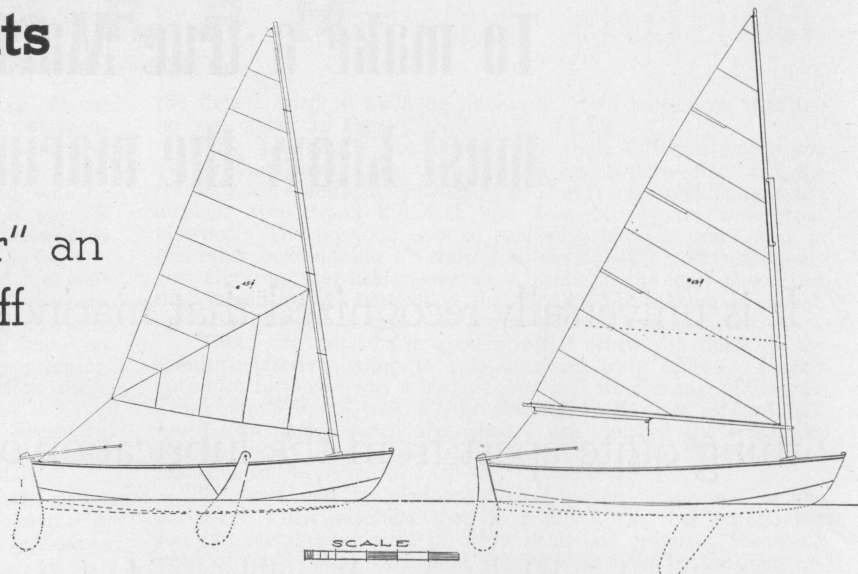


# Plywood for Boats

By CHARLES G. MacGREGOR

## Part III

### Building Plans of "Beaver" an 11'-8" All Purpose Skiff Designed Especially for The Rudder



THE American skiff is probably the most popular type of boat in this country today. Many thousands are in use and they are to be found in almost every corner of the United States and Canada. These vary in construction and form from the simplest with flat bottom and straight vertical sides to the vee-bottom and flared sides or the beautifully built planked up models, now unfortunately seldom seen or built.

They are our most numerous utility boat though most of them lack the all-around qualifications because of their absolute simplicity of form and build. A utility or all-purpose boat must serve in a wide variety of duties and perform them with the least amount of effort or power whether that power is delivered by oars, sail or motor. These qualifications are listed below:

- a. Strong.
- b. Light weight.
- c. Low cost.
- d. Low upkeep.
- e. Simple and easy to build.
- f. Easy to row with one or more aboard.
- g. Sail well to windward in choppy water.
- h. Have provision for small outboard engine.
- j. Suitable for small inboard engine.

In addition to all these qualifications it may easily be transported on a trailer, on top of a car or on the deck of a larger boat; be readily towed astern of an auxiliary or power cruiser without too much drag, and many other duties too numerous to mention here.

The design submitted in this issue is that of "Beaver," a 12 foot utility plywood skiff of the following dimensions: Length o.a. 11'-8", beam 4'-4", depth 1'-6" and draft, leeboard down, 1'-6".

This design was prepared at the urgent request of a large number of amateur and professional builders in all parts of the country, and through some of the plywood manufacturers. This little craft will perform all of the above duties quite efficiently, provided the builders will follow the plans.

