HOW TO BUILD A CENTERBOARD TRUNK, CENTERBOARD AND RUDDER

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FREQUENTLY this subject is passed over lightly in descriptions of "How To" articles, but it is a detail which very often bothers the amateur builder.

It is assumed that the position and size of the centerboard have been decided upon and it is the intention of this article to show only the manner in which these parts are constructed.

The size of the centerboard slot should be made only wide enough to allow the board to move up and down easily without jamming—allowance, of course, being made for the board swelling after it has been in the water. Do not make it too wide, as little chips and bits of seaweed become lodged in the trunk, and as they accumulate quickly they soon make it impossible to move the board either up or down. For example, in a board 7/8 inch thick, the slot should be about 1 1/8 inch wide.

The length of the slot is governed by the manner in which the board is hung, as well as its length. A description of a few of the methods used will be given later.

The trunk is of course made with an upright at either end, the exact width of the slot and wide enough fore and aft to take the rivets and also to form a good landing for the side pieces (to prevent any twisting), and the trunk logs and side pieces which are riveted to them.

The uprights are usually fastened to the keel in the following manner: The after side of the forward and the forward side of the after upright being the limit of the slot, the dovetails for these are made accordingly. The dovetail is made as shown in Fig. 1 and where possible a pin should be put through the keel and upright. After the hole is bored through the keel, place the upright in position, pressing it down firmly in place and mark the spot where pin comes. Then remove the post and bore the hole through it just a little above the mark so that when the pin is driven through, the tendency will be to draw it down firmly onto the keel. If it is impossible to do this, another method is to put a long screw through the post endwise into the keel; but this method is not as good as the first mentioned, for the screw does not hold as well in the end wood nor does it tend to pull down as well.

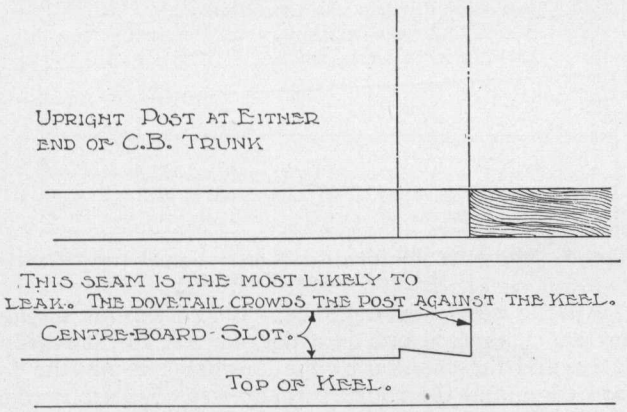


Fig. 1. Detail of Dovetail for Centerboard Trunk Uprights

A very good plan is to make both posts—the forward one being straight and the after one curved to the proper radius—wide enough so that the dovetail may be made sufficiently long and still leave a shoulder to rest on the keel.

When the posts are fitted, heavy paint or white lead should be put on the end and in the keel and the whole fastened together. If this is done carefully there should never be any leaks. As this is a very awkward place to make tight, once it does leak, this job should not be slighted for the sake of a few hours' time.

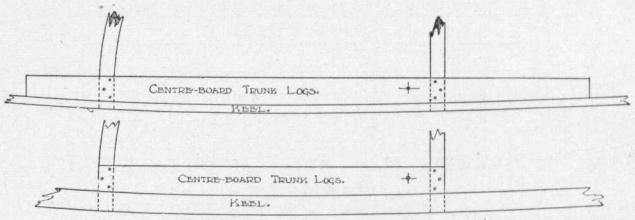


Fig. 2. Showing Long Trunk Logs on Thin Flat Keel and Short Ones on Heavy Keel

The bed logs, as the pieces on the side next to the keel are called, are then first fastened to keel, with screw bolts preferably, with a thin strip of cotton or wicking and plenty of white lead between, and then riveted to the posts. The spacing of the bolts or rivets should be such that there is no possible chance of either the keel or logs opening up between and causing a leak.

In a boat with a wide flat rocker keel it is a very good plan to run the trunk logs well forward and aft of the posts, and fasten them along their entire length—as this forms a very strong backbone and holds the keel in shape. Of course in a boat with a deep keel this is not necessary.

