The mast beam of the vega

It is well known among vega owners that the beam supporting the mast is a weak design. The original drawing by the designer Per Brohall is reported to have shown a different construction — a rounded vault —. but this solution was considered by the first boat builders (Larsson Trade, later Albin Marine) to be too expensive and the construction used in production became a straight beam. Most vega-owners have changed this and reinforced the construction in various ways.

The basic idea of the design.

Transfer of load

The principle idea is that all of the vertical load shall be transferred to the hull via the bulkheads on either side. The function of two "posts", one on either side of the opening between the cabin and the fo'c'sle, is only to prevent the bulkheads from buckling (i.e. bending forward or aft under the pressing load). These posts must not transfer any load directly to the hull, since the hull is not fit to take such concentrated load. Consequently one should make certain that the posts do not touch the hull by cutting away some mm at the bottom if necessary.

The beam must be firmly fixed to the bulkheads, which is done by means of through bolting. Then the bulkheads must be firmly fixed to the hull. For this purpose there is a "L-shaped" GRP flange which is glued to the hull and to which the bulkheads are bolted. There should also be a putty filling between the edges of the bulkheads and the inside of the hull. The bolts must be firmly drawn. See Figure 1.

There is a vertical grove in each of these posts into which the bulkhead is fastened and glued. It is usually possible to dismount the post by gentle hammering sideways. If a post has come loose it should be re-fastened with fresh glue.

Ventilation via the mast beam and the mast.

The design contains a rather ingenious ventilation system, which one will have to abandon and replace with something else. About 4" forward of the true beam there is a panel with holes on the port and starboard sides. Under and between this panel and the beam there is a bottom. The panel is held to the deck by a weak GRP flange. The design appears as a "false beam". The space inside this one is connected to the mast via a hole through the deck, the intention being that the mast shall act as a very tall chimney and suck air out of the boat. When this means of ventilation is destroyed it must be compensated for in some other way. Se Figures 1 and 2.

Reinforcement of the mast beam

Several methods have been successfully tried. Most of them contains an extra beam on the forward side of the original one, using the space where the ventilation duct of the "false beam" used to be.

Stainless steel plate, 3-5 mm

Use the panel forming the forward side of the ventilation duct as template and cut the plate to shape. Dismount the "false beam" and the bolts through the old beam and the bulkheads. Then jack up the deck gently a few mm (put a strong crossbeam under the jack, the GRP floor is too weak) and fit the steel plate. Mark the bolt holes, dismount the plate and drill holes, replace the plate (it is recommended to strengthen the bond between the plate and the old beam with epoxy glue), replace the bolts (it may be necessary to use longer ones) and replace the "false beam". (This leaves the ventilation intact.) Remove the jack. Figure 3.

Stainless steel L-shaped profile, 100 x 50 x 3-5 mm

Cut the 100 mm leg of the profile to shape as described above. Then the procedure will be much the same but the bottom of the ventilation duct will need some adjustment to give a nice appearance. This design is stronger than the one with a simple plate. Figure 4.

Aluminium L-shaped profile, 100 x 50 x 3-5 mm

An Al profile can be cut to shape manually which does away with workshop work. The Al profile is weaker than steel but may still be adequate.

Aluminium L-shaped profile, 100 x 50 x 3-5 mm plus wooden beam

Use an Al profile as above and add a wooden beam on the forward side, i.e. placed "inside the L" Bolt through them all: the old beam, the bulkhead, the L-profile and the new wooden beam. Apply epoxy glue between them first. This method stiffens both the legs of the L of the Al profile. Before you mount the new wooden beam you will have to cut groves in it on its forward side for the electrical cables to the mast and a hole obliquely vertically to join the old hole through the deck. Also make shallow holes to countersink the nuts of the through bolts in order to make the covering board fit snugly. Use the old forward panel to cover the wooden beam for neatness. This solution destroys the ventilating function of the original design. Figure 5

Angular stiffening

The tension of the shrouds give a horizontal force that will try to "capsize the doorway" between the cabin and the fo'c'sle. In order to stiffen the construction against this the steel and Al profiles mentioned above should be extended downwards along the bulkheads by welding a plate about 300 x 300 mm to each end. These plates will be glued and screwed to the bulkheads. Figure 6.

Reconstruction of the vaulted doorway

This solution calls for considerably more work and handicraft.

Dismount the vertical posts and the old mast beam. Cut a ledge in each bulkhead about 300 mm below the deck (to be exact: half of the doorway width + d — see figures!) and about 50 mm deep. Cut a piece of plywood, the same thickness as the bulkheads, to fit between the bulkheads and into the newly cut ledges. Shape the top side of it after the top of the old beam and the under side of it into a circular arch, passing just under the beam and ending 3-

4 mm (d) inside each of the ledges (thus leaving room for a 3-4 mm covering — for neatness). Figure 7: New central board.

