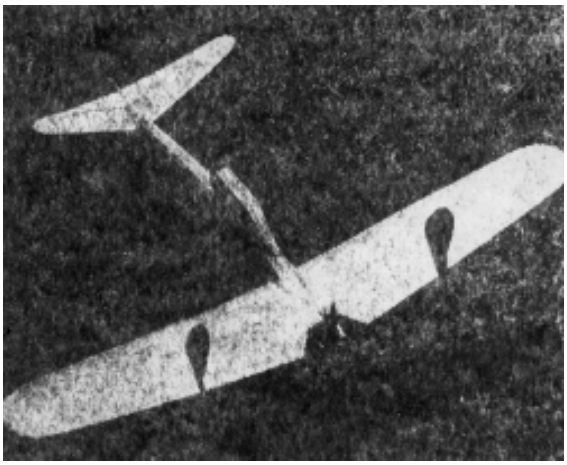
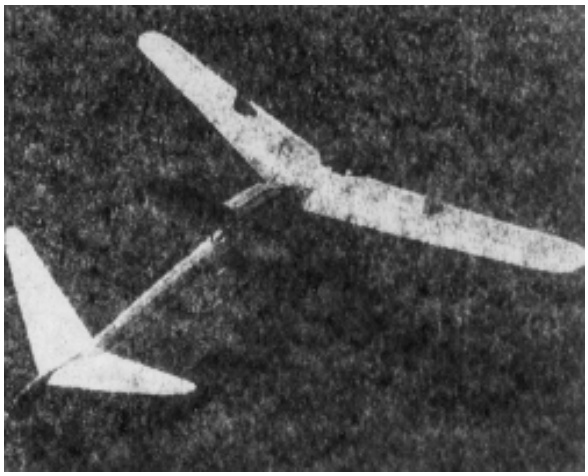


The "canard" gas model ready for flight



Fuselage diagonals have been added fur strength

"Tail First" With Gas Power

Why "Canard" Gas Models Have Been Unsuccessful in the Past And How You Can Build One -- Properly Designed --That Will Out-Fly Tractors

By ALFRED RUBIN

A month or two ago we promised to present a sensation, new, in the line of gas powered models.

We take great pleasure therefore in placing before you this canard-type gas powered plane, possessing unusual performance.

The secret of successful canard planes has long been known to a small number of model builders and the editor; however, it has never been applied successfully until this moment. To our knowledge, this little ship is the first canard-type gas model that has ever been built and flown with complete success. The location of the center of gravity well forward of the rear wing is the secret of its success. The wrong placement of the center of gravity in full scale canard aircraft, in the past, has been the chief cause of their failure.

NOW, when you lock at the pictures of this plane a lot of you are going to say to yourselves and to your friends, "Oh, oh --- another freak gas job."

Well, don't fool yourself, there's nothing freakish about this ship! Unusual -- yes -- but not freakish.

To those of you who built models back in the late 20's and early 30's this plane won't seem strange. For you will remember the way those old twin pushers (outdoors) and single pushers (indoors) flew. Was there ever a better type of flying ship -- or one easier to adjust and make fly? We don't think so.

You know, the idea of a canard (tailfirst) is not a new one in gas model building. Many have not been very successful, but there's a definite reason for that! The designers forgot one or two simple little things. Than too, too many of you say that pushers can't be practical or real ships would be made that way.

Well, you're dead wrong. It's an acknowledged fact among aeronautical engineers that the pusher is the MOST EFFICIENT TYPE OF PLANE KNOWN AND THE EASIEST TO MAKE FLY! I know what you'll say now --- "then why don't they make 'em that way?" And that's easy to answer, too. It's because the Department of Commerce has decreed that no full-sized airplane shall have a lifting tail surface (though only Heaven knows why) and, in the case of a pusher, they consider the main wing as the tail surface since "it goes over the fence last" and that puts 'em OUT.

But there's no such law in model circles, and this plane will prove that you've been missing something. First of all, it's so easy to adjust that it isn't even funny. You don't have to have to be afraid to test hop it; it won't crack very easily. And remember, too, that if you are experienced, you're welcome to try some of your own ideas on the design.