The trunk logs should be made considerably heavier than the rest of the trunk. For a centerboard in the neighborhood of 5 feet long the sides would be about 7/8 inch thick and the trunk logs 1 1/4 inch thick.

The space between the bed logs and the top of the posts should be divided up evenly in spaces not over 4 1/2 or 5 inches wide and these should be the widths of each plank. The reason these are made so narrow is that the regular auger bit with which the holes are bored for the dowels is not over 7 inches long and when bored from the top of one plank into the next lower, they only go into the plank about 1 3/4 inch.

In putting on these side planks the fitting of the edges should be done very carefully. The top of each plank is planed up straight and true and the bottom is made slightly rounding—not over a sixteenth of an inch—and with plenty of paint and a thin strip of cotton up the posts and along the top edge of the lower plank, clamp the forward ends against the post and force them down hard. Rivet up this end before removing the clamp. Then clamp up the after end and force it down until it is perfectly tight and rivet it before the clamp is taken off as in fitting the forward end.

By making the bottom of each plank slightly rounding and fastening it as described in the foregoing paragraph a perfectly tight job is assured. Divide up the space between the posts for the dowels so that they do not come more than 15 inches apart and bore the holes so that the dowels *toe in.* These dowels need not be spaced evenly, as the greatest strain comes a little way back from the forward post and the dowels above should be staggered—not spaced one over the other—in order to hold each side rigid. In this manner a strain at most any place on the side of the trunk is taken care of. Where the hole is bored through one plank into the one below, the dowel should be cut off so that when driven in it is about half in one plank and half in the other.

These dowels may be made of either round brass, bronze or galvanized iron rod, the latter of course being the cheapest and answering the purpose as well as either of the other metals.

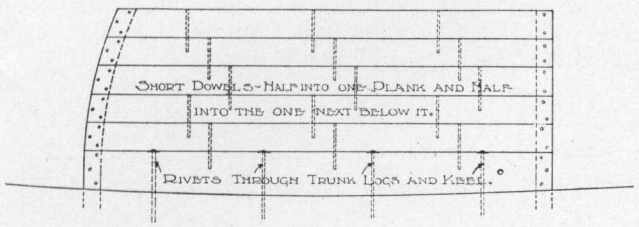


Fig. 3. Showing How Sides of Centerboard are Doweled

The position of the dowels should be marked on the side of the trunk so that in boring for the ones next above the positions may be determined so as not to strike in the same hole. This method is followed for each plank up to the top.

In most cases a cap is fitted on top of the centerboard trunk, which is simply a piece across the top sufficiently wide so that the edges project beyond the sides of the trunk, and are usually rounded off. A slot is of course cut in it wide and long enough for the board to come through. This cap piece is screwed down onto the trunk proper. The sides of the trunk, for the sake of appearance, are sometimes paneled.

It sometimes happens, where a boat has a shallow fin and outside ballast, that the centerboard does not come above the cabin floor and the pennant is led through a pipe to a point above the water-line. In this case the slot is cut in the keel and dead-wood and they are bolted up in the usual manner.

In the opinion of the writer there is only one way to make a centerboard and be sure you are going to have a job that will last and that is to have the dowels go from top to bottom in one piece, riveted at both ends. This would seem a very difficult job, but when correctly performed is not much harder than the short dowel method. Most every centerboard, being wider at the after end than at the forward, the first step in its construction is to lay out the lumber so that the board will come to the proper shape.

An example will perhaps best explain what is meant. Supposing we have a board 5 feet long and about 24 inches high at the forward end, and 36 inches high at the aft end, this will require 15 linear feet of 1⅛-inch stuff—the boards being finally finished to ⅞ inch thick, 10 inches wide.

These planks will of course be cut off in 5-foot lengths and each one is cut so that two pieces are gotten out with one end 3½ inches wide and the other 6½ inches, the cut of course being diagonal and not parallel to the sides.

When the planks are cut there should be six pieces—wedge-shaped—and they should be laid out on a flat surface. The lower board is laid with the wide end forward—so that the hole for the pin will come in the one plank—and all the upper boards are placed with the small end forward.