Then cut another piece of plywood with the length of the mast beam. Shape the top side as the top side of the beam and the under side centrally as the central piece, at the sides horizontally. This piece will fit on the forward side of the bulkheads and the central piece. Figure 8. For the aft side-make pieces no 3 and 4 as shown in Figure 9 and trim them to fit against the under side of the old beam. The ventilating duct will have to be trimmed to give place for piece no 2 on the forward side. Drill a hole centrally in piece no 2 to join with the hole through the deck to the inside of the mast! All the pieces will be glued and screwed together and to the mast beam.

Fore refinement you dress the under side of the vault with a thin piece of plywood, 3-4 mm thick, that will fill out the space you left on the ledge. Then, as extra stiffening and neatness, fit pieces about 30 x 50 mm along the curved edges, see detail in figure 10.

This solution will interfere partly with the ventilating system unless you widen the duct.

With this construction one could probably do without the old beam all together, replacing the pieces 3 and 4 with one like piece 2, but I have not made any calculations to prove it. Of course one could intersperse a piece of steel sheet as in Figure 3, which wood certainly make the old wooden beam superfluous.

A stainless steel frame around the opening to the fo'c'sle.

This is a somewhat fancy solution that has been constructed on vega 3055 by its owner Per Wasberg, who is an expert in the field of bending thin steel sheets and welding. He made a"dressing" to the opening between the cabin and the fo'c'sle forming a very stiff doorway (enclosing the old wooden beam, the side posts and the threshold piece in its U-shaped cross-section and resting directly on the true bottom = keel). This frame takes care of both the vertical and side-sheering loads. Then he anchored down the chainplates of the main shrouds to the bottom corners of this frame, thus closing the triangle of forces at play..

A strut in the opening

This is of course the simplest solution that can be applied temporarily or in emergency.

Cut a hole in the GRP floor directly under the mast beam to allow a strut to be placed directly on the bottom or keel part of the hull. Make a strut of, for instance, a piece of 50 mm Al tube with a screw-up device at the top or a piece of wood 50 x 50 mm complemented with two wedges at the top end. Loosen the aft stay and the main shrouds before inserting and tightening the strut. You will have to apply some kind of fastening between the top of the strut and the mast beam, because the boat will flex when jumping along in a rough sea, so, much to your surprise, the strut will work loose even if it was well tightened. If you place the strut slightly off centre you might still be able to squeeze past it.

This device does nothing to stiffen the design sideways.

Joining the bulkheads to the hull

Assuming that you have got all the loads transferred from the mast beam to the bulkheads it remains to get the pressure on these ones transferred to the hull. As mentioned above the bulkheads are fastened to the hull with an L-shaped GRP flange. The weakness of this

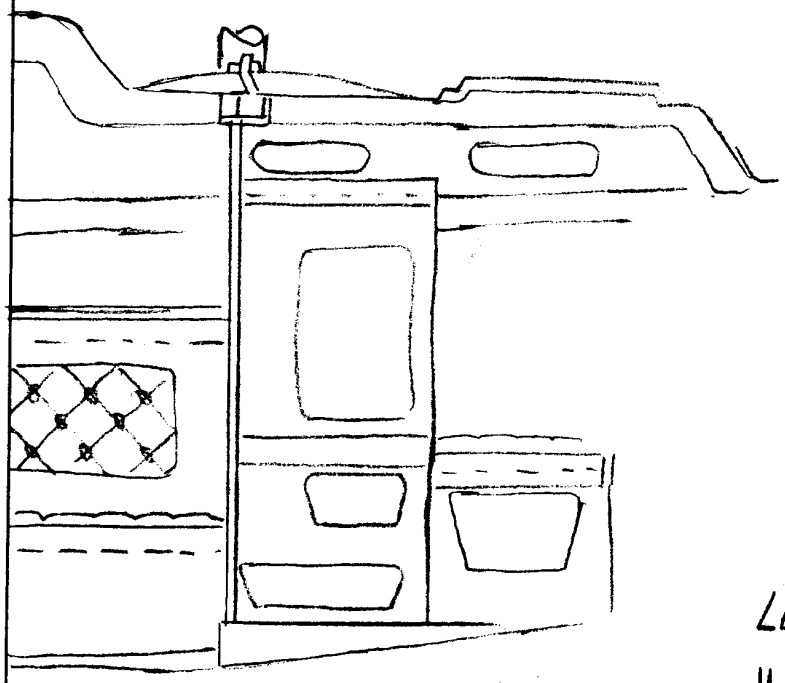
design is that the connection is one-sided. Obviously a flange on either side of the bulkheads and through bolting would be stronger.