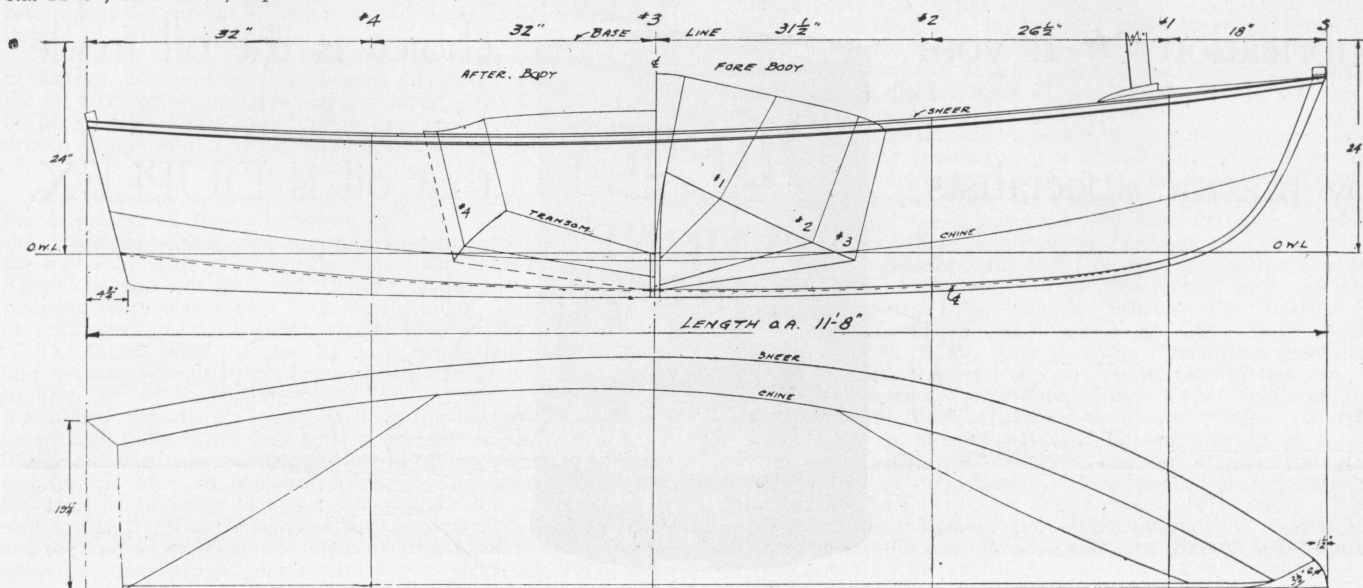
Many prospective builders may not like the rig shown, but this has the advantage of simplicity and efficiency, a rare combination. Leeboards are suggested because of simplicity and lower cost, but a center-board may be used to advantage if desired, with the rudder and tiller instead of the steering oar. The chine and keel construction are very simple. If it is intended to use a center-board the wider keel should be used as shown in the detail to provide room for the slot and center-board trunk between the plank edges.