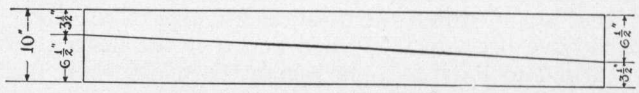


Fig. 4. Showing How a 10-inch Plank is Cut Diagonally to Build Up the Centerboard to the Proper Shape

There will then be five pieces 3½ inches wide or 17½ inches plus the wide one on the bottom, 6½ inches, making the forward end 24 inches high. The aft end being 36 inches high, *i. e.,* five pieces 6½ inches wide, and one, the bottom, 3½ inches wide.

The boards being laid out this way, they should be marked 1, 2, 3, 4, 5 and 6, starting either from the top or bottom—it doesn't make any difference—and the edges jointed up. The way to get the edges to fit accurately is to first plane up one edge square, on one plank. The next plank is then planed up square and placed edge to edge with the first one. Any hollows or lumps may then be seen and planed out.

When two edges—top of one and bottom of the other—are matched, true and square, they should be marked and the next plank is fitted in the same way.

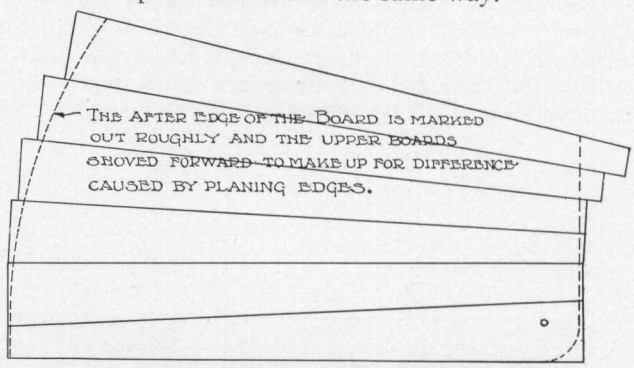


Fig. 5. Showing Planks for Centerboard Laid Out in their Proper Positions

All the planks having been jointed in this manner, they are again laid out on a flat surface, in their proper places, and the position of the hole for the pin, the forward edge, and the round of the after edge are marked.

The lines showing positions of the dowels are then marked across the board. In the case referred to above four dowels are used, the three forward ones being about square with the bottom of the board and the last one at such an angle that the dowel will be about the same distance—top and bottom—from the aft edge of the board.

Next take each board separately and bore it. A line should be squared across the board or plank where the

dowel marks are, top and bottom, and the center marked with a marking gauge. The holes should be bored from both edges. In this way, if the holes do not meet exactly from both sides, they can be reamed out, and when the dowels are driven in the edges should match fairly well, and not have one high and the next low, as the case might be if the holes were bored clean through from one edge.

When boring these holes it is a good plan to clamp an upright to the piece being bored, as a guide, as it is more important that the holes are bored correctly sideways than in a fore and aft direction.

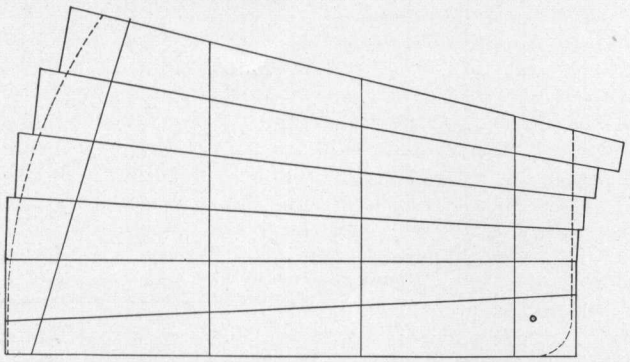


Fig. 6. Line of Dowels Marked Across Centerboard

The holes being bored, the planks are again laid out in their proper positions and the dowels cut to the proper length. Allow about a quarter of an inch on each dowel for riveting.

The first three dowels are then driven through the bottom plank—the last one being on an angle is not driven through until all the planks are together—and each plank above is then driven on separately.

When the dowels are all in place the board should then be planed off smooth. No matter how carefully the holes are bored there will be places where the edge of

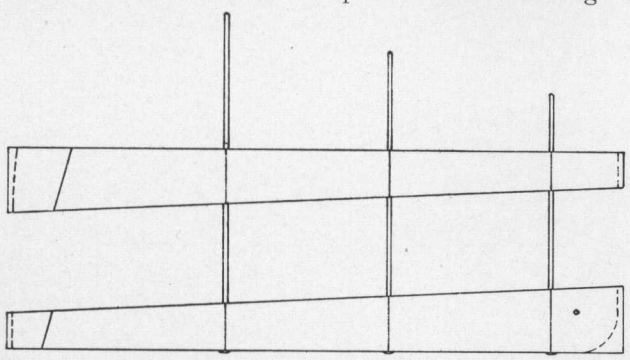


Fig. 7. Showing How Straight Dowels are First Driven Through Bottom Board and How Each Board Above is then Driven Down into Place

one board is higher than another and a straight edge should be used, both across and diagonally, to true up the board and to work out any wind that may have occurred.