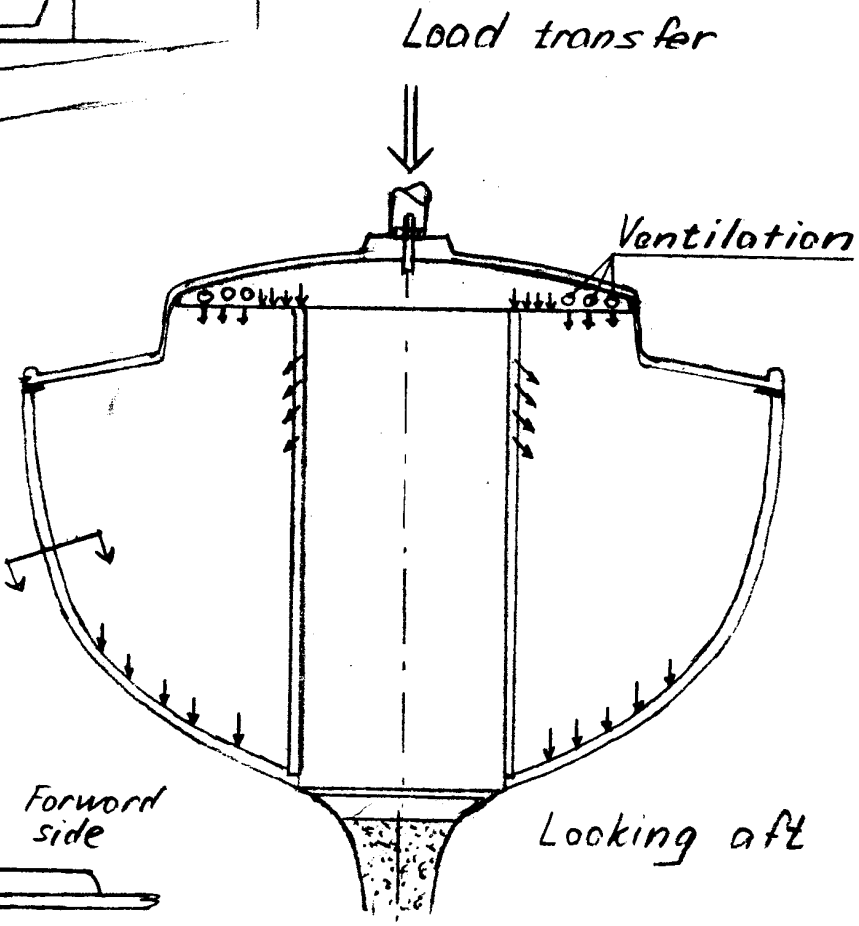
In order to execute this you must first dismount the bunks on either side. Start with the shelves behind the top of the back sides, then dismount the interior shelves inside the aft lockers, then the back pieces and finally the bottom of the bunks. It is a lot of un-screwing but no principal difficulty. Put the screws in separate bags and mark the bags.

Check that the space between the edges of the bulkheads and the hull is filled out with putty, otherwise do so. (See detail in Figure 1) I suggest you leave the old bolts in situ. Then grind away paint from a strip along the aft side of the bulkheads to give a clean surface onto which to glue the new flange. Mask off a proper width on the bulkhead and sand down the exposed surface. Cut a sufficient amount of glass fibre strips (about 10 layers, depending on the thickness of the glass web) Epoxy is reported to give a stronger bond to old polyester than new polyester does, but be careful because epoxy can give allergic reactions. Watch the curing process carefully and cut a clean edge along the masked line on the bulkhead when it is hardened just enough. When all is well cured drill new holes through all: the new flange, the bulkhead and the old flange and bolt through. If you wish you can dress the new flange with a nice piece of thin plywood or some other material. Figure 1.

Now that the bunks are dismounted you might want to do some extra work, e.g. check all the bolts of along the bottom of the vertical side pieces (if the old holes in the plywood are worn drill new ones and put in new bolts, because this is a vital part of the longitudinal stiffness of the hull), fasten down the chainplates, insulate the hull etc., but that is another story.

Kind regards from vega #7 IMARI (* 1966 and now better than ever!)