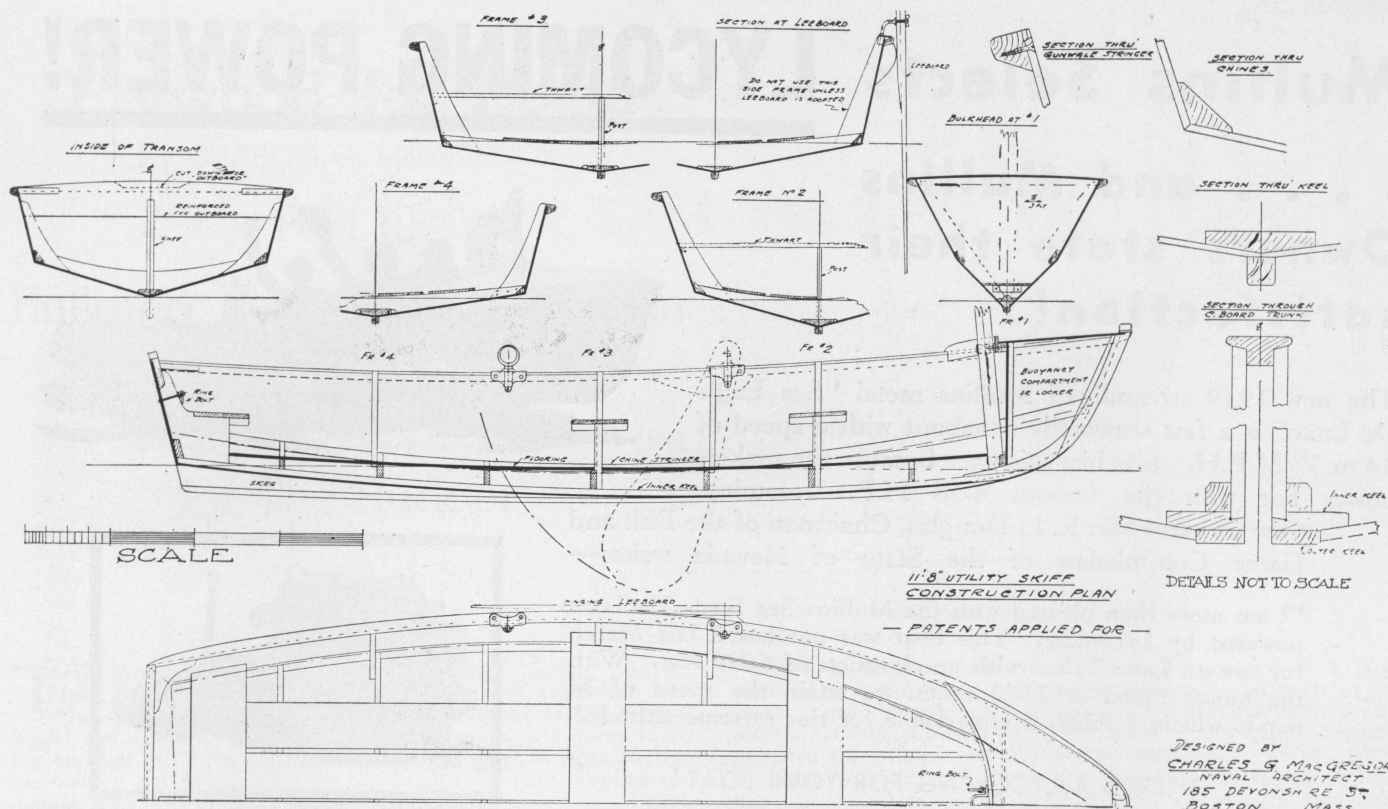
In using plywood for boats, builders, whether amateur or professional, should exercise great care in its use, more even than is ordinarily given to lumber used in conventional construction. Following are a few hints and please bear them in mind:

Resin-Bonded Plywood furnished by reliable manufacturers is an excellent material. Use material only stamped with a recognized trade name on the edge of the panels, and be sure not to accept anything "just as good." It must be the best. Insist on close joints on cores of all panels.

If you do not know what these trade names are communicate with the writer and they will be furnished. Do this before you buy, not after.

Protect all edges of the plywood either with a good wood cement or glue, and where possible the edges should be set into a rabbet.





FOR OFFSETS SEE PAGE 84

For best results on watertight seams use special resin glue. If this is used the surfaces must be in close contact. No caulking is necessary if the seams are properly glued.

For those who plan to build this boat where light weight is important, use 1/4" plywood for the planking. For more rugged service, and particularly for the sailing model, use 3/8" plywood for the planking.

**COST:** The material to build the hull should not exceed \$20, sail, spars and leeboards extra.

**STRENGTH:** If properly and carefully built this boat will have great strength, since all contact surfaces are glued, and in plywood there is very little shrinkage, expansion, splitting or warping.

**WATERTIGHTNESS:** Since boats built on this system of construction have glued or fused seams, they will not leak even if the boat is left exposed to the sun. However, the wood must and should be well protected with suitable paint. If left afloat it will absorb very little water; therefore, the hull does not increase appreciably in weight from this cause as do so many boats built with ordinary planking.

**REPAIRS:** Are seldom required and very simple to make. A hole in the planking may easily be repaired by simply filling the hole with a piece of the same material as the planking, backing it up with a similar but larger piece so that it will overlap on the inside of the planking; the whole glued and screwed in place.

