



Bannock

A versatile craft is yours when you build this sturdy pram—it can be sailed either cat-rigged or sloop-rigged, paddled with oars or powered by a small o.b. motor

By George B. Buckley

Craft Print Project No. 377



This strong, beamy, eight-foot pram may be sailed either cat-rigged or sloop-rigged. The daggerboard may be adjusted forward to balance the helm when sailing with the addition of the jibsail. Oars or a small outboard motor may also be used to power this versatile craft. Before the construction begins, a few general procedures will apply: all screws will be F.H. galvanized steel and will be slightly countersunk; when plywood is connected to hardwood the screw will be slightly countersunk in the plywood, not the hardwood; all plywood will be exterior grade; all wood-to-wood attachments will be with screws and waterproof glue.

Construction begins with the full-size drawing of the outlines of the stem, mold #1, mold #2 and transom on ½" plywood. All curved lines are drawn by driving small brads at the ends and center of the curve, springing a thin batten along the brads and, using the battens as a guide, drawing the curves. Cut out these four panels noting that only mold #1 and #2, not the stem and transom, are notched for sheers, chines, keelson and stringers. Bevel the stem and transom to the dimensions shown, using a plane or "Surform."

Next, cut the stringers to size; nail the 1 x 6 braces, 2 x 4 cross braces and ½" shelf brace to the stringers as shown. Erect the entire stringer assembly onto two sawhorses. Securely brace the sawhorses as required to prevent any shifting of the stringer assembly during construction: Notice that the top of the stringers are in the same plane as the bottom of the seats. This facilitates construction of the seats later on.

Now, attach mold #1 and #2 to their 1 x 6 braces with wood screws (no glue). Use shims, if needed, to align the molds properly. Attach the stem and transom to their 1 x 6 braces with wood screws (no glue). Be careful to properly align the stem and transom with the stringers.

Cut out the framing for the stem and transom from ¾ x 1½" hardwood. Clamp this framing in place temporarily before beveling and notching it for sheers, chines and keelson. Spring a thin batten to simulate the actual planking. This will provide a guide for the angle of bevel required and, also, a guide for how much bevel is required on the inside faces of the notches. Notice that the part of the framing that supports the seat is beveled. Attach all the framing to the stem and transom with glue and 1" #8 screws on 3" centers.

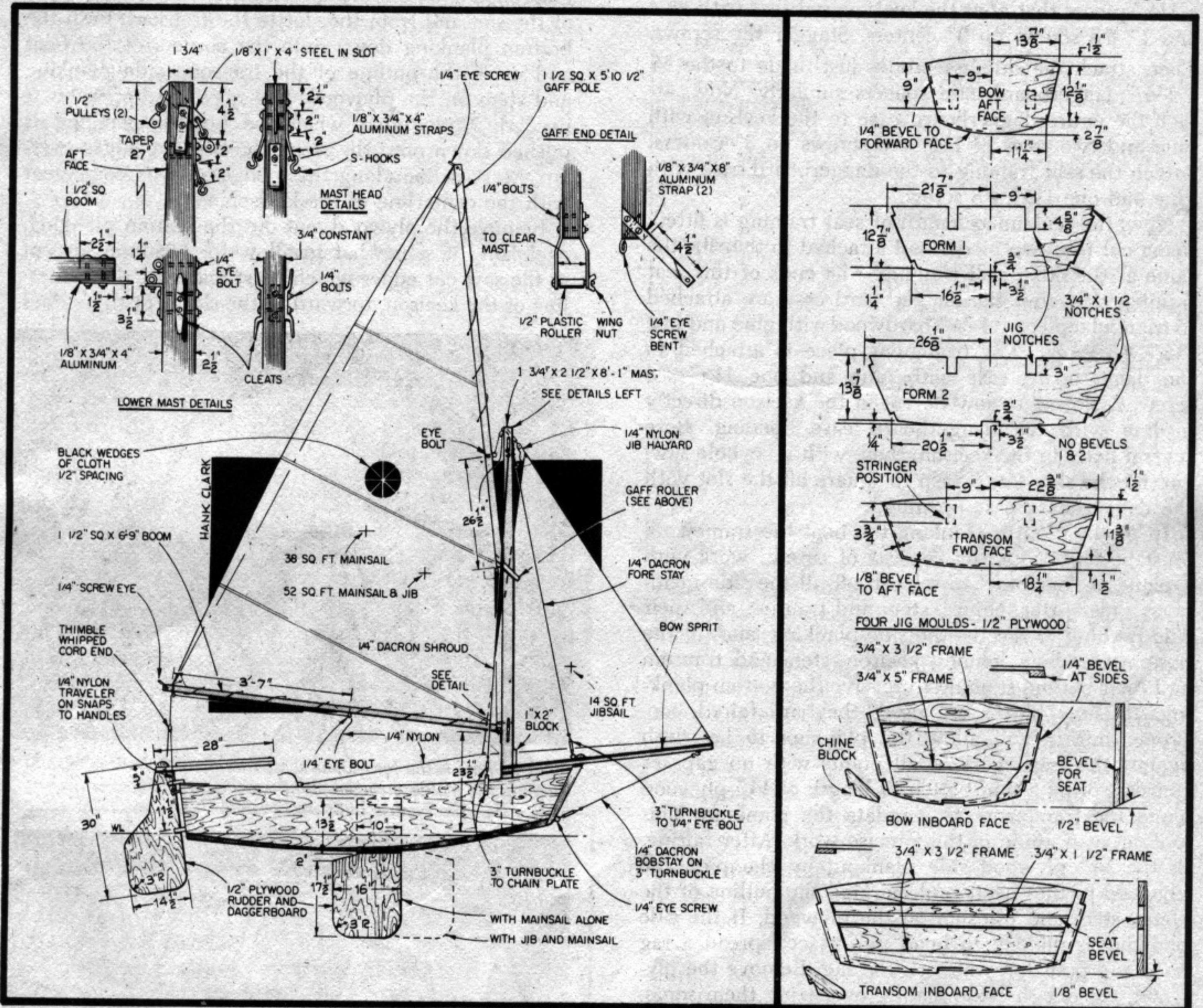
Now, attach the keelson, beveling the ends to fit snugly against the stem and transom, with glue and two 1¾" #8 screws at each end. If the keelson is difficult to bend into place, wrap it with rags and pour hot water onto the rags. Wood soaked in hot water like this will bend much more readily than dry wood. Note that the keelson is not attached to the two molds.