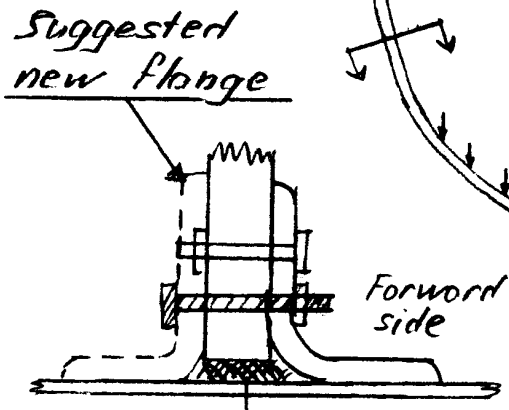


Fig. 1

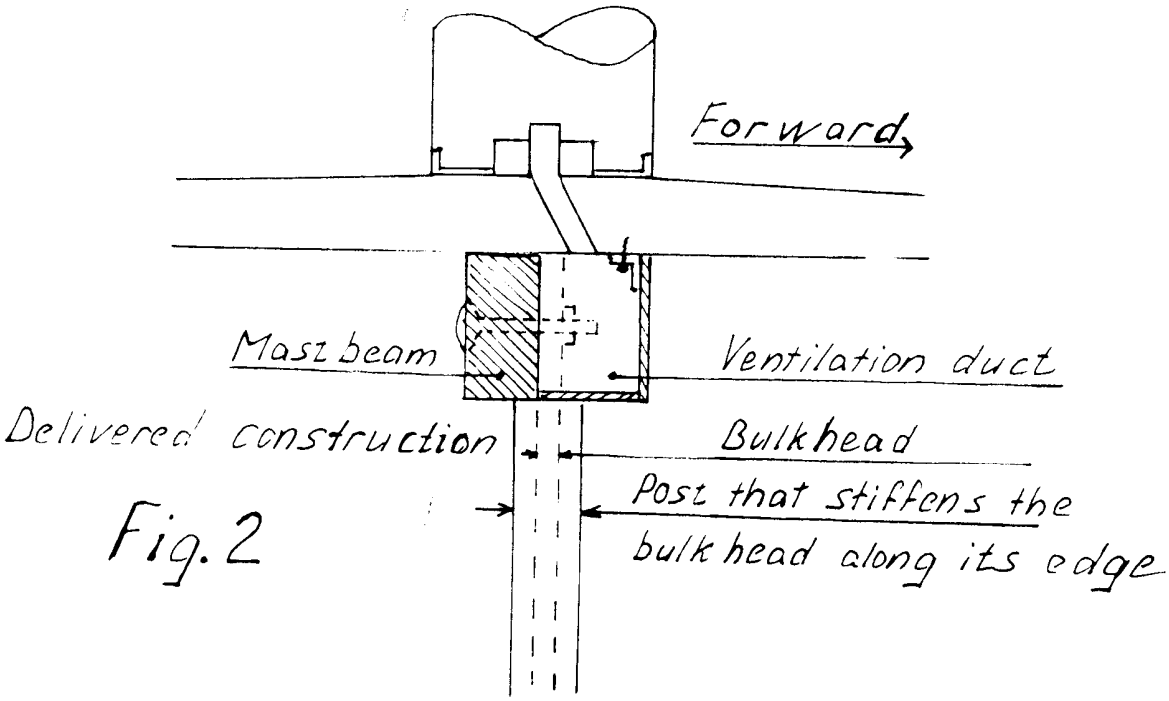


Fig. 2

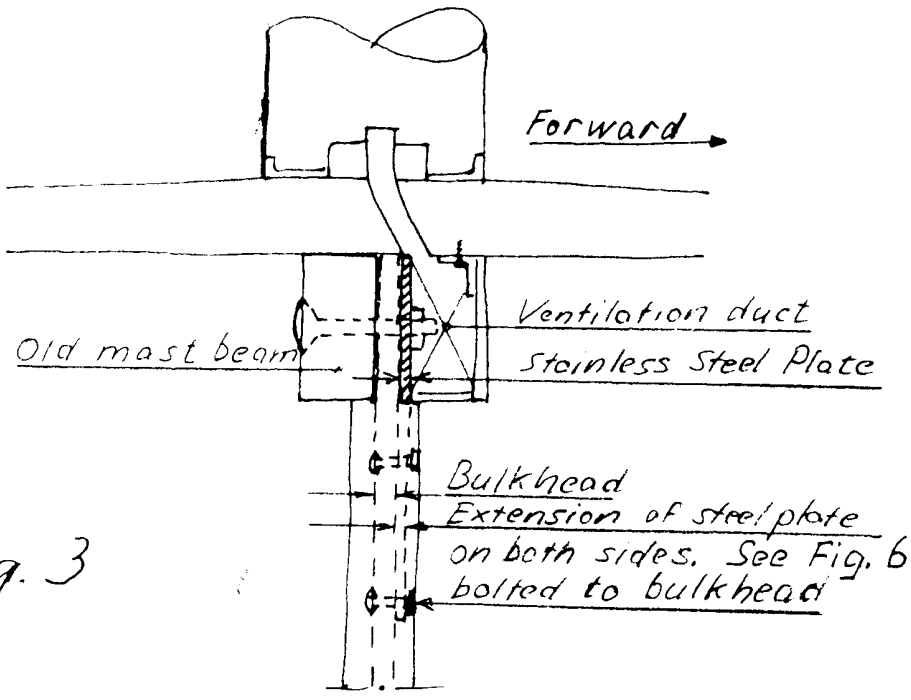


Fig. 3

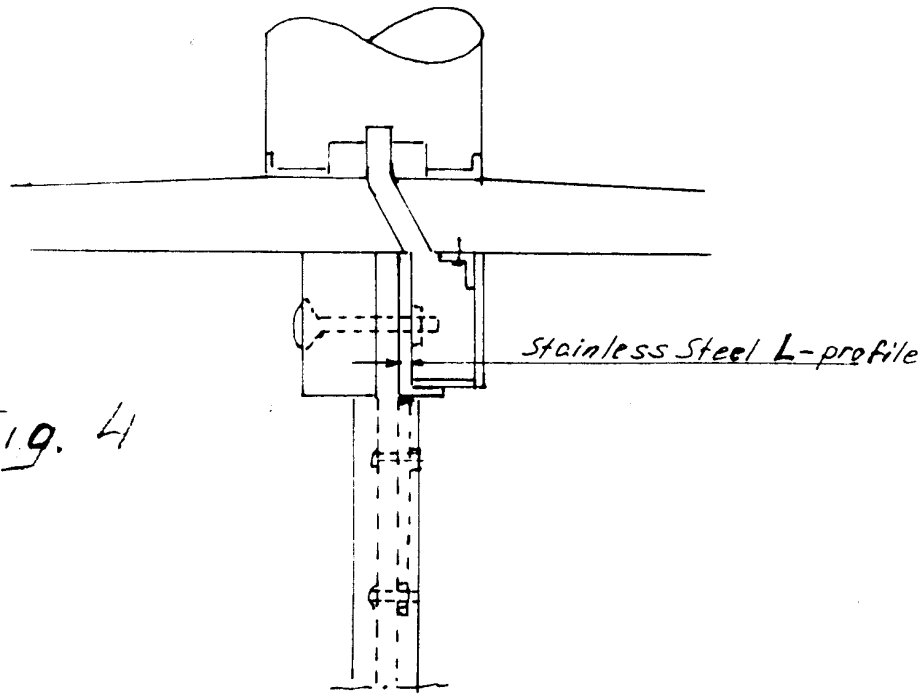

