How to Build a Cruising Yawl

REVISED AND IMPROVED EDITION

Price $2.00

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HOW TO BUILD

A CRUISING YAWL

SEA BIRD 25' 7½"

SEAGOER 34' 0"

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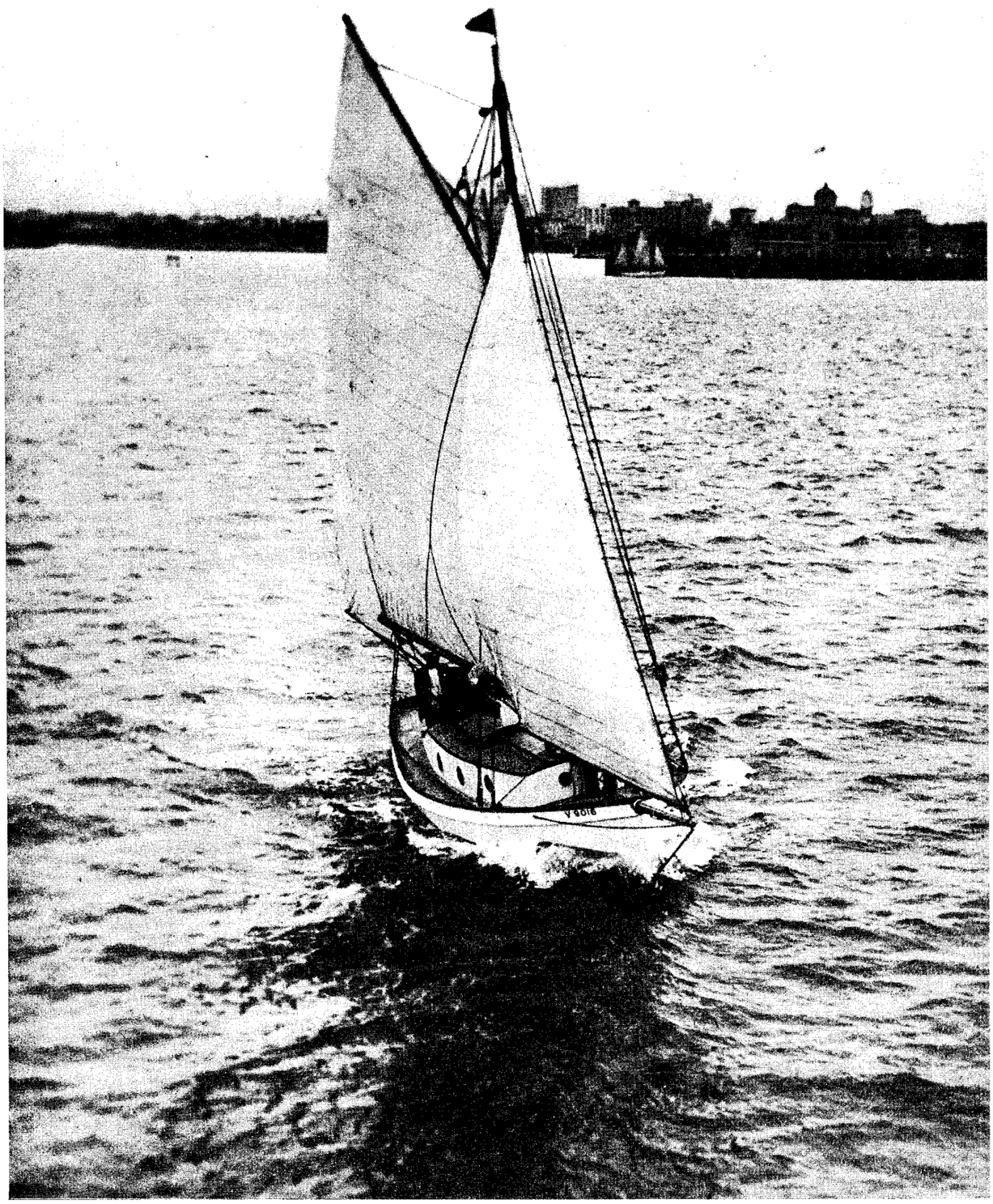

The Sea Bird, Maralen II, just before starting in one of the St. Petersburg-Havana races which she won twice in class I

Ray Williams photo

How to Build the Cruising Yawl Sea Bird*

25 feet 7½ inches overall, 19 feet waterline, 3 feet 6 inches draft

Sea Bird was designed as a safe, handy cruiser. She is not a racing boat but is meant as a comfortable cruiser of moderate draft and with the maximum amount of seaworthiness. She is said to balance well under full or shortened sail and the original Sea Bird once cruised from New York to Rome, Italy. Hundreds of duplicates have been built by amateurs and professionals.

SEA BIRD, herself, needs little introduction to the yachtsmen of the world as her record is well-known and her name will echo down the corridors of time for many years to come. We will therefore dispense with any unnecessary palaver and get down to business. In the first place, Sea Bird is designed primarily for the professional builder but, as already stated, a great many duplicates have been built with considerable success by amateurs. If you are handy with tools and know a little something about boat building, you ought to be able to complete her but if you have had little or no experience on the subject, we would suggest that you take up something simpler to start off with—the dinghy for instance.

The first requisite is the ability to understand the plans. You must spend hours studying them, acquainting yourself with the table of offsets and with the general construction of the boat. The second essential is a good place to build her. You should have a building at least thirty feet in length and at least twelve feet wide. There should be eight to ten feet headroom and the floor should be smooth, strong enough to bear the weight and of wood so that you can nail down shores, etc. The floor, if it is level, may be used as a baseline for setting up the keel and frames. If no such floor is available, lay one or don't build the boat.

The first thing necessary in the construction of any boat, no matter how large or how small, is to lay down the lines—full size. This work must be done or you will never get the boat fair and true and will wind up with a "botch" job.

Study the lines carefully as given on these pages and then, on your smooth floor, lay down a perfectly straight line at one side and lengthwise. This will represent the baseline. It must be straight. It may be struck in first with a chalk line and then checked over with a long straightedge, finally scribing the line into the floor with the aid of an awl. Do this so it will not become erased when you are working on the rest of the lines. Exactly two feet above this draw in the load waterline. It must be parallel and perfectly straight.

With these two lines, we are now ready to make the full size profile of Sea Bird and we now start putting down the frame or station lines. These are spaced exactly two feet apart, no more, no less. Accuracy in the line drawing will save you hours of unnecessary work later on. Start at the stem and work on aft, putting in these station lines at exactly right angles to the baseline and load waterline. When finished we are ready to start with the lines themselves.