In other words, it lends itself to experimentation If, however, you're not confident of yourself as a designer. build it as shown and you won't be disappointted, even if you do go out of the way on the minor points once or twice --- it's that flexible.

How does it fly? Swell! On its first flight, with an 18-second motor run, she did more than two minutes; on the second, with a 16-second blast, she was up for more than two minutes, and on the third. with a 20-second drag, she went out of sight, after three minutes, in the general direction of Europe, never to be seen again.

And we'll tell you something else. We're from Atlantic City, and down here a "calm day" means about a 20-mile-an-hour wind. So you see she isn't easily affected by weather. The original was powered by an Ohlsson "23", but a Brownie will do just as well --- they're both fine "put-puts"! If you wish, go ahead and decrease its size to a Class "A" job, or step it up to a Class "C" --- you'll have no trouble. We never have had so much confidence in a gas job. . . . Do anything you want to it --- bet you cant keep it down!

What's the secret of its success? Center of gravity, properly placed! Yep, that's the story a nutshell. (Thanks to Mr. Chas. Grant for this information.) You see, when you flew those old twin pushers, they were loaded down with rubber motors that often weighed twice as much as the ship itself and most of that weight was concentrated well forward of the main, or rear, wing, bringing the center of gravity well forward of the a main surface --- WHICH IS ESSENTIAL IF THE

MODEL IS TO BE KEEP FROM STALLING. That's the trouble the others ran into. They forgot that in a gas model pusher, the motor weight was concentrated to the rear and that the center of gravity would consequently, be brought back over the main wing. That won't do.

So, you move the main wing back as far as it will go without getting wound up in the propeller, put on a long fuselage, and stick ,the batteries, coil, timer and everything else but the kitchen sink way up near the front wing, and, Voila! --- there you are! It's simple, but annoying, if you haven't found it out.

So don't forget that in building this plane or in building some improvement of it --- keep the center of gravity way up front. A good healthy forward landing gear helps a lot here, too.

Remember that this plane is an experimental model and while its success is really terrific, it can be improved upon. Streamlining, different aerofoils and all the rest can be tried. This is merely here to help you build your first successful "canard" and, to accustom you to where the various weights and surfaces belong. We think that you fellows can take this design, as we intend to do, and fiddle around with it until you have an unbeatable plane is competition with tractors. I guess this makes us unique among model designers --- the others usually caution against changes. But the credit is not ours --- but rather this swell little plane. One of the things, by the way, that will please you most in this ship is its excellent glide: it glides like a pancake, yet never approaches a stall --- seems to keep its nose down no matter what the speed --- or lack of it.

You might, if you wish, give the ship a bit more rudder area. You see, with the rudders out of the slipstream of the prop, as they are here, they lose a lot of effect, as well as some more through interference on both sides of the wing, where mounted.

Now a word about the possibilities of shifting power plants and consequently weights, on this particular ship as regards the new rules.

The original plane weighed 24 ounces, giving a wing loading of ten and a half ounces per square foot, and was powered with an Ohlsson "23". The plane flew very well under this loading, which had the plane carrying five and a half ounces more than is required if this motor is used. Therefore it is easy to understand that this plane can easily handle a motor of similar displacement to the new Brownie "E", which requires that the plane weigh 23.30 ounces. If, however, you want to use the Ohlsson and want to better the model's performance, you may actually cut down your weight to about 19 ounces and still meet all requirements under the new rules. This will give the plane a loading of only a fraction more than eight ounces per square foot and should add to the climb and soaring qualities considerably. If, however, you decide to cut down the weight in order to take advantage of this possibility, cut it down TOWARDS THE REAR OF THE PLANE.

ALWAYS REMEMBER, WHEN BUILDING THIS TYPE OF SHIP, THAT THE IMPORTANT THING IS TO KEEP THE CENTER OF GRAVITY WELL FORWARD OF THE REAR WfNG --- and this is the best way to do it.

But let's get on to the actual construction of this baby. As in most cases, we'd better start with the fuselage, which is simple and orthodox in construction.