The sheers are fitted and attached in a similar manner: with glue and one 1¾" #8 screw at each end. Remember to spring the sheers into place together to prevent the boat from becoming lop-sided because of pressure from only one side.

The chines are fitted, sprung into place and attached the same way as the sheers; however, since the chines are being bent in two directions, horizontally along the curve of the side planking and vertically along the curve of the bottom planking, they will have a tendency to twist. This can be overcome by clamping 1 x 4s at the chines mid- and quarter-points. These 1 x 4s can be used as levers to take the twist out of the chines and, after being loosely clamped to the sheers, will keep the chines from twisting. The following is

with the ribs on the other side for symmetry of location and length. Attach ribs with glue and one 1 1/4" #8 screw at both sheer and chine. Relocate the 1 x 4 levers as required while attaching the ribs; then, after all the ribs are installed, remove the 1 x 4 levers entirely.

Install the seat framing. The seat framing consists of six lengths of hardwood, two of which are already attached to the stem and transom. Of the remaining four lengths, one is attached later after the dagger-



optional: chine blocks. Chine blocks make a stronger boat and, for the beginning boat builder, overcome slight imperfections in the fitting of the chine ends. Chine blocks are simply 3/4" hardwood pieces cut and beveled to fit around two sides of the chine. Attach the chine blocks to the stem and transom framing with glue and two 1 1/2" #8 screws.

Cut the ribs from 3/4 x 1 1/2" hardwood. There are six ribs on each side of the boat, the ribs being located at the seventh points of the sheers. Each rib is notched at the sheer and chine and is located perpendicular to the sheer. Check the ribs on one side of the boat

board case is installed and three are installed now, each length simply laying on the top of the stringers and extending across the entire width of the boat and slightly beyond the ribs. Bevel the ends of each length to fit snugly against the side of its rib. Attach the seat framing to the ribs with glue and one 1" #8 screw at each end. Trim off the excess portion of the seat framing to the ribs with glue and one 1/4" #8 screw

Then fit the fore and aft seat braces, using 3/4 x 1 1/2" hardwood for the framing and 1/4" plywood for the diaphragm. Attach the framing one piece at a time with glue and two 1 1/4" #8 screws, then attach the

Bannock

diaphragm with $\frac{3}{4}$ " #8 screws on 3" centers.

Assemble the daggerboard case of $\frac{3}{4}$ x $1\frac{1}{2}$ " hardwood and $\frac{1}{2}$ " plywood. Notice that one side of the daggerboard case is planed to fit snugly against the keelson and the other side of the daggerboard case lines up with the underside of the seats. Fasten the $\frac{1}{2}$ " plywood sides of the daggerboard case to the $\frac{3}{4}$ x $1\frac{1}{2}$ " pieces that abut the keelson and seat with glue and 1" #8 screws on 3" centers. Stagger the screws. Then attach the side assemblies just made to the $\frac{3}{4}$ x $1\frac{1}{2}$ " daggerboard case spacers similarly. Now, attach the entire daggerboard case to the keelson with glue and two rows of $1\frac{1}{2}$ " #8 screws on 3" centers. Attach the seat framing to the daggerboard case with glue and one $1\frac{1}{2}$ " #8 screw.