Stainless Steel L-profile

Fig. 4

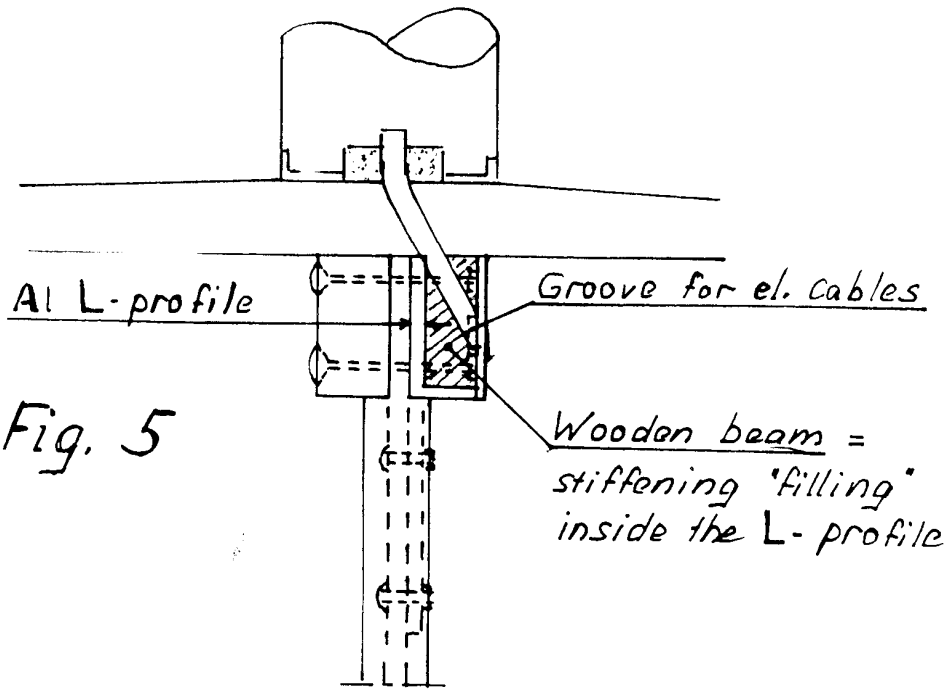

Al L-profile
Groove for el. cables
Wooden beam =
stiffening "filling"
inside the L-profile