Using come solid 3/16" square balsa, lay out duplicate sides of the fuselage, being careful to make both sides identical. One of the best ways to insure this is to build one side on the completed side of the other while still in the drying stage. When both sides are completely dry and checked for alignment, lift them from the table and join them together with 3/16" square crosspieces as shown in the top elevation. Here again. alignment is most important.

The nose block, of solid balsa, and the rear block, of similar material, are then added to the frame, as well as the balsa incidence block for the front plane. Formers "H" to "Q" are then cut out of 1/16" sheet balsa and added to the bottom of the frame, after which stringers of 1/8" square are attached, completing the bottom of the fuselage. Formers "D" to "G" are then placed properly on the top of the fuselage, and stringers of 1/8" square added here, too. Formers "A" to "C" are placed on top of the fuselage ONLY WITH PINS, however, while stringers are properly added, for this section is removed later and hinged, to serve afterwards as entrance to the ignition system, which will be centered well forward.

At this point, 3/32" plywood bulkheads are cut out according to the drawings and attached as shown to be used as mounts for the landing gear. The forward landing gear is "U" - shaped to carry the single air-wheel used to keep the nose of the ship out of the dirt, while the rear landing gear is conventional to carry the usual two wheels there. 1/16" steel wire is used in both cases, firmly attached to the bulkhead by use of the "overlays" grooved to the depth of the wire struts. 2-5/8" airwheels are used throughout. 1/4" x 3/8" hardwood motor bearers are fastened sturdily to the insides of the top longerons. This virtually completes the fuselage except for the balsa piece which fits over the front plane to carry out the streamlining --- which, of course, must wait, and the same is true of the balsa pieces which cover over the main wing to streamline to the rear of the fuselage. The "housing" or "pilot's enclosure is necessary to make the fuselage cross-section legal. It is added later and can be made either permanent or detachable.

Shifting from the fuselage is the front plane, construction here is entirely conventional The center or master rib is shown full-size on the plans and is an original airfoil found to be very successful. The other ribs are similar, though of course properly graded in size. The leading edge is of 1/4" by 5/16", shaped to suit the section. The top main spar is 1/8" by 5/16", HARD balsa, tapered down to 1/8" by 3/16" at the tip rib. The rear spar is 1/8" by 3/16" tapered to 1/8" square. Trailing edge is 1/2" by 1/8". The tips are 1/2" by 1/8" balsa, too, shaped after construction to suit. A steep 4" dihedral on each wing tip is employed here, and the center section planked with 1/32" sheet balsa to give it the necessary strength.

Construction of the main or rear wing is virtually the same as that used in the front plane, though of course, on a larger scale. The ribs, in this case, are mounted on a leading edge of 1/4" by 3/8"; a main upper spar of 1/8" by 1/2" tapered to 1/8" by 1/4" at the tip rib; a rear spar of 3/16" by 5/16" tapered to 3/16" square; and a trailing edge of 3/4" by 1/4". Notice that the trailing edge of the wing at the center section is built with a cut-out, in order to allow simple rubber band mounting without interference from the motor --- thus still allowing the trailing edge of the wing surface to be as

far back as possible. The center section is planked with 1/16" sheet balsa for strength and don't forget the false ribs so as to be able to mount the rudders. Dihedral on this surface is 3" on each tip.

The rudders are simple to make --- four are neccessary --- and are constructed of 3/32" balsa throughout. Covering of the ship is paper, and that job you all know how to do without instructions. Just remember that, this ship, like all others, can do with a good covering job, both for performance's and appearance's sake.

About the only undesirable feature in the entire plane is the fact that, due to the ignition accessories being near the front of the ship, the ignition wires are necessarily long. This, of course, makes ignition trouble easier to occur, though not at all necessary. In other words, be particularly careful in your wiring (something that never hurts) and use medium-sized batteries, even if you are certain pen-cells will do. Do this both because of the added "juice" and also because it will help bring the center of gravity towards the nose. Use a good dependable timer, well mounted, and a sure-fire battery box. This, together with proper wiring, should guarantee you no motor difficulties.