The first of these to be laid down is usually the sheer line. This is the topmost line of the hull itself and represents the upper side of the sheer molding. In the table of offsets you will see that the dimensions for this are given from the baseline upwards and at the stem the dimension is given as 4-11-4. Since the offsets are all given in feet, inches and eighths, this dimension will mean 4 feet, 11½ inches since the last numeral is 4 meaning 4 eighths or one-half. Set your six foot folding rule to its full length and with one end of it exactly on the baseline, measure up and mark off the required dimension. Do the same for station 1, 2 and so on until you have all the heights to the sheer laid down.

The next step is to strike this line in by joining up the various dimensions laid down. This is done with the aid of a batten. A batten is nothing more or less than a long, thin strip of wood, which in this case would probably be about one inch square. It should be free from knots and as straight as you can get it and also planed smooth. Through this batten you drive a brad as it touches each dimension mark. Do not drive the brads all the way through as you must take up the batten after the line is drawn in. When in place, stand forward and look along the edge, making sure that there are no bumps or hollows in the sheer line. It should be a nice, long, swinging curve from bow to stern. You may have to come and go a little on some of the spots in order

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to secure the correct curve and if any spots are thus changed, be sure to change them later on when you make the frames.

The curve, when you are once assured that it is fair, may be drawn in on the floor or better yet scribed with the awl. Now do the same thing with the chine line and also the rabbet line. Where these lines extend beyond their stations, carry the line on up in a fair curve. Thus the chine only has offsets up to station 1 and beyond this point you will have to carry it on in the same character curve as in the rest. The same applies to the chine aft of station 12 and the rabbet ahead of station 1. The contour of the stem is secured from the offsets given on the stem itself. Each of these dimensions is taken at a six inch interval. In other words, measure up from the waterline 6 inches and then measure toward the stern 0-10-4. Make a mark. Then do the same with the next one and so on until you have all the spots down showing the stem contour. Now take another batten, somewhat lighter than the one used for the sheer, and bend this around so that it crosses each spot. Scribe in the contour of the stem. Then draw in the correct angle of the stern as shown in the profile and this part of the drawing is finished.

We next draw the plan view showing the chine and deck lines. For this drawing we will use the baseline, which we already have on the floor, as the centerline of the boat, in other words, we simply put one drawing right on top of the other in order to save space. You already have the station lines on the floor and now all you have to do is to use the half breadth part of the table of offsets and work through from station to station, putting down the proper dimensional spots and then joining them all up with the batten when you are sure that the line is straight and fair.

Draw in the chine and the stern or transom, as it is called, on this plan also, and you are now ready to make the drawing for the sections from which the frames themselves will be built.

This is called the body plan and is shown on the right-hand side of the lines drawing. You must make a duplicate of this from the lines already laid down and from the offsets. Take section 1, for instance. Using the table of offsets, note that the height to keel is 1-9-0. Measure up 1 foot 9 inches from the baseline and make your spot. The half breadth of the keel at this point is given as 0-0-2. Measure out ¼ inch and mark the intersection of this dimension with the one previously laid down. Now measure up to the rabbet line—1-10-3. Measure this height up from the baseline and make your spot. The width of the keel is 7 inches (see construction section) and so your keel will be tapered and have a lot of it planed away at the side. At the point of intersection between the dimension just given and the 7 inches (which will be only 3½ inches in the half breadth) you put another spot.

The next step is to measure up for the height of the chine. This is, as given, 3-2-2. The half breadth for this same point on station 1 is 1-4-0. Therefore measure up 3-2-2 and make a mark. Measure out 1-4-0 and have this mark intersect the one just previously put down. This is your chine point. Now do the same with the sheer. The up dimension crosses the out position and you have it licked. Now connect the chine with the rabbet by a straight line. Do the same between the chine and the sheer. Connect also the rabbet point with the keel joint and you have the exact contour of your boat at the first frame.

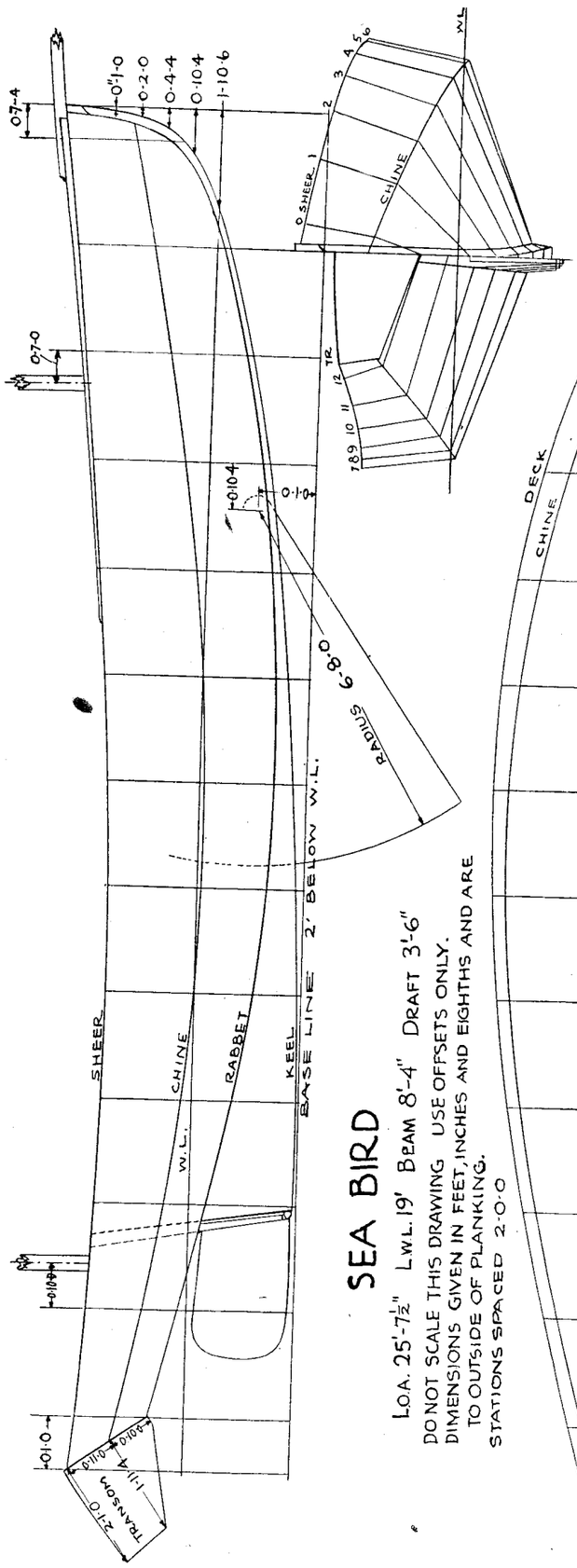
All the frames must be laid down this way. Work at them accurately. Note that the keel is tapered up and down and also fore and aft. When you get finished you should have an exact duplicate of the line drawing, but full size. Mark in the location of the masts and centerboard. Note particularly the transom drawing on the left-hand side of the drawing. This is the true shape of the transom and from this you can make the stern piece. If the transom were placed vertically in the boat, it would not be necessary to do anything more than with the ordinary frames but in this case the transom has a rake or slant of one foot and consequently it will not fit inside the planking properly unless the actual dimensions are taken at the proper angle. In the body plan, the section marked "TR" shows the transom as it will appear in the boat when in place and complete. The transom drawing at the left-hand side of the profile drawing is how the transom shapes up if you were to look at it at exactly right angles to the face of the transom. In the body plan, it is, of course, foreshortened.