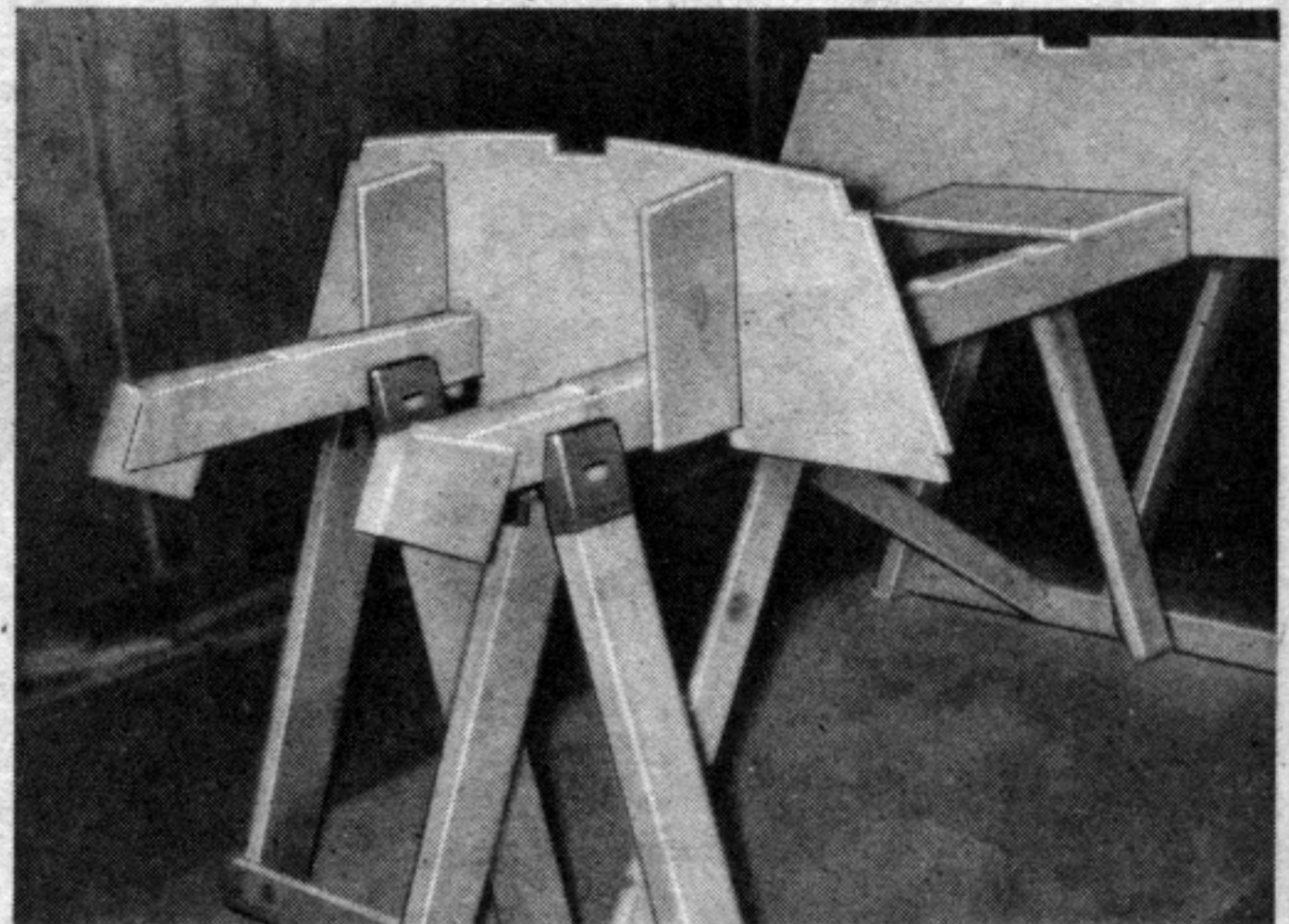
Now, the remaining length of seat framing is fitted, being cut into two pieces and attached to the ribs the same as the other seat framing. The ends of this seat framing that abut the daggerboard case are attached to triangular pieces of $\frac{3}{4}$ " hardwood with glue and one $1\frac{1}{4}$ " #8 screw. The triangular piece is attached to the daggerboard case with glue and one $1\frac{1}{4}$ " #8 screw. A slot must now be cut in the keelson directly in line with the daggerboard case opening. Bore several holes in the keelson, then, with a keyhole saw, cut out the slot. Use a rasp to square off the slot with the daggerboard case opening.

In preparation to planking the boat the framework must be faired. Fairing consists of careful work with a plane or "Surform" to smooth off all the side members: sheers, ribs, chines, stem and transom and their side framing to receive the side planking, and all the bottom members: chines, keelson, stem and transom and their bottom framing to receive the bottom planking. If chine blocks are used, they are faired, too. Proper fairing will allow the planking to lay flush against the framework at all points with no gaps or spaces. Spring a thin batten or length of $\frac{1}{4}$ " plywood along the framework to simulate the planking. This will act as a guide in this precise work. After fairing, fit the $\frac{1}{4}$ " plywood side planking by clamping the plywood to the sheers and marking the outline of the chine, stem and transom on the plywood. If the side planking is difficult to bend into place, spread a rag on it and pour hot water on the rag. Remove the plywood, cut out the side planks, oversizing them somewhat to allow for trimming, and spring both side planks into place together. The side planks are attached to the sheers, chine, ribs, stem framing and transom framing with glue and $\frac{3}{4}$ " #8 screws on 2" centers, staggered slightly to prevent the side planking from splitting. Start attaching the side planks at the rear of the boat. Notice that the side planks will be about 1" short. Cut out a small triangle of excess $\frac{1}{4}$ " plywood and fasten it with glue and one $\frac{3}{4}$ " #8 screw.