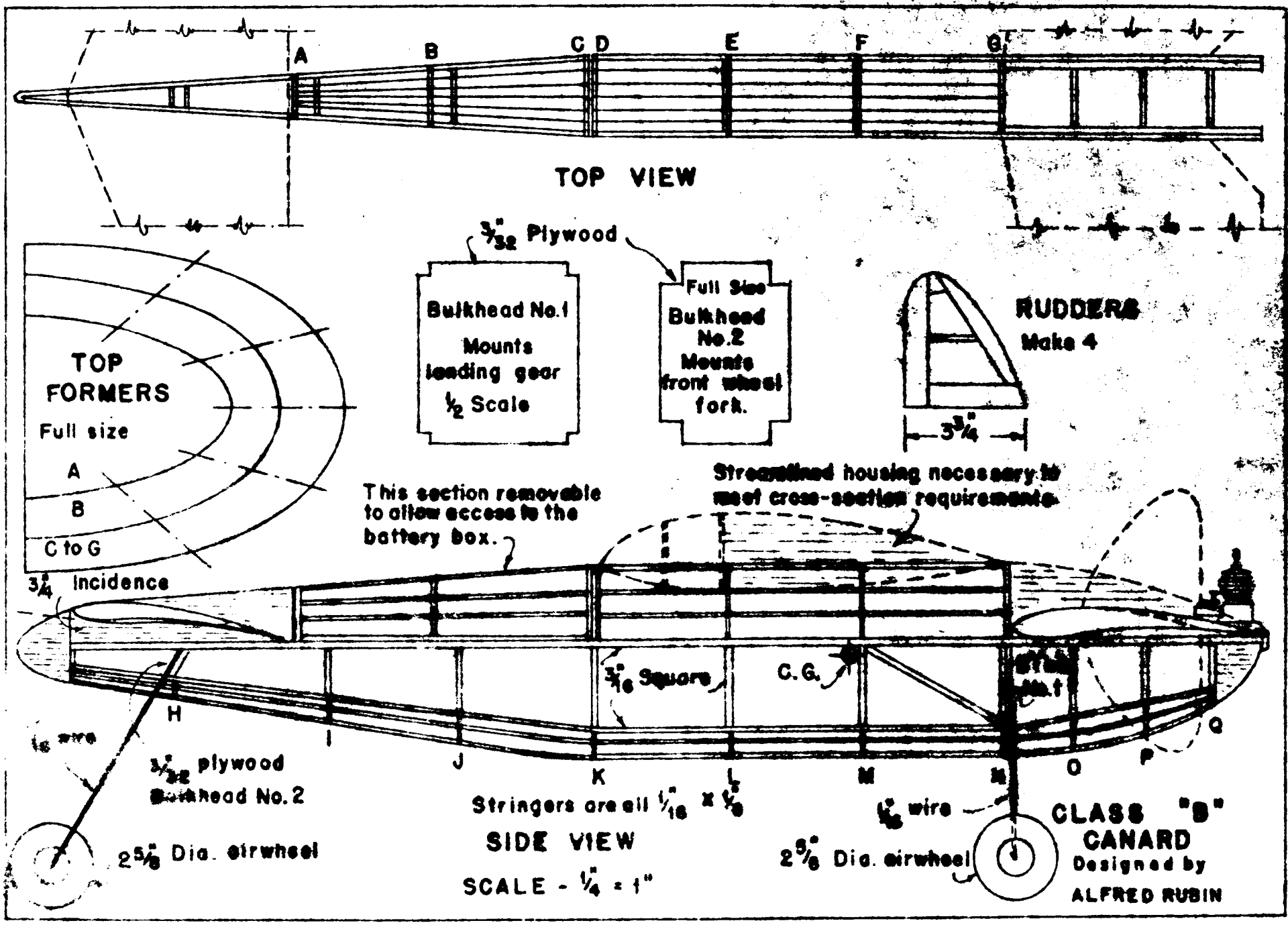
After covering, be very careful in mounting the front plane, being certain your incidence angle is proper and that it is mounted level when sighted head-on. The same is true of the rear wing (execept that that NO incidence is used here). Ordinary rubber attachment is used in the rear surface and, although the original had the front plane permanently attached, it might not be a bad idea to mount this plates with rubber, too; at least untill you are certain the prescribed incidence is proper for your particular ship, which may vary somewhat from the original. However, suit yourself on this --- as you probably will do anyway. A good 11" prop was found to be perfectly suitable on the original, although, frankly, we had little chance to test it, losing it on its third flight.