**ROWING:** This boat should be easily rowed by any youngster, even in choppy water. When fully loaded it will carry its way between strokes. Generally flat bottom skiffs are hard to row because of the drag at the back of the transom. You will notice the transom is well lifted on this model, and this is particularly necessary when sailing.

**SAILING:** If it is planned to use this boat as a racing class of sailboats it would be advisable to adopt a hinging or dagger-type center-board boat and rudder, with either a Marconi mainsail, lugsail or sliding gunter, and the heavier planking as previously mentioned.

**POWER:** A small outboard motor about 2 hp. would be suitable and can be used in either the rowing or sailing model. The transom is suitable reinforced for such an engine. If an inboard motor is preferred, one of the new air-cooled engines can be used. Be sure to have good engine beds, and a skeg for the protection of the propeller and shaft. Names of manufacturers of suitable inboard or outboard motors will be furnished on request.

**TRANSPORTATION:** The skiff with lighter planking is suitable for hauling on a trailer or carrying on top of the car. The spars, sails and oars can be stowed inside the hull.

**SPECIFICATIONS**

**PLANKING:** Use 1/4" plywood for the lightweight model, or 3/8" 3-ply fir resin-bonded plywood as previously noted. The sides can be made from one panel 48" x 144"; the bottom from one panel 48" x 144"; bulkheads and deck are 1/4" 3-ply. The inner keel, chine, stringers, gunwale stringers, frames and floors should be Sitka spruce; the outer keel of oak; stern, gunwale cap and seat edges, rudder and leeboards of mahogany. If a center-board is to be used, use a wider keel as shown in the detail.

Use bronze flathead wood screws 1" No. 8 in 3/8" plank edges and 1 1/4" No. 8 in keel. Use larger screws through chine stringers into frames and through inner keel into floors.

To ensure best results in planking use some 1/4" inexpensive plywood as a template; fit this carefully; then mark this shape accurately on the resin-bonded plywood.

Before gluing the planking, drive all screws in; examine all contact surfaces and seams; then back out all the screws; apply the glue to the contact surfaces; replace the planks; and redrive the screws quickly before the glue sets. It is suggested that extra care be exercised in doing this work; it is most important and is well worth the extra effort in having a tight boat.

For any items not specified here it is suggested that you turn to the previous issue of THE RUDDER and study the specifications and construction of Sabot. They will be a great help.