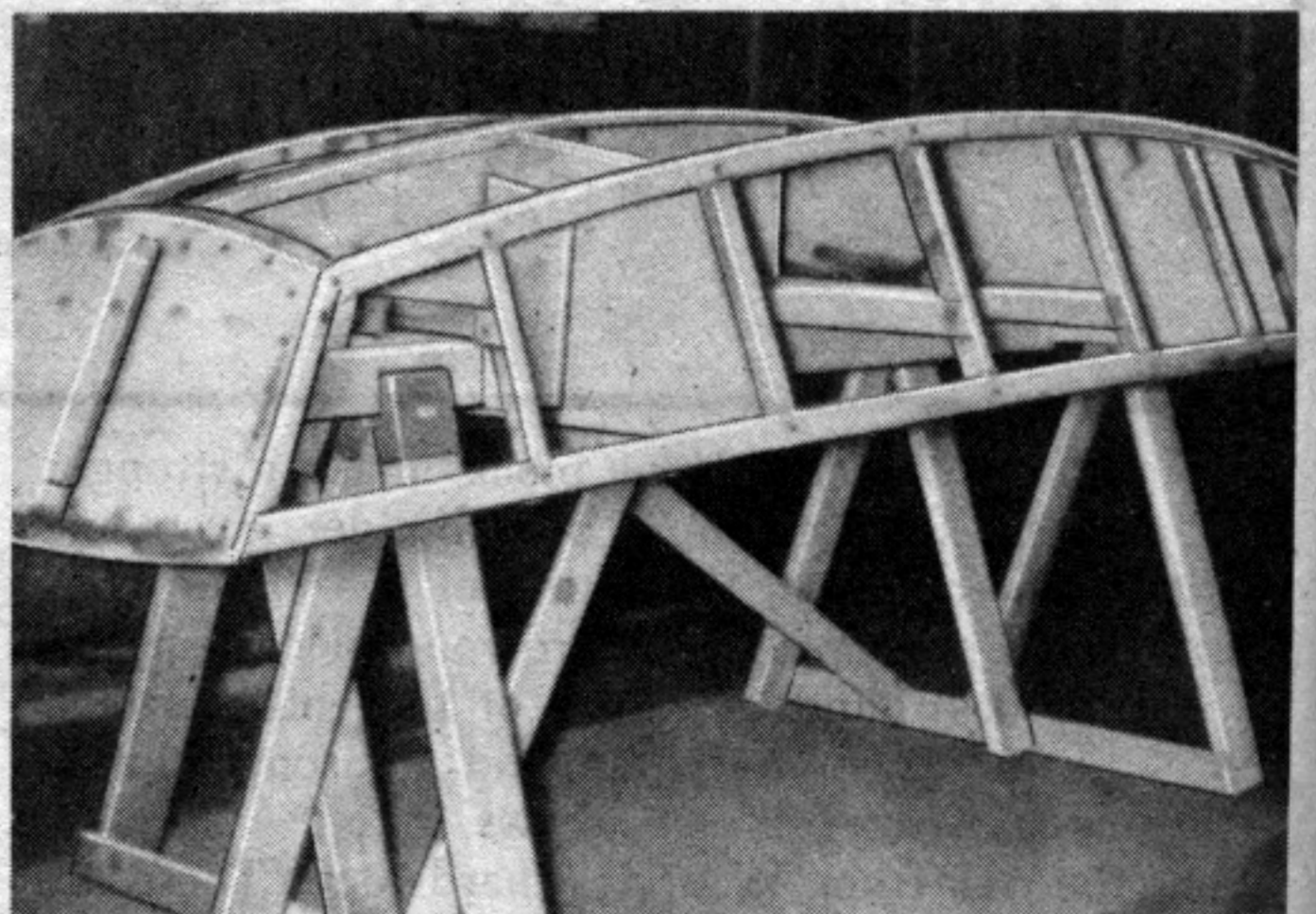
Fair the side planking to make sure the bottom planking will lay flush at all points. After fairing, fit

the $\frac{1}{4}$ " plywood bottom planking by laying it in place on the bottom framework, lining up the edge of the bottom planking with the transom. Using a pencil taped to a stick, reach up inside the daggerboard case opening and draw the outline of the slot in the keelson with $\frac{3}{4}$ " #8 screws on 12" center (use no plank and saw cut it from the stem edge to the aft side of the slot outline. Replace the bottom planking on the framework and attach temporarily to the keelson with $\frac{3}{4}$ " #8 screws on 12" centers. (use no glue on this temporary attachment) along both sides of the slot and from the slot to the transom. Push the bottom planking down onto the corners of the boat and mark the outline of the transom, side planking and stem on the plywood. Use rags and hot water if needed. Notice that when the bottom planking is pushed down onto the stem, the saw-cut edges overlap. Mark a line along these edges that is coincident with the centerline of the keelson.

Remove the plywood, cut out the bottom planking, oversizing it somewhat to allow for trimming except at the saw cut edges which must match at the centerline of the keelson, forward of the slot. Cut these lines



Pictured here is the form upon which Bannock is built showing the molds, stringers, braces and sawhorses. Notice that the boat is built upside-down.