Fig. 5

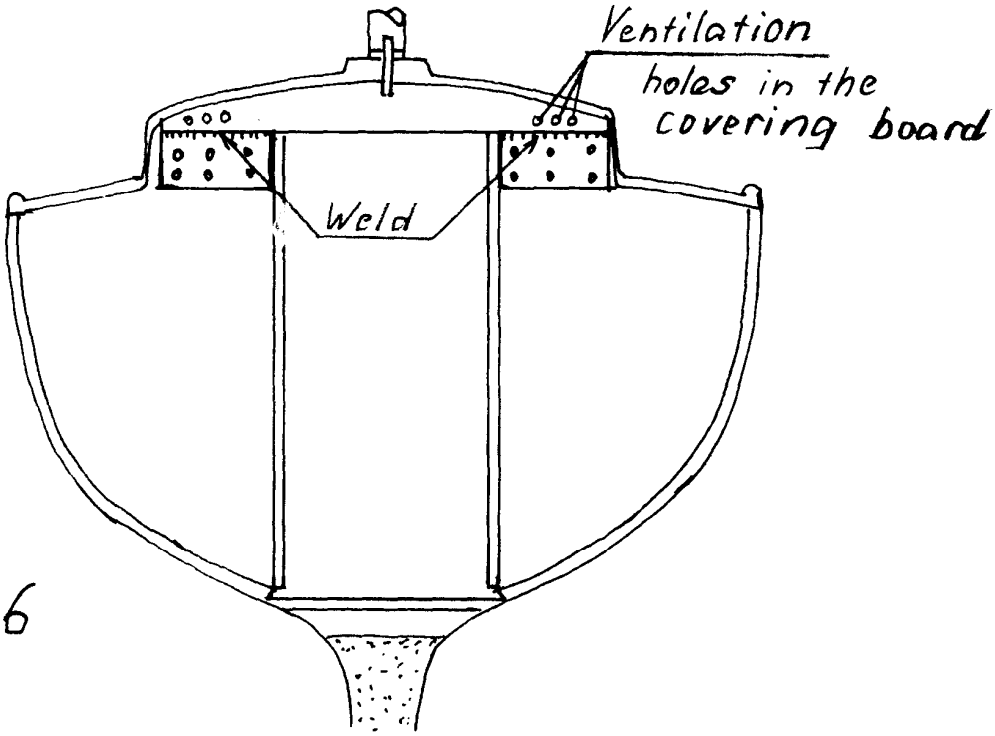


Fig. 6

Looking aft

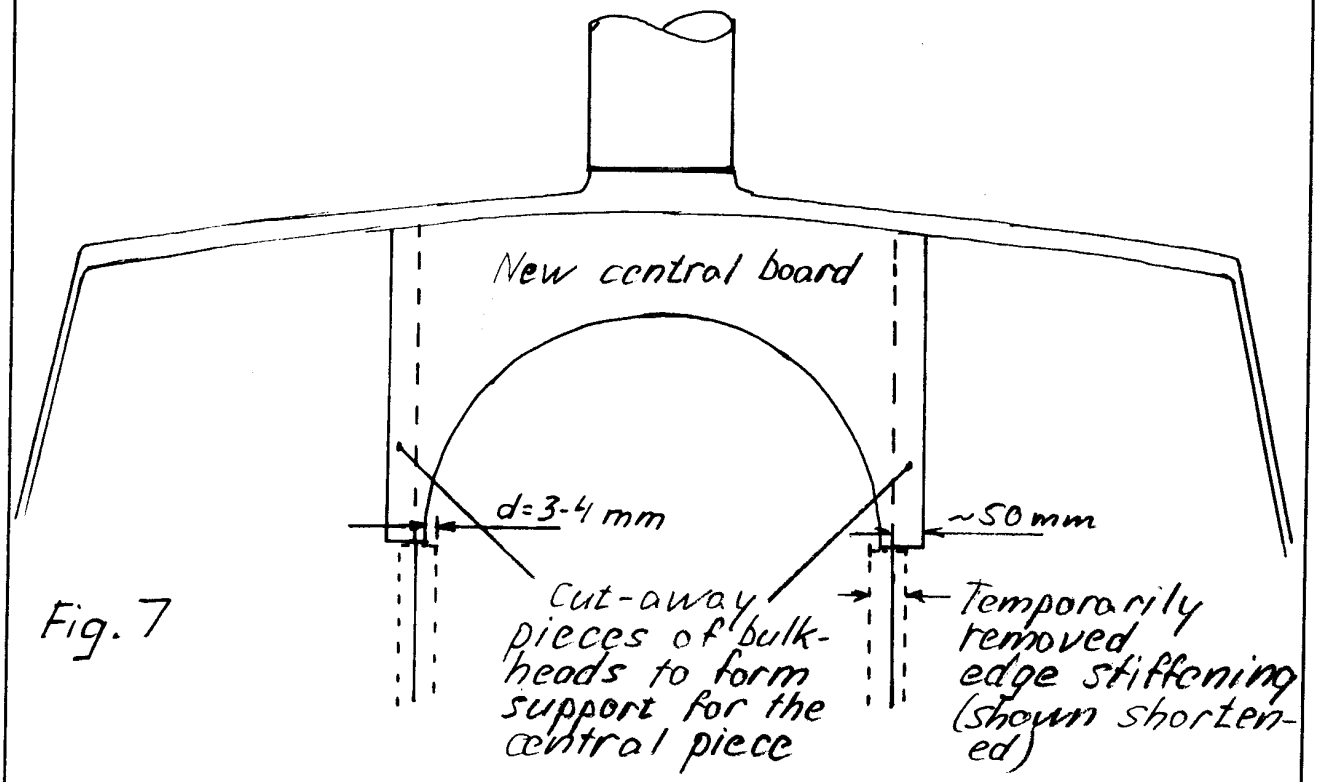