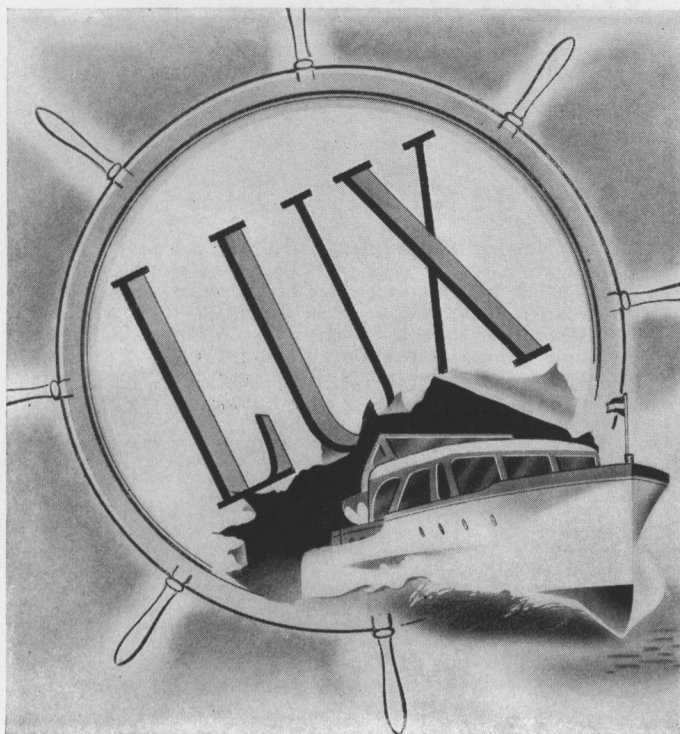
\* \* \*

**Questions and Answers on Plywood**

**Q.** (M. E. N., Belmar, N. J.) Can Weldwood be used on a clinker-built hull to make a smooth side job of the same? If so, what thickness and wood finish would you recommend? The boat in question is a cabin cruiser rated at 10 tons gross and is 36' in length and has an overall beam from gunwale to gunwale of 10', and draws 4' of water. Can this material be started at the keel and be shaped to the hull without soaking or steaming and in one piece from keel to gunwale? Would you recommend the use of screws or copper nails to fasten said siding? What method of waterproofing is used at the seams and joints?

**A.** You would find it a very unsatisfactory and expensive job to replank this boat with any material, especially since she is clinker built. Weldwood could be used as well as any other material if it is laid on over a flush surface. The planks should

(Continued on page 82)



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### PLYWOOD (Continued from page 54)

be laid fore and aft in narrow strips. It is not feasible to put it on in the wide panels since these cannot be laid over a compound curve. My suggestion to you is to take off the present planking and have the whole hull replanked. This should be done at least on the bottom.

Q. (J. H. C., New York City.) I wish to apply an outer covering of this material over the present planking of a runabout, both on the bottom and sides. Therefore, I do not require strength to hold the hull together, but enough thickness to allow the material to be properly fastened. Your comments as regards the best thickness to use, the method of fastening and general application would be greatly appreciated. I should also like to know whether the Douglas Fir Weldwood, with their filler, would not do, for I intend to paint the hull black at any rate.

A. If your runabout is of the simple Vee-bottom type without any compound curves I would suggest your removing the present planking and replacing it with resin-bonded plywood. By doing this you will have a much stronger and lighter boat, and it will not cost you much more than applying it to the outside of the present planking. However, should you have a Vee-bottom boat with compound curves I would not advise using plywood over the conventional planking since you add to the weight. The results would not be very satisfactory and the cost would be quite high. It would be almost as satisfactory to put a double skin on the bottom, using African mahogany with a waterproof glue between.

Q. (C. L. J., Glendale, Calif.) I am building the first of what I hope to make a popular line of small cruisers using Weldwood everywhere except the keel, chines and frames. Here is what I want to know: Will  $\frac{3}{8}$ " thick Weldwood be enough or too much for this boat? Second, note the outside curve of the sides at Stations 6, 7 and transom. Can this be made, in your opinion, with the proper thickness of Weldwood, and is it necessary to soak it? You see, it is a curve in two directions and I do not want to have to make saw cuts to get these curves, and I want curves.

A. It would be quite possible to build this boat of Weldwood construction, but the construction of a plywood boat is entirely different from that of the conventional Vee-bottom. There are several items that could be changed to advantage, and would cut the labor costs, particularly where you are planning to make a one-design boat out of her. In certain parts of the hull I think  $\frac{3}{8}$ " Weldwood would be satisfactory, but I would be inclined to make it a little heavier on the bottom. A very slight curve can be made on the stern, probably less than that shown on the lines. It would not be necessary to soak the Weldwood to accomplish this. I do not like the idea of making saw cuts on plywood. This has been suggested by some people, but where it is necessary to retain the strength of the material it is the wrong thing to do.

Q. (W. H. D., Norristown, Pa.) I am building a 12' fishing boat and wish to know where this plywood can be purchased close by. What method is used to fasten a one piece bottom and two sides to a light framework using this plywood? Will it easily form to the sides, and how can I be sure that the sides will fit? Should it be fitted to sides, then trimmed to proper curves at bottom and top? Is this plywood expensive in Douglas fir?