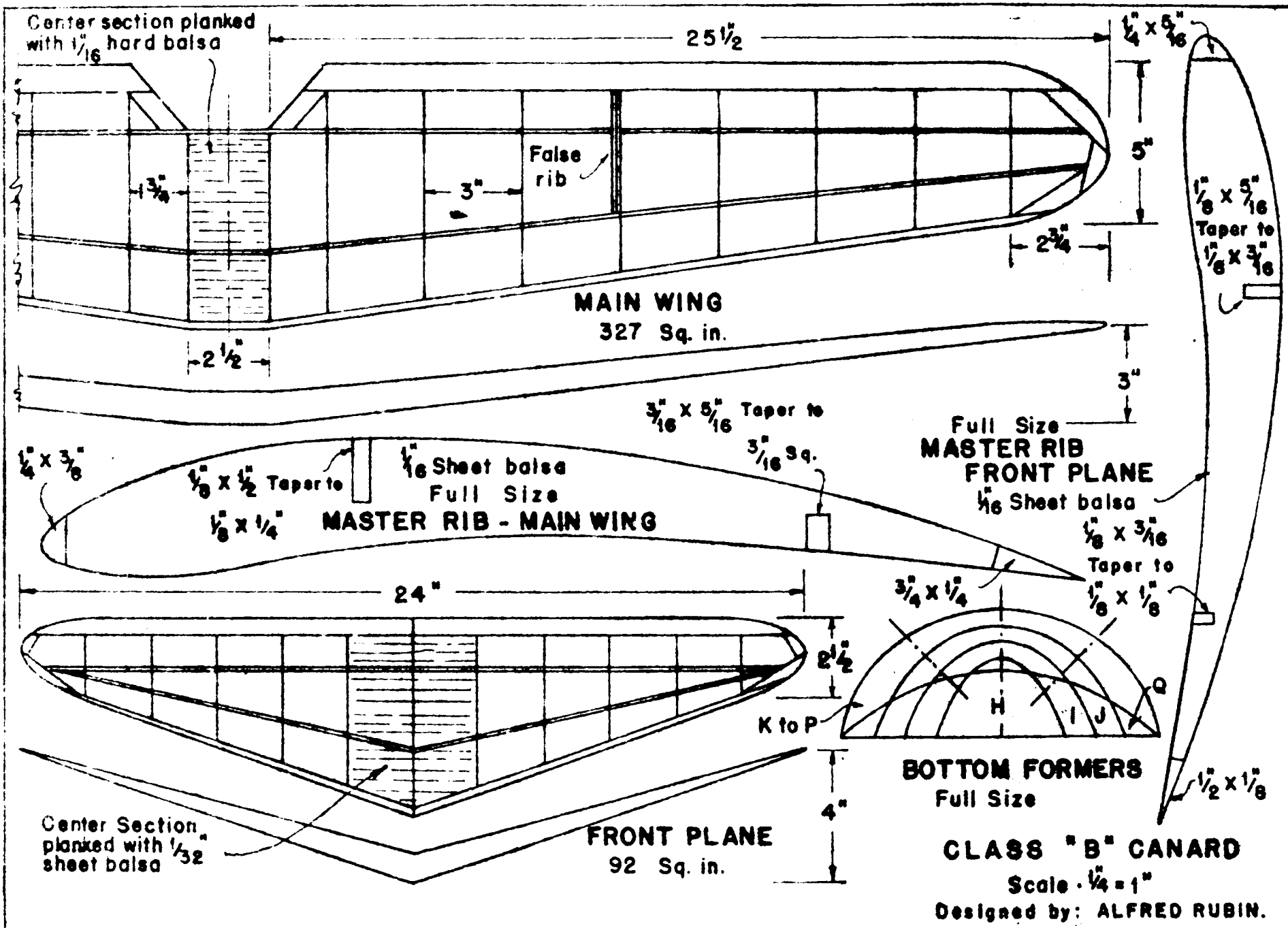
You'll find the ship easy too fly, and easy to get off due to its three-wheel underpinning. It isn't upset easily on the take-off and unassisted take-offs are essential with this ship, unless you want your fingers chopped off! The climb is steep and steady and the glide flat and easy. She soars on the slightest implication and has a funny habit of fighting into the wind that's usually good for a few feet of altitude before she turns tail and runs before the breeze.