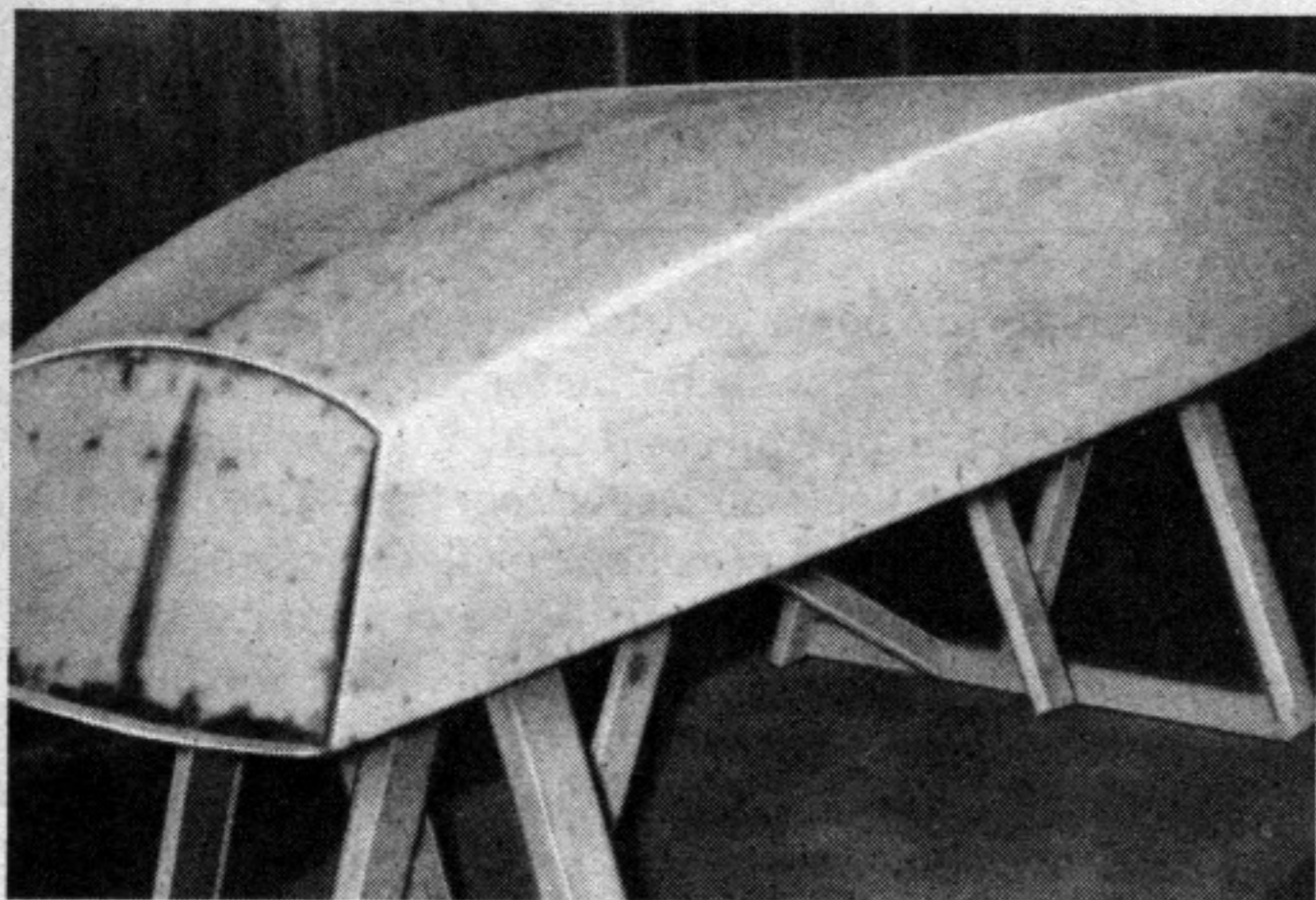


A view of the framework before the planking, showing sheers, chines, keelson, ribs, stem and transom, all of which are completely faired.