In taking off the rough places the quickest way is to use a Burrough plane—one with the face rounded—across the grain, finishing up with a jack plane, set fine, in a fore and aft direction.

The forward edge of the board is then cut off to the proper shape, as is the after edge. The latter is usually pointed slightly, and in a great many cases a half round band is fastened on to tie the end together, and the bottom is also usually rounded, so as to offer as little resistance as possible.

There are a great many different methods of hanging

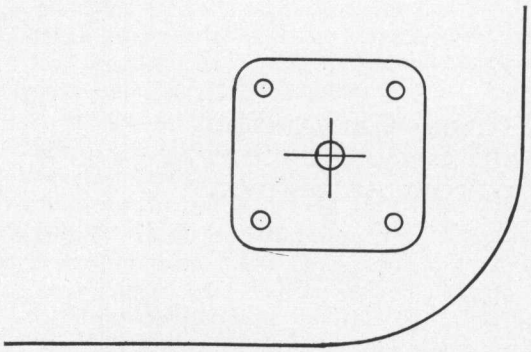


Fig. 8. Plates are Sometimes Rivited to Both Sides of the Board to Form a Bearing for Centerboard Pin

the centerboard, the most common of which is a hole through the board and a bolt through the trunk, on which the board hangs at the forward end. In this method some sort of metal bearing is fastened to the board to prevent the hole from becoming enlarged. Sometimes plates are put on the sides, but probably the simplest way is to get an iron nipple, the inside diameter of which is slightly larger than the bolt to be used, and screw it into the board, cutting off the extra length which projects beyond the sides of the board. In some cases where a new trunk has been put in and it is impossible to bore a hole low enough a special hanger will have to be made. A simple way to make one is to take a piece of T iron, making sure that the top of the T fits in the trunk, and cut off all except a short piece near the bottom of the upright part of the T. The illustration shows how the top and bottom are turned over and fastened to the upright post and bottom of the keel respectively.

Two straps are fastened on the centerboard with the ends bent in together, allowing just enough space to fit over the angle iron and a bolt is then put through.

In a case of this kind the hanger will, of course, have to be fastened to the centerboard before the latter is put in the boat.

If the boat is on land the board may be put in from below by digging a pit for the purpose—and of course if the boat is overboard it can usually be put in from above, putting the after end down first and then pushing the forward end in place.

The manner of hauling up and lowering the board depends largely on its size. In any case the best method of fastening the pennant to the board is to rivet two straps on either side, close to the after edge, with the top ends projecting enough above to get a pin across, through a thimble, and to splice the rope around the latter.

In small boats of course the board may be pulled up by hand, but with a large centerboard a block and fall, or jig as it is usually called, is fastened to the pennant after

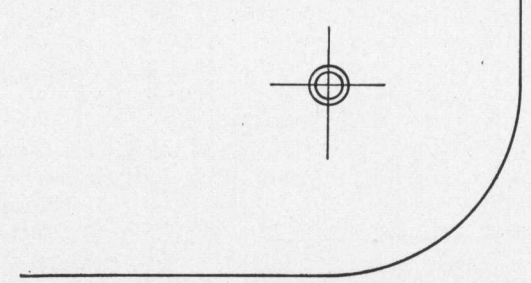


Fig. 9. Another Method for Pin Bushing is to Screw a Nipple into the Board and Cut off the Ends Flush