From the construction profile shown on the pages, you can rough in the shapes of the various members of the keel, stem and deadwood. Note how these are scarphed and riveted together. You may make some changes in the actual way that these are built up so long as you retain the same general contour. In some cases, amateurs make paper patterns of the shape of the keel, stem, etc., and then turn this over to some lumber yard where the various component parts can be sawed to shape exactly and fitted. The various surfaces (faying surfaces) between the component parts must fit perfectly before being assembled and the surface should be painted before they are finally put together. Actually, the best way to do the job is to have some professional boat builder make up the keel and its parts for you. This will take a great deal of the drudgery out of the job and unless you have a power band saw you will really have a terrific time trying to saw these parts out by hand. One concern in the United States is able to supply these parts knock-down.

The various keel parts, stem, deadwood, etc. (after the slot for the center-board is cut), should be set up on blocks so that its height is just the same off the floor as shown in the profile drawing. Thus you will be able

TABLE OF OFFSETS

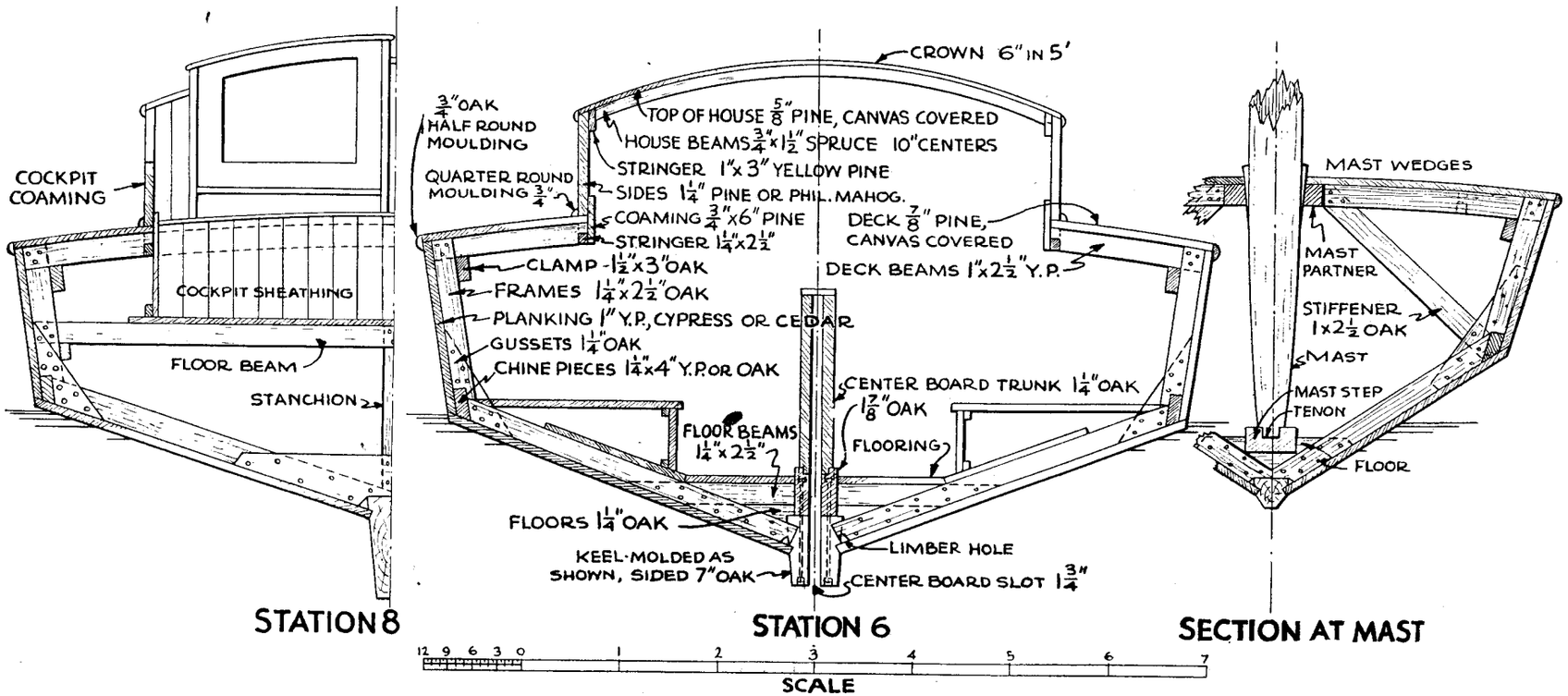
	STATION	STEM	0	1	2	3	4	5	6	7	8	9	10	11	12	TRANS.
HEIGHTS TO	SHEER	4-11-4	4-10-4	4-7-5	4-5-0	4-2-6	4-0-5	3-11-1	3-9-7	3-9-0	3-8-5	3-8-6	3-9-4	3-11-0	4-0-6	4-2-0
	CHINE		3-7-1	3-2-2	2-9-6	2-5-7	2-2-6	2-0-4	1-11-2	1-11-2	2-0-3	2-2-4	2-5-7	2-10-1	3-3-1	
	RABBET		2-11-4	1-10-3	1-4-7	1-0-4	0-9-4	0-7-6	0-7-3	0-8-4	0-11-2	1-3-2	1-8-3			
	KEEL		2-8-3	1-9-0	1-3-2	0-10-6	0-7-4	0-5-0	0-3-2	0-2-0	0-1-2	0-0-7	0-0-6	2-2-2	2-8-4	
HALF BREADTHS TO	DECK		0-6-0	1-8-6	2-7-5	3-3-2	3-8-4	3-11-4	4-0-5	4-0-2	3-10-4	3-7-4	3-3-4	2-10-3	2-4-2	2-1-0
	CHINE		0-4-0	1-4-0	2-2-0	2-9-7	3-3-6	3-7-3	3-9-2	3-9-2	3-7-6	3-4-6	3-0-4	2-7-0	2-0-6	
	RABBET		0-1-6	0-1-6	0-1-6	0-2-0	0-2-4	0-2-6	0-3-0	0-2-7	0-2-6	0-2-4	0-2-2	0-2-0	0-2-0	
	KEEL		0-0-2	0-0-2	0-0-4	0-1-2	0-2-0	0-2-3	0-2-6	0-2-4	0-1-6	0-1-3	0-0-6			