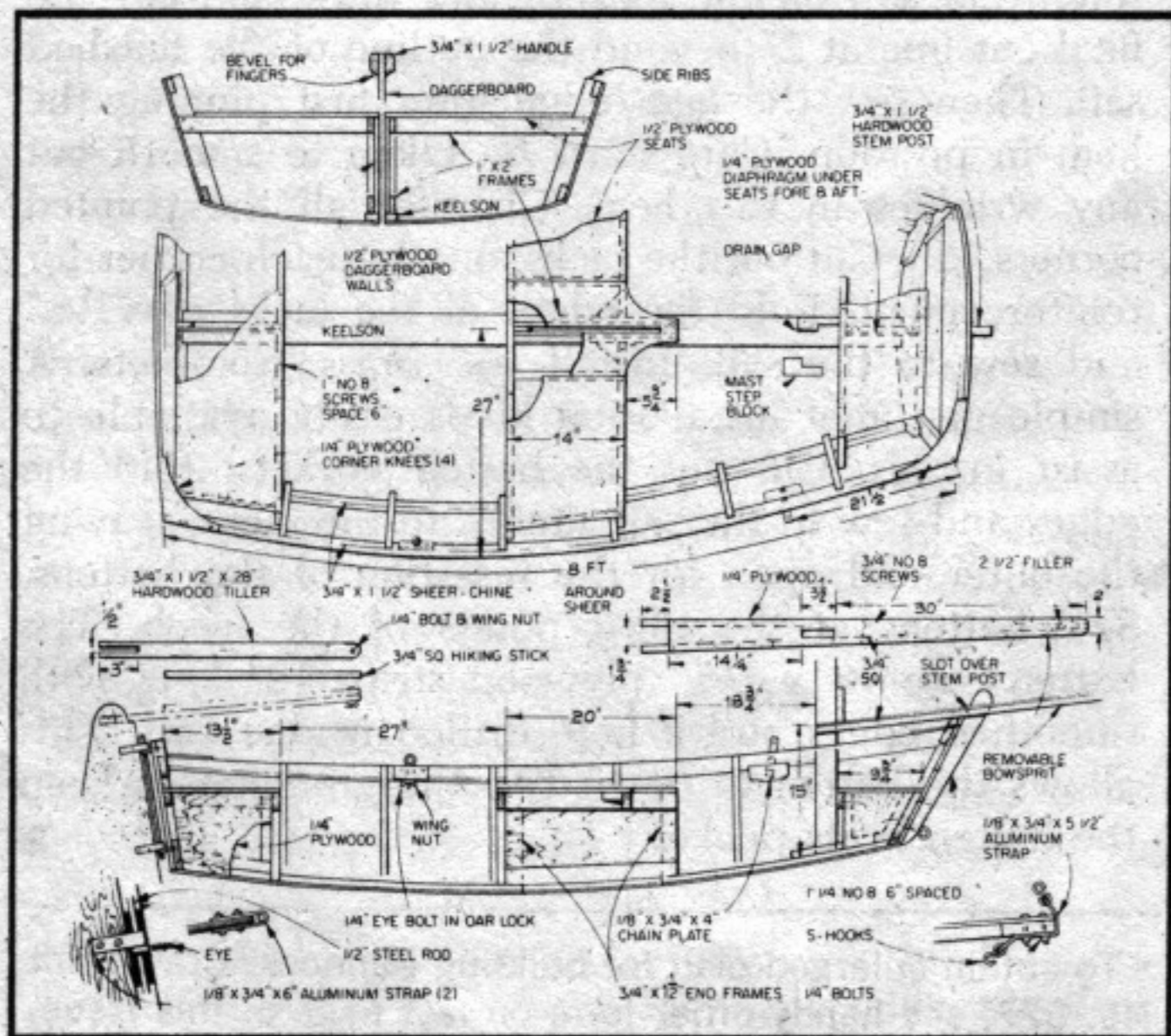
exact as they must butt against each other. The bottom planking is fastened to the keelson with glue and a double row of $\frac{3}{4}$ " #8 screws on 2" centers and to the transom framing, chines and stem framing with glue and a single row of $\frac{3}{4}$ " #8 screws, slightly staggered. Fill the saw cut from the slot to the stem with a thick mixture of glue and fine sawdust. Use this same glue and fine sawdust mixture to cover all screw heads. Sand entire hull lightly until smooth and round off all edges of planking except at the sheer. Remove hull from stringer assembly by detaching all 1 x 6 braces. Turn hull upright on floor and remove both molds.

Cut the three seats from $\frac{1}{2}$ " plywood and fasten to seat framing with glue and 1" #8 screws on 6" centers. Remember to slot the middle seat at the daggerboard case opening. The ends of the seats may follow the curve of the hull as shown or may be squared off at 90°.

Cut out the mast step and the two chain plate blocks from $\frac{3}{4}$ x $3\frac{1}{2}$ " hardwood. Note that the mast step is in two pieces to allow draining. Fasten the mast step with glue and four $1\frac{1}{4}$ " #8 screws and the



Here is the planking complete including slot cut out for the daggerboard. The boat may now be removed from form and turned right side up for the interior work.



BILL OF MATERIALS

Quan.	Use	Size & Description
2		2" x 4" x 8' fir jig rails
2		2" x 4" x 36" fir jig braces
1		1" x 4" x 8' form brace
2	sides and bottom	$\frac{1}{4}$ " x 4' x 8' plywood exterior or marine
1	forms, seats	$\frac{1}{2}$ " x 4' x 8' plywood exterior or marine
1	rudder, daggerboard	$\frac{1}{2}$ " x 4' x 4' plywood exterior or marine
4	chines, sheer	$\frac{3}{4}$ " x $1\frac{1}{2}$ " x 8' fir or mahog.
1	keelson	$\frac{3}{4}$ " x $3\frac{1}{2}$ " x 8' fir or mahog.
2	frames	$\frac{3}{4}$ " x $1\frac{1}{2}$ " x 10' fir or mahog.
6	centerboard frame, rails	$\frac{3}{4}$ " x $\frac{3}{4}$ " x 48" fir or mahog.
2	bowsprit	$\frac{3}{4}$ " x $\frac{3}{4}$ " x 5' mahog.
1	tiller	$\frac{3}{4}$ " x $1\frac{1}{2}$ " x 36" mahog.
1	bow frame	$\frac{3}{4}$ " x 5" x 24" fir
1	bow, transom frames	$\frac{3}{4}$ " x $3\frac{1}{2}$ " x 10' fir
1	mast	$1\frac{3}{4}$ " x $2\frac{1}{2}$ " x 9' fir or mahog.
1	gaff, boom	$1\frac{1}{2}$ " x $1\frac{1}{2}$ " x 9' fir or mahog.
1	stem post	1" x 2" x 24" mahog.