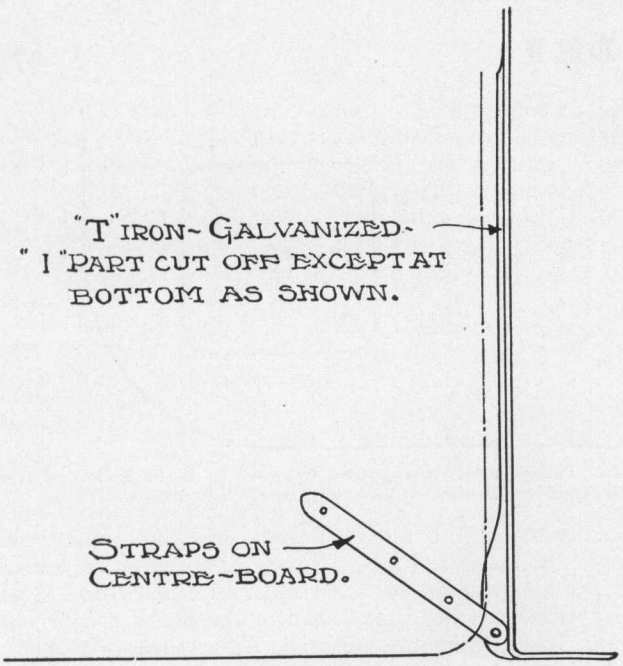
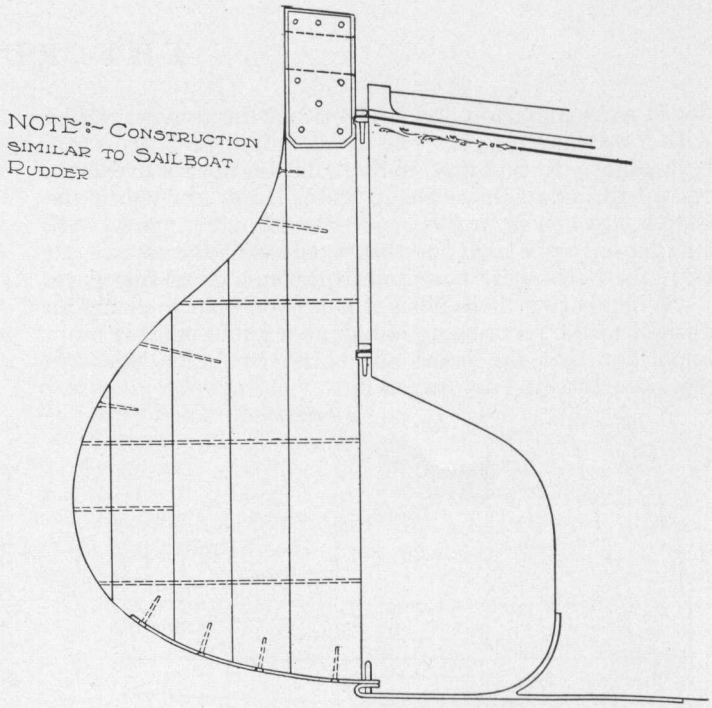
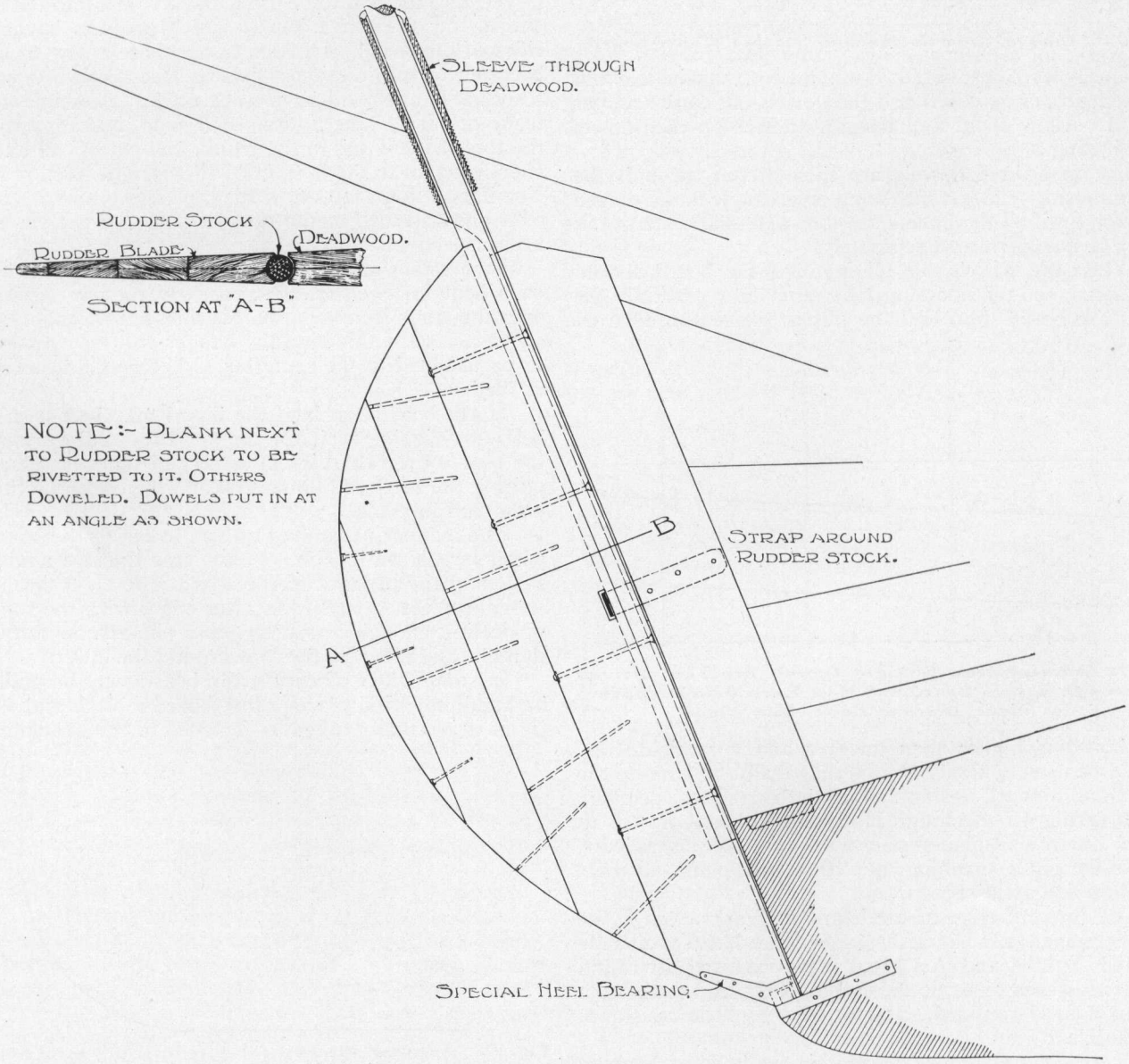