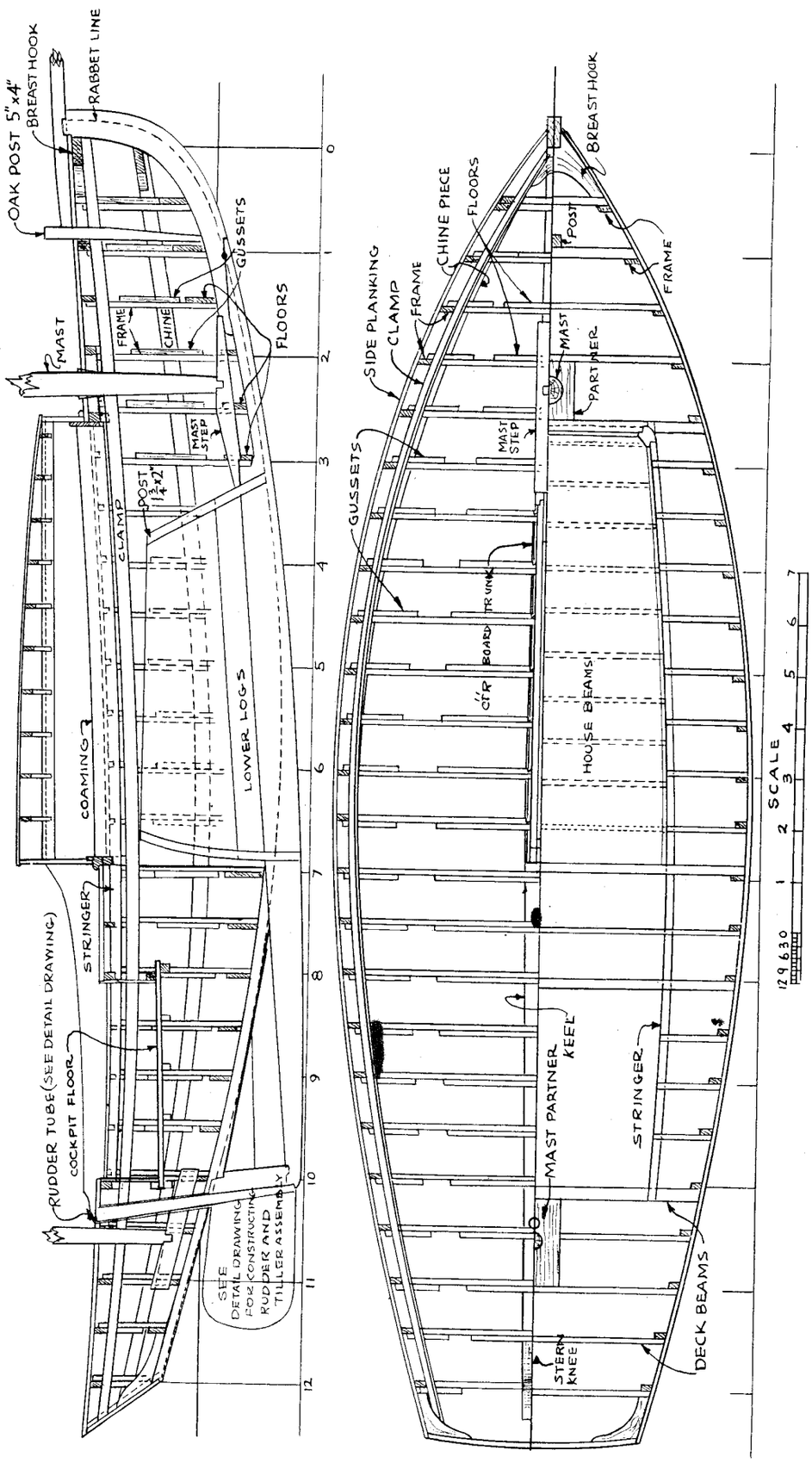
SEA BIRD

L.O.A. 25'-7½" L.W.L. 19' BEAM 8'-4" DRAFT 3'-6"
DO NOT SCALE THIS DRAWING USE OFFSETS ONLY.
DIMENSIONS GIVEN IN FEET, INCHES AND EIGHTHS AND ARE TO OUTSIDE OF PLANKING.
STATIONS SPACED 2'-0"-0

The lines of Sea Bird which must be laid down full-size according to the dimensions shown in the table of offsets



Representative sections of Sea Bird, showing method of construction and sizes of materials to be used. The type of lumber indicated on the drawing is the best for the particular member shown but other materials may be substituted if the specified lumber is unobtainable. Builders are warned against changing the method of construction indicated on these drawings; also the use of heavier materials than those specified is not recommended.



Construction profile and plan view of Sea Bird, showing frames, mast steps, deck beams, half deck beams, mast partners, etc.

of spots. Your chine log should be in place, notched into the frames and stem, and all you will have to do there is to draw a pencil line along the under side of this member.

When this is done, take the plank off the boat and with a batten, connect up the various spots showing the upper edge of the plank. Cut away the excess material, allowing an eighth of an inch and then plane this down evenly to the mark. The plank should be slightly beveled so that when the second plank goes in place, the seam formed between the two planks will be slightly open on the outside. This need be no more than one-eighth of an inch, while the inside edges come together. Into this slightly veed seam thus formed, you can run a little caulking and seam compound later on.

Of course you will be unable to run one plank clear from bow to stern and it will be necessary to stagger the butts in order to make the hull strong. By this it is meant that if the butt in the end of the first plank comes between frames 4 and 5, the butt for the next plank above should come somewhere else, in fact just as far away as possible from the first butt. In making butts, fit the planks to the frames and clamp in place. Let them overlap an inch or so and then run a crosscut saw down through both of them so that an even butt joint is made. In back of this you can make an oak butt block, about two inches wider than the plank, so that it will have a grip on the next plank above and below. The ends of the planks are then screwed to this butt block with at least five screws in each. The butt block should fit snugly from frame to frame fore and aft.

To return to our first plank, after you have it marked out, put it on the band saw, cut it to close limits and then plane the rest off. If possible try to avoid having butts come too far forward, if this is done it will be difficult to bend a short piece of planking around the contour forming the bow. There should be no butts ahead of frame 2 if possible.

Our piece of plank is once more held up in place and clamped to the frames. If it fits up against the rabbet at the stem, be sure that it fits snugly into the rabbet. Start fastening it from that end, using brass screws at least an inch and three-quarters in length. Galvanized iron screws may be used but they are not as good as brass. Each screw hole should be bored a little smaller than the screw and countersunk at least a quarter of an inch. After they are all in place, regular marine plugs may be set in each of these countersinks so that when smoothed off there will be no fastenings showing whatever. The plugs are held in place with marine glue, usually.