HARDWARE

3 gross	$\frac{3}{4}$ " #8 screws FH brass
4 doz	$1\frac{3}{4}$ " #8 screws FH brass
6 doz	1" #8 screws FH brass
1	$\frac{1}{8}$ " x $\frac{3}{4}$ " x 8' aluminum bar (fittings)
12	$\frac{1}{4}$ " eye screws
14	$\frac{1}{4}$ " x 3" galv. bolts and nuts
3	$\frac{1}{4}$ " x 3" galv. bolts and wing nuts
5	$\frac{1}{2}$ " pulleys
5	2" S-hooks
2	5" cleats
24	$\frac{1}{4}$ " grommets
2	oarlocks
4	4" turnbuckles
4	lift handles
10'	$\frac{1}{4}$ " nylon line
24'	$\frac{1}{4}$ " Dacron line
52 sq. ft.	4-oz. Dacron canvas

chain blocks with glue and two $\frac{3}{4}$ " #8 screws. Bevel the top of the stem and stem framing with a plane to blend with the sheers. Continue this bevel from the sheers towards the middle of the top of the stem where the bevel is parallel to the line of the bowsprit. Cut out the stem post from $\frac{3}{4}$ x $1\frac{1}{2}$ " hardwood and fasten with glue and $1\frac{1}{4}$ " #8 screws on 6" centers.

Cut out the stem knees and the transom knees from $\frac{1}{4}$ " plywood. Fasten each knee with glue and five $\frac{3}{4}$ " #8 screws, warping the knee to fit the sheer and the stem or transom.

The daggerboard and rudder are cut out of $\frac{1}{2}$ " plywood. The daggerboard handle is made of two pieces of $\frac{3}{4}$ x $1\frac{1}{2}$ " hardwood, rounded at the edges with a finger grip cut into the lower side. Fasten the handle with glue and three $1\frac{1}{4}$ " #8 screws, staggered. Round off the edges of that portion of the daggerboard that extends below the keelson and that portion of the rudder that is underwater to provide less resistance to the water. A length of $\frac{3}{4}$ x $1\frac{1}{2}$ " hardwood, slotted carefully at one end and reinforced with a $\frac{1}{4}$ " bolt is the tiller while a length of $\frac{3}{4}$ x $\frac{3}{4}$ " hardwood is the hiking stick. Join the tiller to the rudder and the hiking stick to the tiller with a $\frac{1}{4}$ " bolt and wing nut.

The mast is shaped from a $1\frac{1}{2}$ x $2\frac{1}{2}$ x 8 length of spruce or fir. Bevel the bottom of the mast to fit the keelson curve and taper the top as shown. Round off

Bannock

all edges to about $\frac{1}{4}$ " radius except at the bowsprit block, which is fastened to the front of the mast with glue and four $1\frac{1}{4}$ " #8 screws.

The gaff is shaped from a $1\frac{1}{2}$ x $1\frac{1}{2}$ " x 8-ft. length of spruce or fir. Taper the gaff from a square cross-section at the lifting ring location to a circular cross-section at the ends.

The boom is shaped from a $1\frac{1}{2}$ x $1\frac{1}{2}$ " x 6-ft. 9" length of spruce or fir. Taper the boom from a square cross-section at the end nearest the mast to a circular cross-section at the other end.

The bowsprit is $\frac{1}{4}$ " plywood fastened to two $\frac{3}{4}$ x $\frac{3}{4}$ " lengths of hardwood with glue and $\frac{3}{4}$ " #8 screws on 6" centers. Slot the plywood to fit over the stempost and attach a $\frac{3}{4}$ " hardwood filler with glue and two $\frac{3}{4}$ " #8 screws.

Most of the boat's hardware is cut from a $\frac{3}{4}$ x $\frac{1}{8}$ " aluminum bar, each piece being bent and drilled as required and all cut ends being filed smooth and the corners slightly rounded. Five pulleys, four lifting handles, two oarlocks, a 1 x 4 x $\frac{1}{8}$ steel plate and four S-hooks complete the hardware. After positioning the hardware and drilling the required bolt holes, the hull and spars are finished. Waterproof all planking seams with 3" fiberglass tape and resin.