Fig. 7

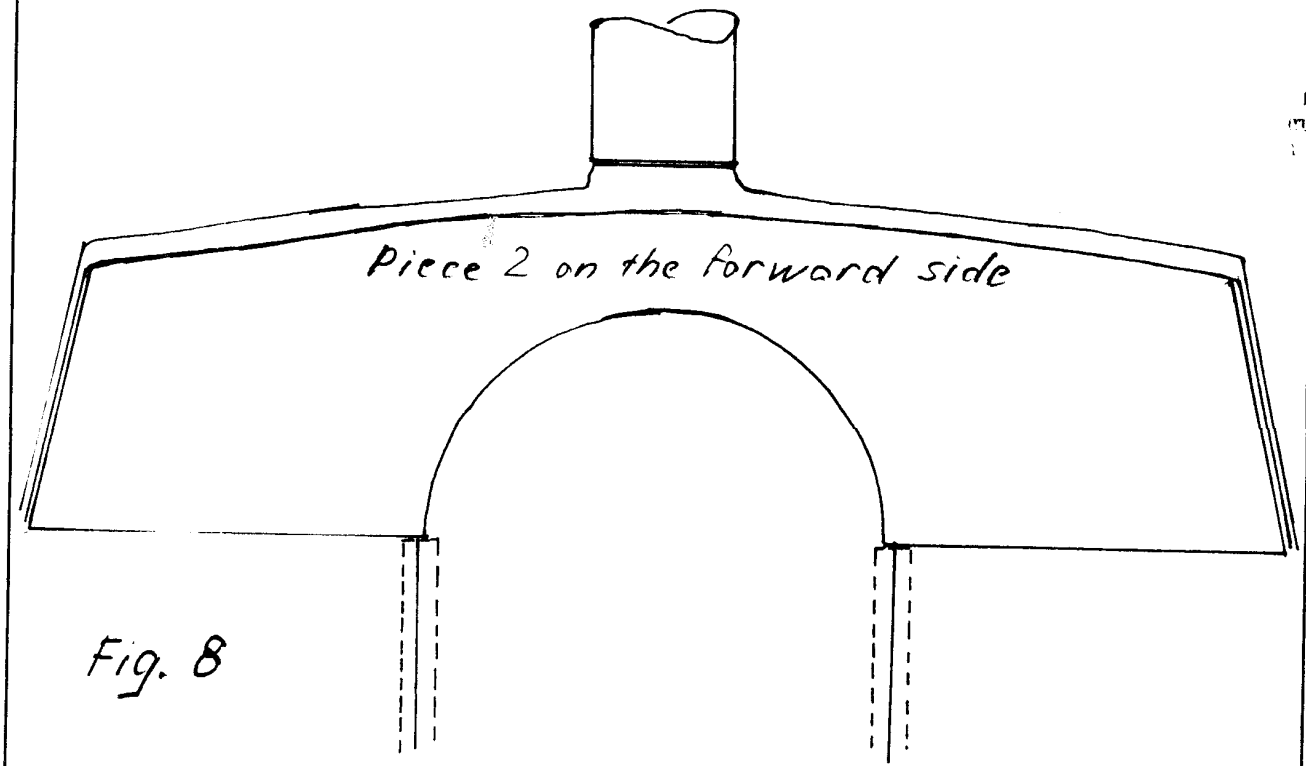


Fig. 8

Looking aft.