When the first half of the first plank is in place, follow the same procedure with the after half, using the system of making butts already described. When making the planks for one side of the boat, double up on the job and make those for the other also—if you are sure that both sides of the boat are exactly alike. It is advisable to put a plank first on one side and then the other in order to equalize the strains which might twist the boat out of shape if one side were planked up without any planks on the other side.

The next plank above the one at the chine is hung up on the side of the boat just like the first, the upper edge of the first plank serving for a pencil guide in marking the edge of the second plank. Be sure the butt does not come in the same frame space. The upper edge of this plank is marked from the inside of the frames where you have your division marks and then removed and marked with a batten. The wood is cut out, the veed seam formed, etc., just as with the first plank.

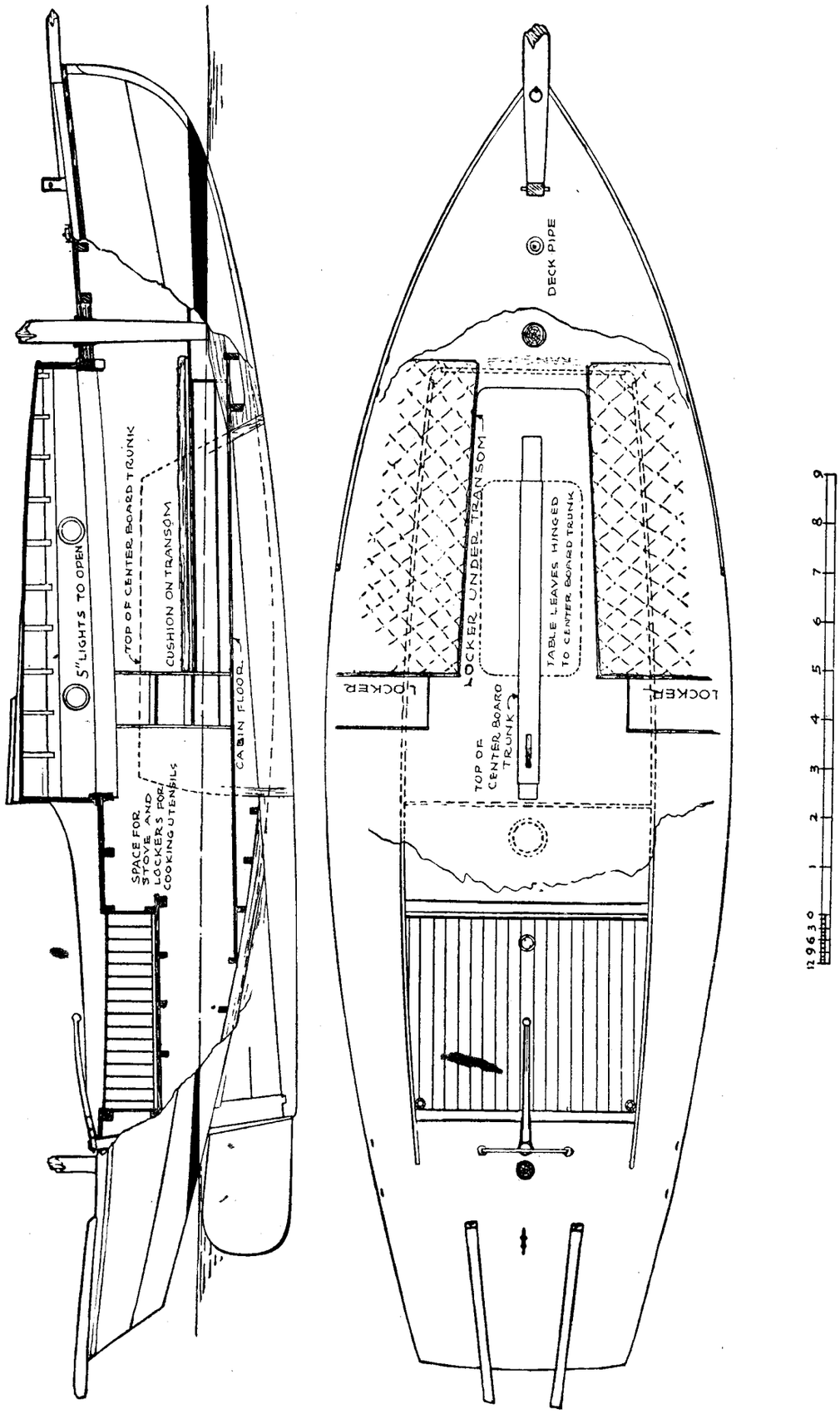
The sheer plank is made in the same way but be sure to take pains that the sheer is accurately followed as this line has everything to do with the appearance of the boat. The topsides of Sea Bird should now be planked in full. Planks are fastened to each frame with brass screws and also to the chine piece. The bottom edges of the planks where they come below the chine piece should be planed off flush with the bottoms of the chine pieces so that the bottom planking when it goes on will fit up flush and snug. The angle should be just the same as the angle for the lower halves of the frames.

The bottom planking is fitted much the same way as the topsides. The seams may run parallel to the centerline of the boat, making a feather edge where they come off the chines or they may be shaped (as they should be). This latter system is more complicated to do and also causes much more waste of materials, but it will give you a better boat and a better job and consequently worth more money some day when you come to sell her.

The garboard strake, or plank nearest the keel, should be the first to go in place. The material for this should be clamped in place and marked off from the inside of the hull or you may do as a professional boat builder does and spile for it. This latter system requires the use of any old piece of light wood, at least sixteen feet in length, which is temporarily nailed in place. It should be about a half inch away from the rabbet at the nearest point. You then set a pair of steel dividers at a distance a little greater than the maximum clearance to the rabbet line and mark off, at about four inch intervals, the spot where the dividers hit the spiling plank when the other end is held up against the rabbet. The system is not as difficult as it sounds.

The spiling piece with its marks is then removed from the bottom of the boat and is clamped in position on top of the next material to be used for planking. This is done on a long work bench. The dividers, still at the same setting, are then brought into use and the series of spots are transferred back to the planking material. This gives you a series of spots every few inches, which if joined up with a pencil line made with a batten, will give you—if you have done the job right—an exact contour for the plank at the edge which will fit into the rabbet.

The spaces between the rabbet and chine in the lower halves of the frames should be divided up the



The interior arrangements of Sea Bird. The arrangement plan shows the best possible layout giving room for two transom berths, but the interior may be modified slightly according to the builder's personal preference. No shift in the major weights of the hull is advised, however

same way that we did with the upper halves. These divisions will give you the shape of the upper edge of your plank, or it may be left straight—if possible—and the joining edge of the next plank matched up by means of spiling. The latter system will give very accurate results if done correctly.