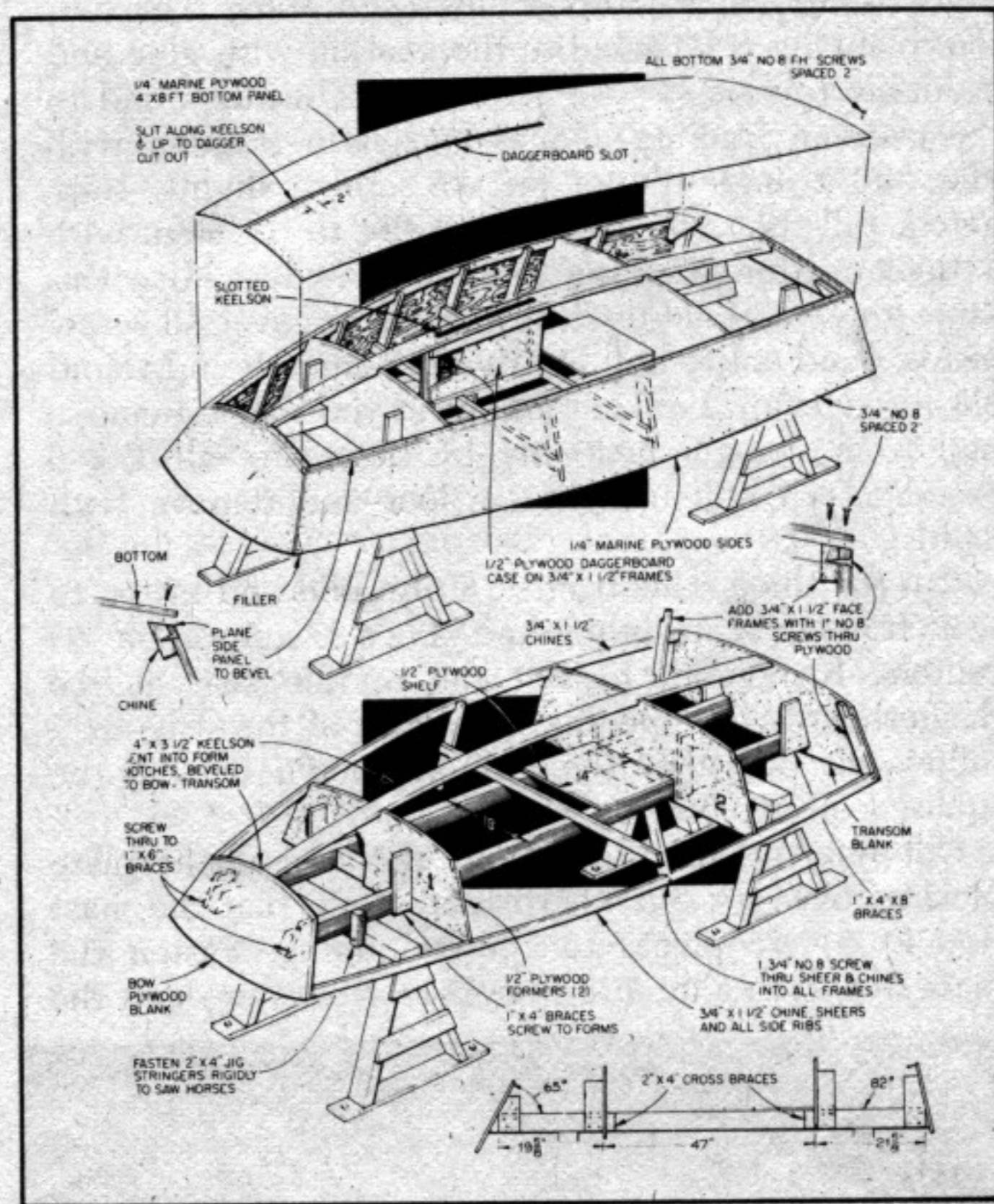
Finish hull inside and out with marine paint and finish all spars plus tiller and hiking stick and daggerboard handle with varnish. Apply both according to manufacturer's directions. Color and trim is according to the builder's taste.

All standing rigging is $\frac{1}{4}$ " Dacron line: the two shrouds, forestay and bobstay. Each line has its ends eye-spliced around a steel thimble. A small plastic fid makes this easy work. The lower end of each line is attached to a turnbuckle and the upper end is attached to an S-hook.

All running rigging is $\frac{1}{4}$ " nylon: the main halyard, jib halyard, main sheet, jib sheet and traveler. The cut ends may be whipped or scorched to prevent fraying.

The sails are made from, preferably, 4 oz. Dacron, although a lighter weight Dacron, nylon or cotton may be used. Don't use an old bedsheet or similar cheap cloth because the end result won't be worth the effort required. All stitching on the sails is zig-zag stitching using nylon thread for Dacron or nylon sails, and strong mercerized cotton thread for cotton sails.

Lay out the sail patterns on a smooth wood or tile floor. Use marking tape to mark the sail outlines on the floor, using, say, 1" long pieces of tape spaced about a foot apart. The four corners of the mainsail and the three corners of the jibsail are tape-marked first. The straight line connecting the corners may be temporarily tape-marked and the offsets measured and tape-marked. Then the curved edges of the sails are tape-marked. The sail cloth is then carefully laid out on the floor and taped down or held down with weights. Draw the outline of the finished sail on the sail cloth and, also, draw the rough cut-line. The rough cut-line is where the sail cloth is actually cut



out to allow for hems and trimming. The rough cut-line is 3" at all edges to be hemmed.

Draw and cut out pieces 1 and 2 (allowing 1" for the seam allowance) and sew together. Use straight pins to hold the seam allowance in place before sewing. To handle this large amount of sail cloth on a zig-zag sewing machine requires two people: one sewing and one controlling the feed of the cloth. Rolling the cloth into a long tight cylinder helps to feed it through the sewing machine.

Lay the seamed pieces 1 and 2 on the floor and draw and cut out piece 3 and sew to piece 2. Continue one piece at a time until all seams are made. Lay the rough cut sail on the pattern and draw and cut the final cut line at 2" beyond the outline of the finished sail. Then sew the hem edge after first pinning the hem in position. Care must be taken to smooth out any wrinkles in this hem. Chamfer all the pointed corners $\frac{1}{2}$ ". Cut out the tacks, one for each corner for reinforcement. Fold the edges of the tacks over $\frac{1}{2}$ " and sew to the sail. Install $\frac{1}{4}$ " brass grommets. A simple grommet installation kit is easily available to assist in this. Cut out the batten pockets; fold the edges and sew to the sail similar to the tacks, leaving the outer end open for the insertion of the battens. Sew battens at the third points of the leech. The battens are $\frac{1}{4}$ x $1\frac{1}{2}$ " plywood strips 12" long with smoothed edges and a hole drilled in one end. This allows the batten to be tied to the grommet to keep the batten in its pocket. ■

• To obtain enlarged plan for building Bannock, Craft Print No. 377, see handy order form on last page of this issue.