A. Ordinarily, any lumber yard in your vicinity can order for you the necessary amount of plywood. Be sure to specify Douglas fir resin-bonded plywood. Any other so-called waterproof plywood is not recommended for boat planking. This material is sold under at least three trade names—Resnprest, Super-Harbord and Weldwood. I would recommend using flathead wood screws to fasten the plywood to the framework. If the sides are of the correct form and do not have a compound curve, the plywood should be easily formed to the sides. If your hull is of the proper form there should be no difficulty experienced in making all parts fit. This depends very much on the experience and skill of the builder. This material is quite inexpensive in the thinner panels.

Q. (G. H. W., Hartford, Conn.) I have read with interest your article in the March RUDDER and other notes on your designing and building small boats of Weldwood. I have been planning to build this summer an Inland Lakes Yachting Association Cub or "X" class and wonder if I could use this waterproof plywood. The boat is a sloop, 16' long, 6'3" beam, with an arc-form bottom. This arc combined with the rocker makes a bottom with curve in two directions so it could not be planked with a sheet of plywood. However, I had the idea that I might cut the plywood into strips three or four inches wide and plank the bottom in two layers, both running lengthwise so that the seam between two planks in one layer would run down the center of a plank in the next layer. The sides I figured could also be double planked but

in one width using scarp joints in different places in the two layers to get the proper length out of twelve foot panels. The plans specify 7/16" to 1/2" planking and ribs of cross-sectional area of 1 1/2 square inches per lineal foot. I am not as much interested in keeping to class rules as I am making a boat that can take a beating for use with lots of boys at a boys' summer camp and yet be fairly light. Would all this be practical? Or has your experience dictated a better procedure? Would both layers of 1/4" panels be best or one 1/4" and one 1/8"; if the latter, which should be on the outside? Or would two layers of 1/8" be enough? Should 3- or 5-ply be used?

A. With slight modifications plywood could be used to advantage in the construction of these boats. It would permit lighter weight and greater strength with a resulting increase in speed. The arc-bottom could still be retained by applying an inner layer of plywood and an outer of mahogany or cedar. I would not advise using the plywood in narrow strips. While it would be stronger than the conventional construction, there is so little gained in using plywood this way.

In building a boat of all plywood the construction is entirely different from the conventional. There are fewer frames, fewer beams, and the whole method of building is a reversal of that usually used. It is developed around the stressed cover principle used in aircraft wings. I believe in constructing it of Weldwood the cost would be materially reduced if a number of boats were built, and it would be simple enough for young boys to construct. In all thicknesses up to 3/8", 3-ply is available. Above this, only 5-ply is available.

Q. (B. L. A., Theresa, New York.) Is Weldwood fir a suitable material to construct a 12' flat bottom boat? If so, is 1/4" heavy or strong enough? Would you use about 1 1/4 x 1 1/4 oak for chine? Also, how would you reinforce the bottom? Any other suggestions would be appreciated.

A. Weldwood fir is very suitable material for a 12' flat bottom boat. If properly reinforced inside, 1/4" material is strong enough, but there should be certain stiffening members behind as the larger surfaces might be too flexible.

Q. (F. T., Chicago, Illinois.) I have plans of a center-board cabin boat. I want to use Weldwood for the freeboard and bottom, and also use prefabricated parts. My idea in using Weldwood was to butt the ends between No. 4 and No. 5 rib and use a plate over seam as Weldwood can only be secured in 12' lengths, but my worry is if I use 1/2" stock 5-ply in bending, will the inner ply separate? And can I twist Weldwood enough to fit it into stem below chine for bottom boards?

A. Since I do not have plans of the center-board cabin boat at hand, I can only assume from photos that being of the Vee-bottom type, plywood could be used for the bottom and topside planking; also, the decks, trunk cabin top, and much of the interior work. Seam battens, of course, would be eliminated and this would simplify the whole construction. Special reinforcement for the planking would not be necessary if the same number of frames are used. I would also like to point out to you that the construction of such a boat would be a compromise, and the better way to get good results is to build a boat specially designed for plywood construction. Generally the plywood can be obtained in 8', 10' and 12' panel lengths. In bending plywood you need have no fear of the inner ply separating, and you can twist the material without fear of the separation of plies up to the point where the grain of the wood will collapse.