Fig. 10. Special Hanger for Centerboard





Special Fitting for Hanging Centerboard and Two Types of Rudders, Sailboat and Launch

the latter has been led over a sheave on the under side of the cabin top.

Another way is to haul up the board with a small windlass fastened to the after end of the trunk. When this is done the pennant is usually fastened to the board low enough down so that the board may be hauled up to its proper height, thus permitting the top of the centerboard to be hauled above the case and completely housed in the trunk.

There being so many different styles of rudders, I will only take two as examples, as they should pretty near cover, in a general way, the usual method of construction. Most sailboats nowadays having an overhang stern, I will first deal with this type.

The rudder post is of course round and may either be made of bronze or wrought iron galvanized, of suitable diameter for the size of the blade and size of the boat.

The blade of the rudder is constructed of wood and the boards are laid out and their edges trued up. The rudder blade being nearly symmetrical the planks are parallel and not tapered as in centerboard construction.

In laying out the dowels the same procedure is followed as was used for the centerboard. The planks are all laid out with the edges trued and line of the dowels marked across. Each board is then taken up separately, the line squared across both edges, the center marked with a marking gauge and the holes bored from both sides.

In this particular case the dowels do not run through in one piece. Short dowels are used and a smaller diameter dowel is used for each plank, working away from the stock.

The plank next to the stock is riveted to it. The rest of the dowels just go through one piece into the next, and are toed or put in at an angle. It is then impossible for one plank to pull away from another.

The reason through dowels are not used is that the after edge of the board is tapered quite thin and the heavy dowels necessary near the stock, if run through would come out the side or leave very little wood there.

The rudder is built up from the stock. The piece next to it is first riveted up. The next plank is then fastened on, the next and so on. Where only a narrow piece is needed to fill out as shown in the drawing it may be nailed on.