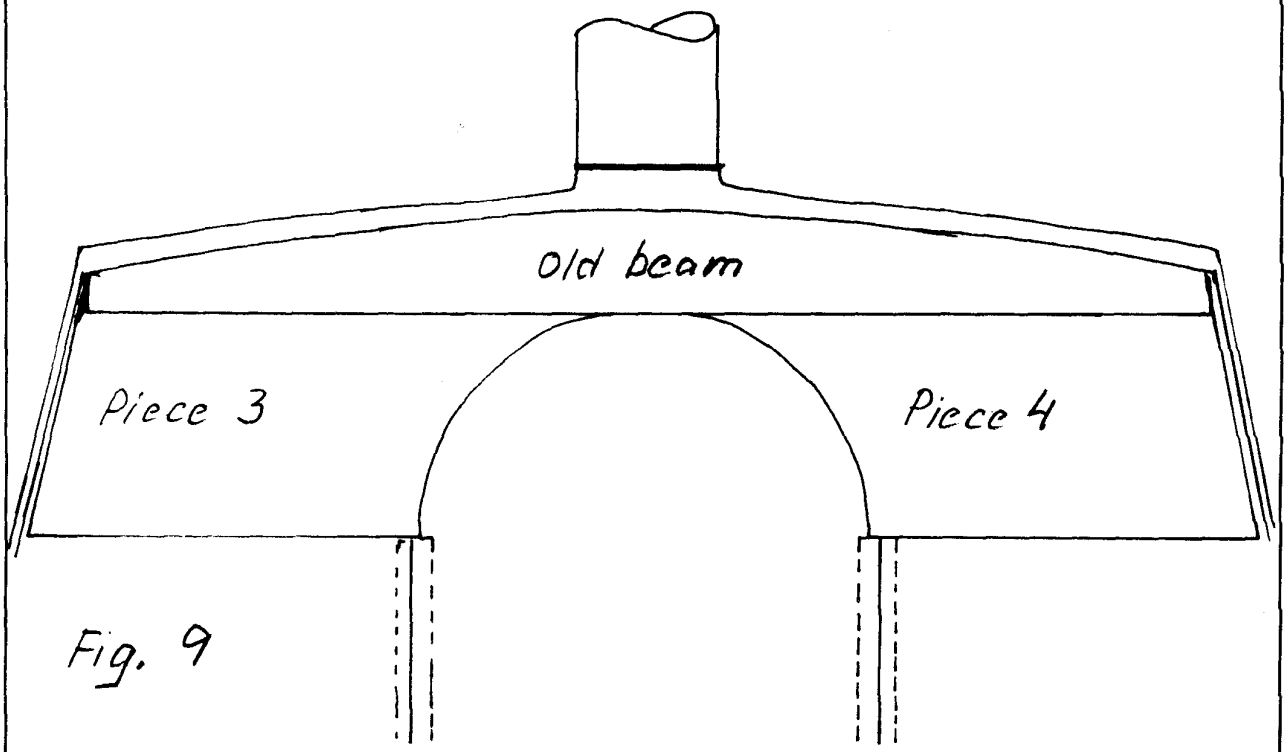


Fig. 9

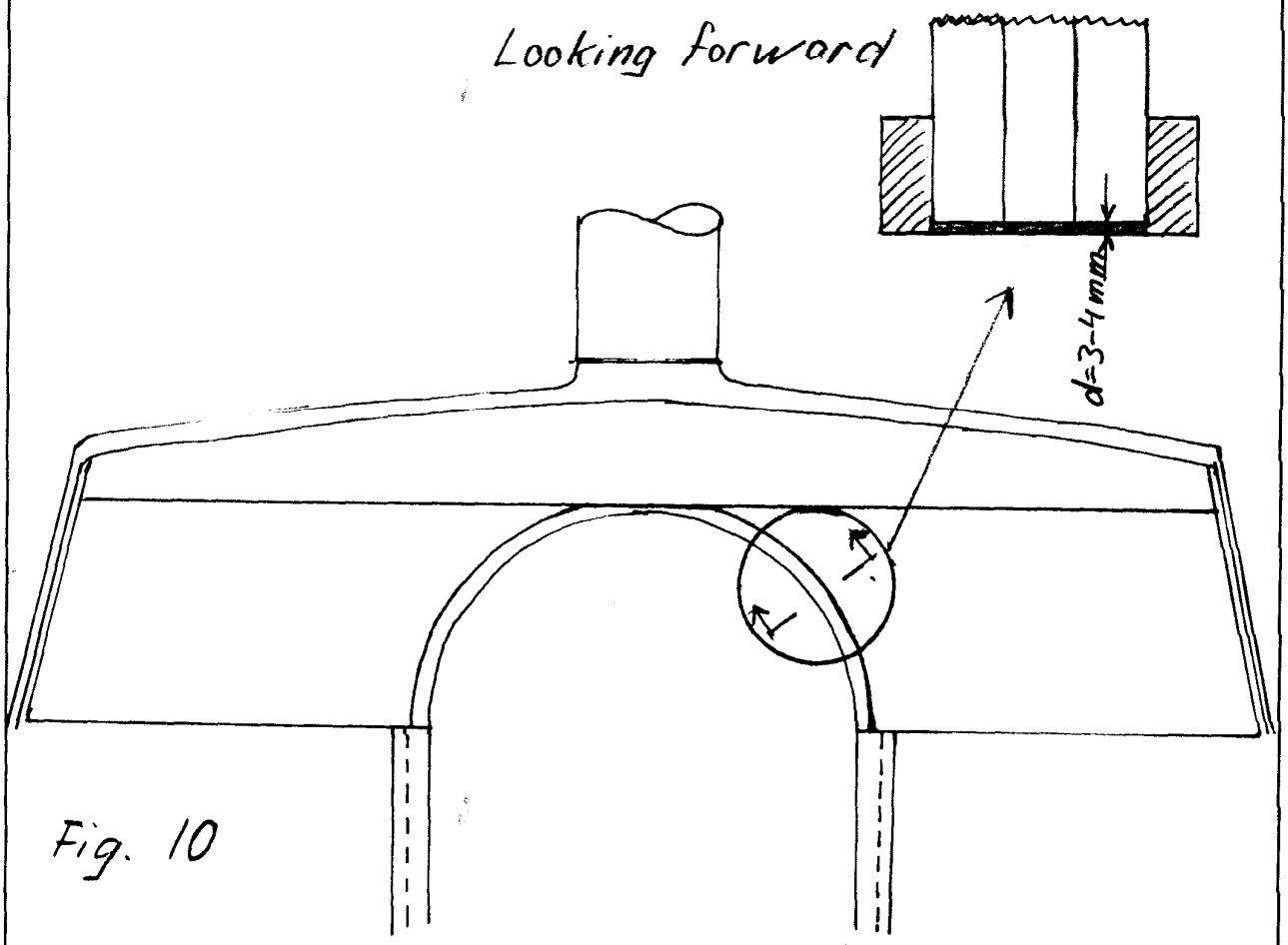


Fig. 10

Looking forward