Q. (R. J. A., Sidney, Ohio.) We are thinking of building a small cabin cruiser 17' long and wanted to use 3/8" Weldwood for the outsides. Since Weldwood does not come in these lengths we wondered if we could splice it and still have a real waterproof boat. Have you made any boats of Weldwood; can it be spliced; and what do you think of it?

A. Weldwood can be spliced very easily where greater length than the stock panel cannot be obtained. The material is very satisfactory if properly handled. All joints should be glued besides being fastened. Yes, 3/8" would be suitable for outside planking.

Q. (R. M., Long Beach, Calif.) In building one of your larger 32' auxiliaries with Weldwood, would this require experienced builders?

A. The use of Weldwood for boat construction does not require the services of an experienced builder. In fact, in using Weldwood for quantity production, the less experienced a man is in boat building, the better off the manufacturer generally is since young boys can be trained to do the various operations.

Q. (K. H., Jamestown, N. Y.) I am interested in a 12' to 14' combination sailing and rowing boat. Could you please advise me of any concerns making this type of boat in either knockdown or complete form?



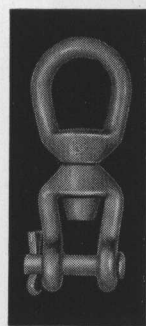
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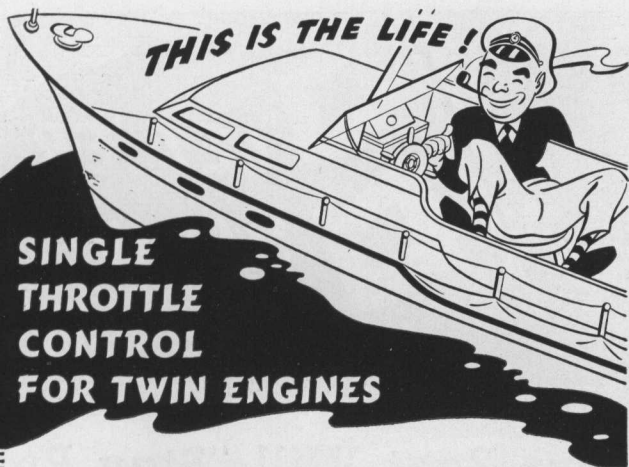
New York\*  
Chicago\*

Detroit\*  
New Orleans

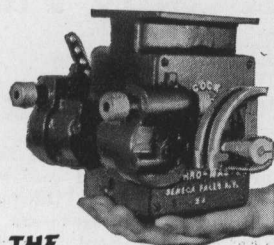


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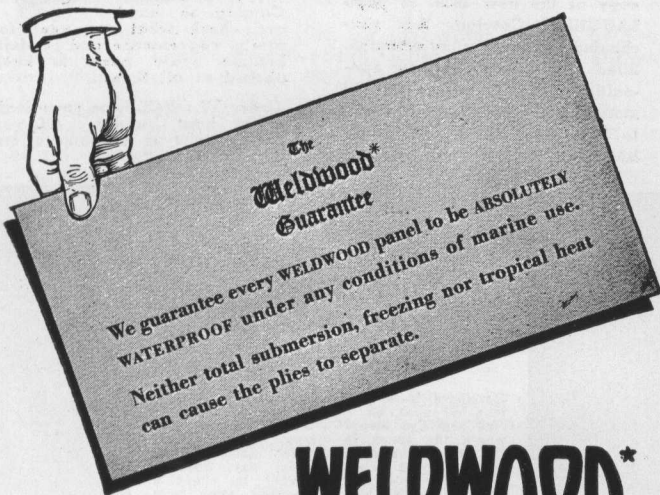
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A. I have just completed the design of a 12' combination sailing and rowing boat, using Weldwood throughout. Several builders have requested permission to build from the design in both knocked down and completed form.