You will find that the planks, as they go forward in the bottom of the boat, take on a considerable amount of twist as they approach the stem and if you put the planks on too wide, they will surely crack and split when you begin to force them home. For this reason use narrower planks and if they still refuse to take the twist soak them in water for a few days, or better yet, wrap them in hot, steaming blankets until thoroughly impregnated with the heat. If this is done you must work them quickly in place before they get a chance to cool off. It is advisable in making these stiff bends in planking, to start the bend by screwing the plank to the stem first and then working it around.

While on the subject of planking, we cannot resist warning amateurs against building boats in heated places. The room should never be warmer than sixty degrees unless the boat is built in the summer when there is no artificial heat. Building a boat in the winter in a heated room or building will always dry out the material badly and when your boat is launched there may be so much soakage and expansion of the materials that the planking will actually be forced off its fastenings. This has happened altogether too often with amateur-built boats. If it is too cold to work on the boat, don't heat the shop but wait until the weather moderates. Also never, under any conditions, use any kiln-dried wood in a boat but only the best seasoned lumber. For this reason we would warn you against the usual run of lumber yard material. This stuff is meant for house building and is usually entirely unsuited for boat building. Try to get your lumber from a regular boat yard or from some concern that knows the difference between ordinary oak flooring and the kind of oak used by a yacht builder. Some of the oak sold by lumber yards is entirely unsuited for boats.

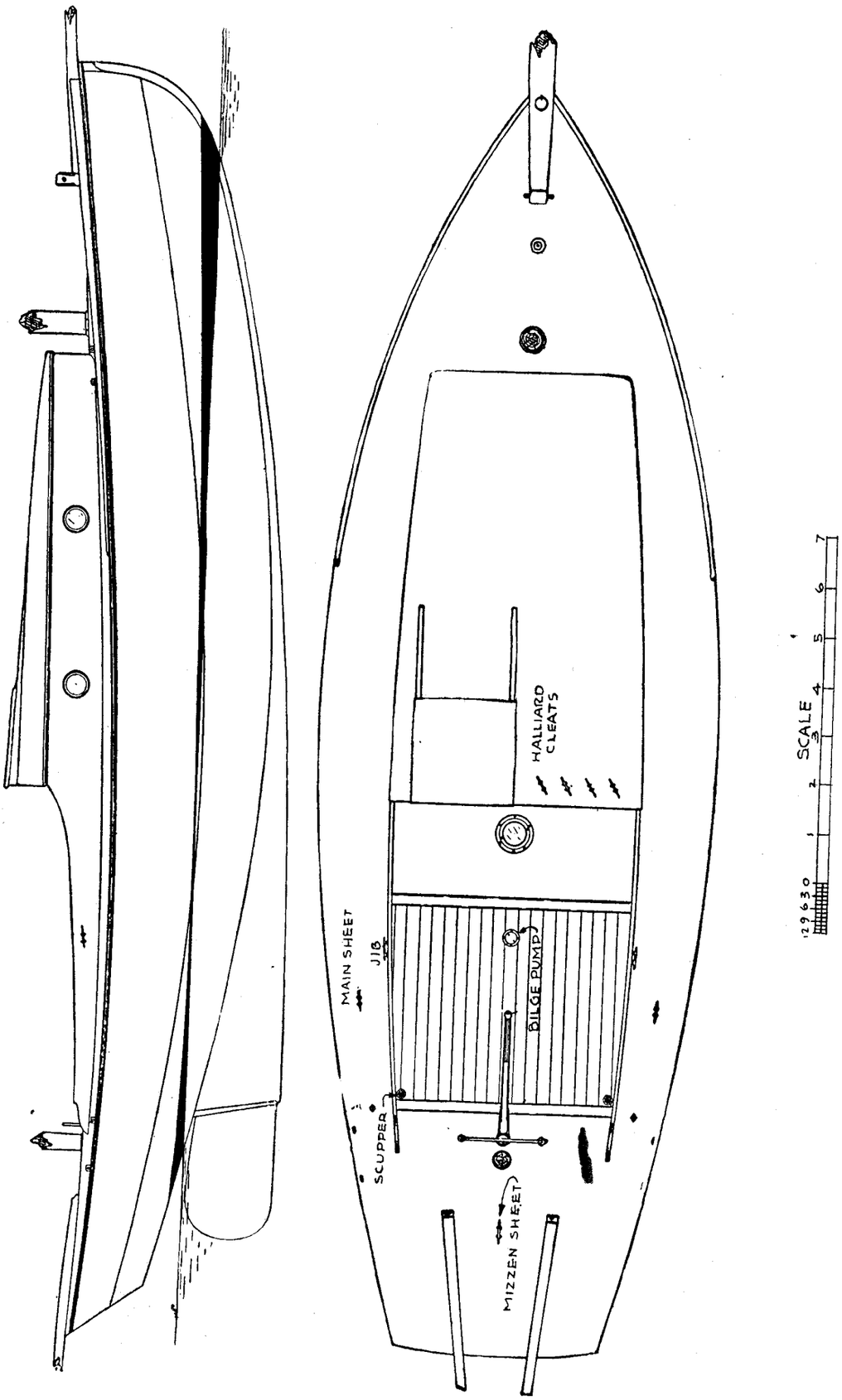
When the planking is at last complete—and it is some job—set all the plugs in the holes for every fastening. Allow them to get good and dry and then go along with a very sharp chisel and trim them off flush with the outside of the planking. These plugs are made especially for the purpose and have the grain running across them. They should be set so that the grain follows the grain of the planks. When this is done, plane the entire outside surface smooth and then sandpaper. In caulking, it is not advisable to ram this material home as they do in large ships. Instead get yourself a good sized iron or brass washer and file the edge to a vee all the way around so that it is sharp but not sharp enough to cut. Set this in a handle so that it will turn easily and then roll your caulking in place evenly. Use cotton caulking, which is made especially for the purpose. The seams should be painted first to make the caulking stick fast. Finally finish off the seam with either seam composition or by mixing white lead and putty to the proper consistency. Paint the seam again before you put in this mixture so it will stick properly.

The main deck beams should be made next. These are cut to a crown of about five inches for the maximum beam. Lay off one master one with the aid of a trammel or a piece of string, pencil and tack and then use this for a guide for all the others. These come on every frame and of course in way of the deckhouse and cockpit they must be cut and butted up against a fore and aft partner which will take up the strain. Between each of the original frames you can now fit another frame of somewhat lighter material in order to keep the planks from weaving and leaking. These intermediate frames may be made with the gussets and floor timbers just like the original frames or they may be simply straight pieces from sheer to chine and then from chine to rabbet.