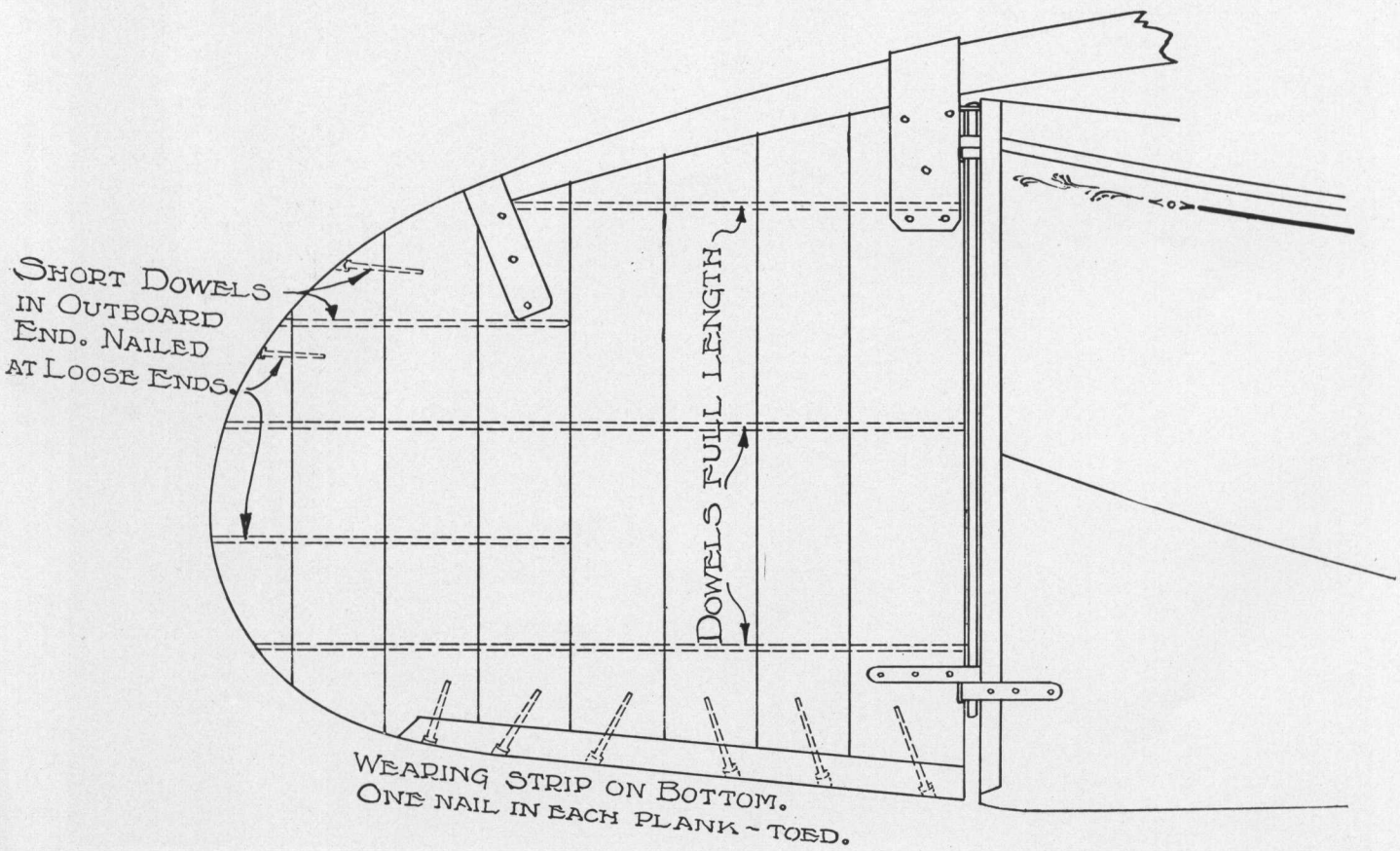
The other general type of rudder is that used on either an old-style sailboat or some of the modern launches with square sterns.

With the exception of the metal stock the description of their construction is simply a repetition of the foregoing.

The layout of the stuff, marking for the dowels, boring and driving the board together is done in the same manner.

On the sailboat rudder the metal straps for the tiller are the neatest. In launch work a wooden head is most used as there is only one socket, and it carries out very well.

There are a great many different ways of hanging rudders. The methods shown are as simple as any, and as no special fittings are called for I should recommend them for ordinary use.



Rudder Suitable for the Ordinary Square Stern Sailing Craft