Q. (W. C. B., Bangor, Maine.) I would like to build a small, practical, sailboat for two people to use on our Penobscot Bay, in moderately protected waters which can yet develop quite a chop at times. I already have a 30' yawl and my son is building a Snipe. What I want is something smaller which yet may be fairly practical in speed, seaworthiness, etc., and suitable for amateur building. I would like to know if you have plans for anything which you think might be suitable. A Western firm making Resnprest recommend 1/4" for such a boat. Would this be practical?

A. See the featured design in this issue. Resnprest is similar to Weldwood and is quite suitable.

Q. (W. W., Youngstown, N. Y.) Advised by the United States Plywood Corporation to ask your assistance, I am taking the liberty of writing you. I wish to build an 18' outboard hull and have been considering using plywood to cover the hull. Would you advise the use of nail, screw or rivets for fastening the plywood to frame? Would 1/4" plywood be practical in making the hull?

A. The resin-bonded type of plywood is suitable for planking any small Vee-bottom boat. It must be remembered that it cannot be molded over a compound curve, but for simple curves it is ideal. In all cases I would recommend the use of bronze screws only. They should be spaced closer along the edges and spaced double that distance in any other locations. For an 18' outboard hull use 3/8" plywood on the bottom, and 1/4" on the topsides. In using this material for planking consideration should be given to the framework so that there will be a proper distribution of stiffening members to prevent panting or "flexing" of the unsupported surfaces.

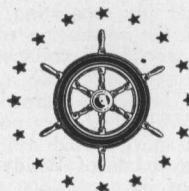
(R. L. C., Cambridge, Mass., and others.) The 6 1/2' plywood pram referred to in these columns in a previous issue is being manufactured in Massachusetts. I have requested the manufacturers to communicate with you. Briefly, this pram is 6 1/2' long, 3 1/2" beam, about 16" deep; weighs under 60 pounds; can carry three grown-ups; designed to carry on top of car, stow on deck of small sail and power boats, for fishing; and a small outboard engine can be used. It is in the moderate price class.

Q. (H. M. M., Kennebunkport, Me.) I have been informed there are several kinds of plywood suitable for boatbuilding. Is this so; what are their names; and what is your experience with them?

A. If you mean resin-bonded plywood, there are three with which I have had personal experience. They are:

- "Resnprest"—M. & M. Wood Working Co., Portland, Oregon.
- "Super-harbord"—Harbor Plywood Corp., Hoquiam, Wash.
- "Weldwood"—United States Plywood Corp., New York City.

These companies have distribution in all parts of the United States and Canada, and I am sure will be very glad to give you full information regarding their product. Their plywood is manufactured to very rigid specifications and inspection. I do not hesitate in recommending any one of them, but be sure the name is branded on each panel. Do not accept anything "just as good."



**OFFSETS FOR "BEAVER"**

HEIGHTS FROM BASELINE						
STATION	ST.	1	2	3	4	TR.
SHEER	4 1/2	6 1/2	8 3/4	10 3/8	10 1/2	9
CHINE	—	1-6	1-10 1/2	2-1	1-11 1/2	1-7 1/4*
RABBET	—	2-3/4	2-5/8	2-4 1/8	2-2 3/4	1-11*
KEEL	—	2-1 1/2	2-4 1/2	2-5 1/8	2-4 1/4	2-3 3/8*
HALF-BREADTHS FROM CENTER LINE						
SHEER	—	1-1 3/8	1-1 1/2	2-2 3/8	2-1/2	1-7 1/4
CHINE	—	7/4	1-5 3/4	1-10 1/2	1-9 3/8	1-4 3/8
STEM PROFILE OFFSETS	O. WL.	WL. 3" ABOVE	WL. 6" ABOVE	WL. 9" ABOVE		
	1-1 1/2"	8 7/8"	6 3/8"	4 7/8"		

DIMENSIONS IN FT. AND IN. TO OUTSIDE OF PLYWOOD