In the lower half of the construction plan view you will see how the deck beams at the side of the house and cockpit are set into the stringer which runs fore and aft (partner). The scale may help you out considerably on this drawing. With your deck beams in place, put in the various reinforcing pieces around the masts, in way of the bitts, rudder stock, etc. These pieces are simply fitted between the deck beams tightly and nailed or screwed so that they will stay there.

The side deck is made up of ⅞ inch pine, canvas covered. It way be tongue and groove but if the material has a beading on one side of it, set this so that it comes next to the deck beams. The top should be planed and sanded perfectly smooth. This side deck, as well as forward and aft, should be covered with at least 12 ounce canvas laid in marine glue. It is tacked down along the edge of the sheer with copper tacks and the sheer molding will be screwed on over it. The inner edge should be left slack and if you will look at the construction sections you will see that the construction is such that the canvas should be carried up about two inches on the inside of the house sides. This will make an absolutely tight joint which cannot leak rain water down into the bunks.

The sides of the house are shown in the construction section and they are set on the fore and aft stringer (partner) and screwed up from underneath. The canvas is brought up inside, tacked in place and then the inner coaming will go on to cover the edge. At the corners of the house, forward, special rabbeted pieces should be used and before the house sides and front are set in place these rabbeted areas should be thoroughly covered with marine glue or some kindred substance so that when the sides are screwed in place there will be absolutely no chance for a leak. A little precaution here will save you a lot of bother later on for it is far easier to cure the leaks right at the start than it will be after all the work is done.


HALLIARD CLEATS
MAIN SHEET
JIB
BILGE PUMP
SCUPPER
MIZZEN SHEET
SCALE
1 2 3 4 5 6 7
1 2 9 6 3 0

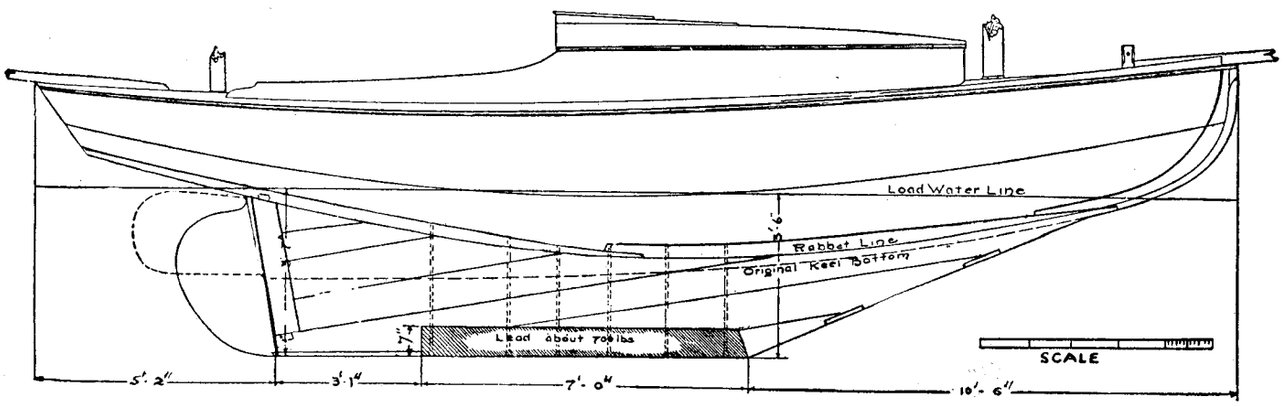
The beams for the house top are made exactly like the regular deck beams but have more crown to give better headroom below. The house top is also covered with light pine and this in turn is covered with the 12 ounce canvas, laid in marine glue. The little half-round molding on the edge will cover the raw edge.

As for the cockpit this may or may not be watertight. It is pretty close above the waterline and if it is made watertight be sure that the lead pipe scuppers are crossed or the cockpit will have water in it every time the boat is heeled under sail. These scuppers are crossed by leading the one that takes off from the starboard after corner out through the port side of the bottom and the port cockpit opening through the starboard side of the bottom. Be sure that where the lead pipe passes through the bottom of the boat that an absolutely tight joint is made. In fact if we were doing the job we would use brass tubing for this with a sea cock on each so that it might be shut off if necessary. The sea cocks, needless to say, should be made accessible and should be shut off at all times except when actually needed.

The companionway into the cabin from the cockpit does not come down to the level of the cockpit at all but presents a high step. See sectional drawing. The sheathing forming the bulkhead between cockpit and cabin should be at least 7/8 inch tongue and groove material with plenty of wet paint in the tongues before the material is put together. This will make it tight. The same material may be used for the sides of the cockpit. A companion slide may be arranged over the companionway but unless you can make a good tight job of this we would not advise it, for there is nothing much worse than a leaky hatch.