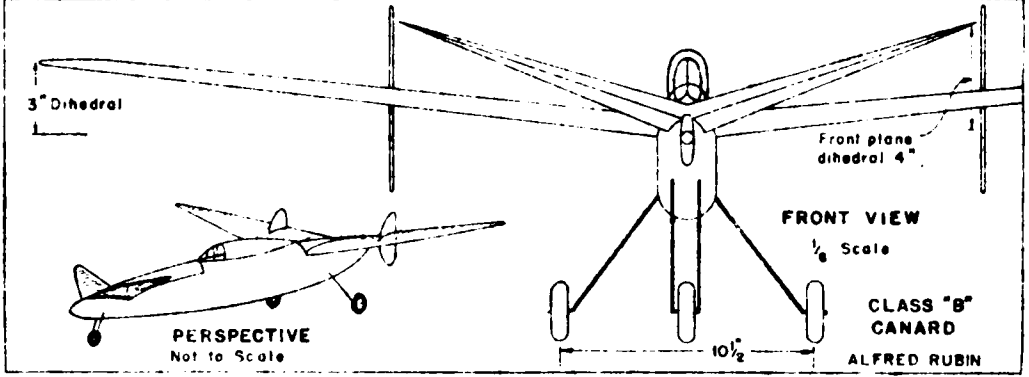
Go ahead and try this crate --- you'll not be disappointed, we know, and it'll open new fields of possibility to you in the future. One fellow we know has already asked for a design of a twin-motored job like this one! Both MODEL AIRPLANE NEWS and the author will be

interested in knowing how you made out with your "tail-first" --- let us know about it, wont you?

Scanned From October 1940
Model Airplane News


A
B
C D
E
F
G
TOP VIEW
3/32" Plywood
Bulkhead No.1
Mounts landing gear
1/2 Scale
Full Size
Bulkhead No.2
Mounts front wheel fork.
RUDDERS
Make 4
3 3/4"
TOP FORMERS
Full size
A
B
C to G
This section removable to allow access to the battery box.
Streamlined housing necessary to meet cross-section requirements.
3/4° Incidence
3/16 Square
C.G.
H
I
J
K
L
M
N
O
P
Q
1/8 wire
3/32" plywood
Bulkhead No.2
2 5/8" Dia. airwheel
Stringers are all 1/16" x 1/8"
SIDE VIEW
SCALE - 1/4" = 1"
1/8" wire
2 5/8" Dia. airwheel
CLASS "B"
CANARD
Designed by
ALFRED RUBIN


Center section planked with 1/16" hard balsa
25 1/2"
1/4" x 5/16"
5"
False rib
3"
3/4"
2 3/4"
1/8" x 5/16" Taper to 1/8" x 3/16"
MAIN WING
327 Sq. in.
2 1/2"
3"
3/16" x 5/16" Taper to 3/16" Sq.
Full Size
MASTER RIB FRONT PLANE
1/16" Sheet balsa
1/8" x 3/16" Taper to 1/8" x 1/8"
1/4" x 3/8"
1/8" x 1/2" Taper to 1/8" x 1/4"
1/16" Sheet balsa
Full Size
MASTER RIB - MAIN WING
24"
2 1/2"
3/4" x 1/4"
H
I
J
Q
K to P
BOTTOM FORMERS
Full Size
1/2" x 1/8"
4"
Center Section planked with 1/32" sheet balsa
FRONT PLANE
92 Sq. in.
CLASS "B" CANARD
Scale - 1/4" = 1"
Designed by: ALFRED RUBIN.


3" Dihedral
Front plane dihedral 4"
FRONT VIEW
1/8 Scale
PERSPECTIVE
Not to Scale
10½"
CLASS "B"
CANARD
ALFRED RUBIN