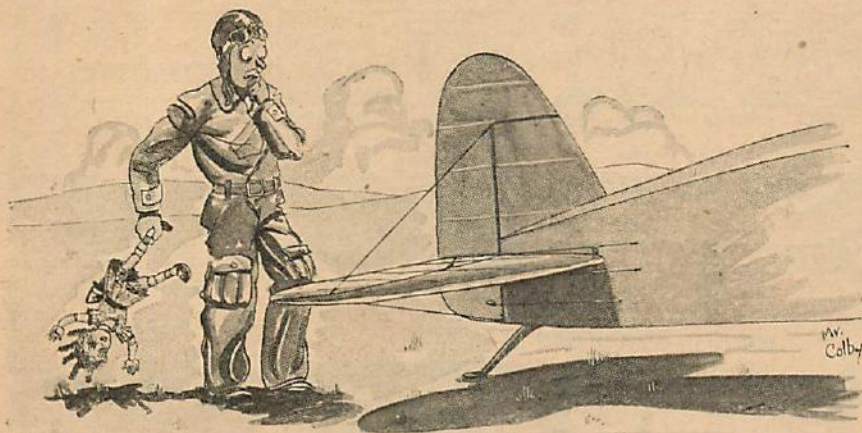
less weight. Large propellers and heavy motors were almost standard equipment. A few modelers still used small propellers and fewer strand motors. Gears were rare and always gave me the impression of an enormous power-loss feeling. Rubber tensioners were numerous. However, many entrants used motors with as much as 18" slack without a tensioner and their models performed nicely in the glide.

I was surprised at the altitude some of the slow-climbing models obtained under power. I wonder now if a fast climb is really any better than a slow one. Decidedly not, if the slow climber gets just as high at the end of its power run. The shortest power run seen in the contest was about 30 seconds. The longest was slightly more than 2 minutes. The general trend seemed to be a compromise with maximum altitude for the goal.

Wings were mostly one piece with center dihedral, high-lift airfoil and tapered tips. A few had sweepback and tip dihedral. Most wings were monospar construction.

The landing gears, free-wheeling units, tensioners, and other similar gadgets seen at the contest were all exactly like our own. In fact our American literature seems to have been the basis of a number of designs entered from other countries.

I enjoyed every minute of the contest. It was fun to talk shop with the boys from all parts of Europe. Some day soon, perhaps, I'll be competing in another Wakefield contest. And that day can't come too soon!



"Now why should the plane be easier to move with this under the skid?"

The Holland entries were the only planes in the contest flown on pure rubber duration. The Dutch boys have not had much experience. Their workmanship was good but their models refused to climb more than 50 feet in the short time they remained aloft.

The New Zealand, South African, and Canadian planes were all flown by proxy. One New Zealand boy had made his box too small to accommodate his model. And when he discovered that the model wouldn't fit, he simply broke it and squeezed it in. The English boys had to reassemble it and try their best to get it flying. The Canadian entry flown

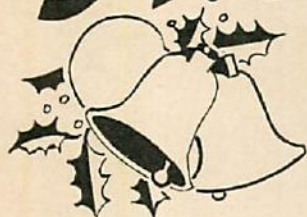
We have no alibi for the performance turned in by the United States Wakefield team. Our models climbed high and fast, flew nicely, glided flat, looked around for thermals and came down promptly. None of us hit even the smallest thermal even though the other contestants got one every now and then.

CONTEST CONCLUSIONS

The models which turned in the best time were not especially streamlined or refined. There was an abundance of solid-covered fuselages but the tissue-covered ones still dominate and seem to get better results—possibly because of

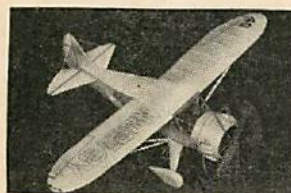
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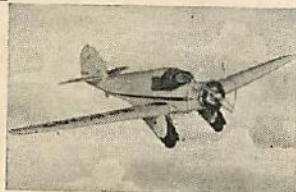
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