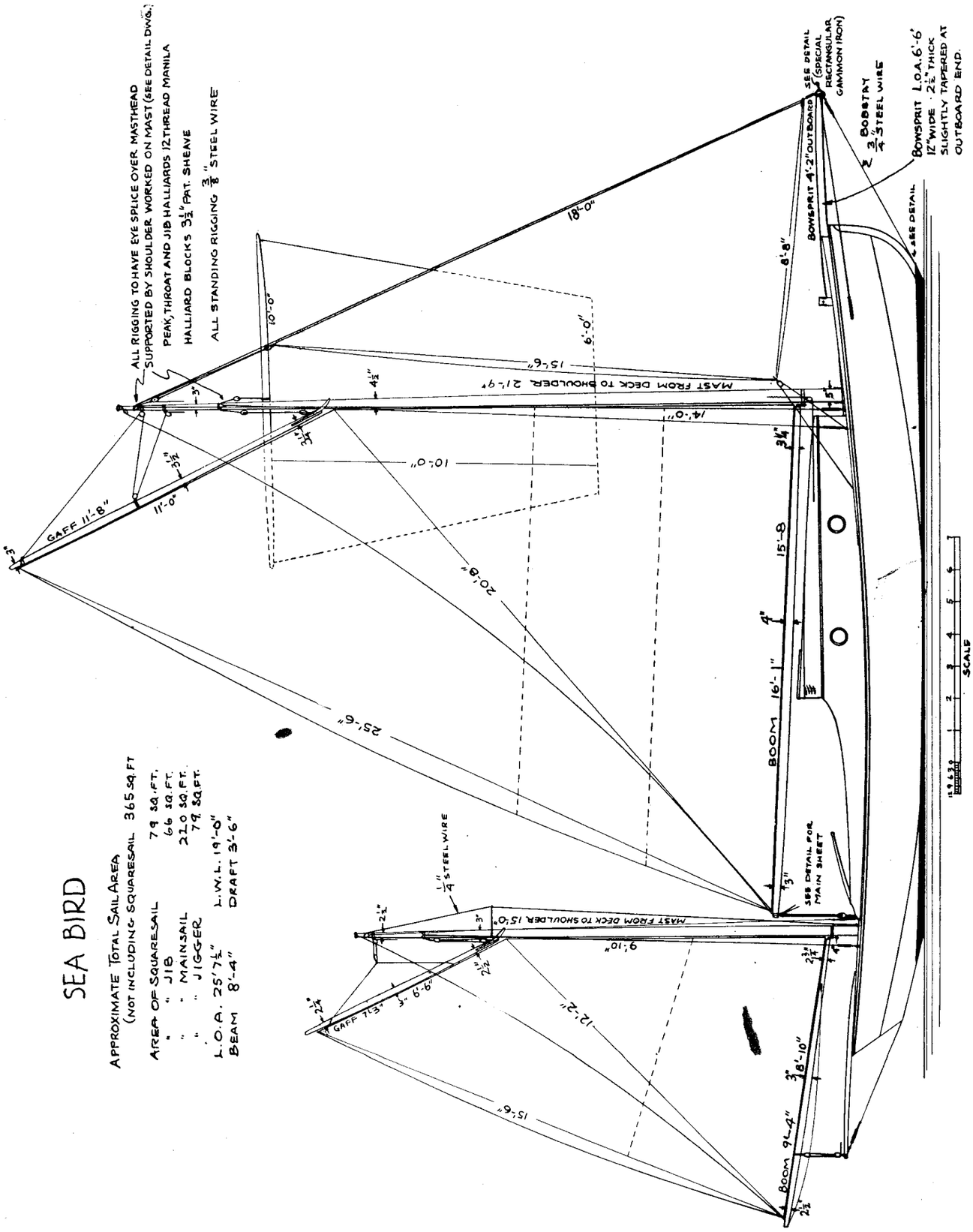
Space is provided in the plans for a small engine between frames 7 and 8. We would not recommend anything over 10 or 12 horsepower and from 5 to 6 will be enough to kick Sea Bird along at four or five knots. Do not try any of those old worn-out auto engines. They are too heavy, too much power and usually are only good for moorings. Instead get yourself one of those new, little marine engines or, if you prefer, even an outboard motor may be used. Oatboards are now available with extra long shafts and it is possible to make a little hatchway in the after deck so that one may be hung over the transom. If a motor is used inboard, the stern post will have to be modified somewhat and the upright piece shown just ahead of the rudder will have to be moved further forward to make room for the propeller. The rudder itself will remain as shown. If you do not care to cut a long shaft hole through all the deadwood, you may place the motor a little off center and have the shaft go out at one side, just enough to have the propeller clear the deadwood.

Speaking of the rudder, we have a very good detail drawing of that with all the dimensions that anyone could ask for. The port is made up of a piece of brass tube or pipe, threaded through the deadwood and with nuts, inside and out, set up on leather gaskets to make a tight job. The rudder stock itself goes up through this tube where the tiller and its fitting may be seen in the drawing. The rudder is made of galvanized iron as shown but if the whole thing were made of brass or bronze it would be much better, particularly if you are going to use an engine with a bronze propeller. The same thing holds true of the center-board. This should be made of 1¼ inch oak, properly doweled together with bronze or galvanized rods and then with maybe fifteen or twenty pounds of lead in the lower corner to make it sink easily. Actually many Sea Birds have been built with steel center-boards but as a rule these get rusty and pitted and make no end of trouble. When they start to get weak they will begin to buckle and the first thing you know the darn thing is stuck in the trunk and then you're in a real fix.



PLAN OF FALSE KEEL

If the boat is to be used for deep-water or coastwise sailing the builder may prefer to build her with a keel, similar to the one shown here. Sea Bird is a better boat without it however. As a center-boarder she is a faster and much livelier boat to handle



Sail plan of Sea Bird. The gaff-rigged yawl sail plan has been found to be the best for this particular hull and builders will be well advised if they make no changes in it. The boat can be Marconi rigged if desired but the change will not improve her sailing qualities particularly, much longer spars are needed and more of a gang of rigging is needed on the main. Also the gaff rig will cost less to set up

If you must use a metal board, have it of bronze or brass and if it is of the right thickness (at least ⅜ inch) such a board will cost you a pretty penny. Better stick to the wooden one. The wooden board has a radius of 6 feet 8 inches and across the after edge it is three feet nine inches. As shown in the line drawing, the board is at its lowest point of immersion. A wire pennant in the after upper corner may be rigged for raising and lowering the board and there should be a few holes through it which will correspond with a hole high up in the trunk. Through these holes a pin may be passed to take the strain off the pennant when the board is not being used. The pennant may go up through the house top if you desire, and if a metal board is used you will have to rig a block and tackle to raise it.

Some builders of Sea Bird have preferred to build the boat as a keel job, thus doing away with the center-board and giving a whole lot more room inside the cabin. The profile for a keel for Sea Bird is shown on these pages and she will make a whole lot better boat. The draft with the keel is about 3 feet 8 inches and 700 pounds of lead should be securely bolted to the outside of the keel as shown. This plan has a scale attached to it which will permit you to scale off any dimensions needed. If you use an iron casting instead of lead, in order to get the same weight, you will need a casting nearly twice the size of that shown, as lead weighs nearly twice as much as iron. The lead keel will be better as it keeps the weight lower.

Sea Bird, either with or without the keel, will need a certain amount of inside ballast. The easiest way to get this is to use old sash weights which may be broken up to suit. Do not pile the ballast all in one spot but after the boat is launched and you can see how she trims, spread the ballast throughout the hull where it will do the most good. Paint the sash weights with red lead and stow them on cross pieces arranged so that the weight will come on the frames and not on the inside of the planking. Battens should be nailed across the ballast when once in place, to hold it there. Not very much ballast is needed as she is surprisingly stiff even without any and if too much is used, you will ruin her seaworthiness as she will become sluggish. Without the lead keel, for the center-board model, you will probably need around 700 to 900 pounds and if you have the keel model, add a few hundred pounds after launching in the place where the boat will trim and behave the best.

The interior joiner work such as berths, lockers, etc., may be put in to suit the builder's fancy but the arrangement shown has worked out very well indeed. The two lockers at the after ends of the berths might be eliminated and a galley rigged up on one side and an enclosed toilet on the other. The locker space could then be rigged up under the forward deck, but we would not recommend closing in the fore peak with a door, etc. Instead, arrange a few shelves up there for spare sails, suit cases and supplies. Spare sails may also be stowed under the after deck where a nice little lazarette might easily be fixed up. A good hatch should be made in the after deck for this purpose.

From the chine down, the entire inside of the hull should be thoroughly cleaned and given two good coats of red lead. This will preserve the wood and keep the bilges clean. Above the chine, she should be painted with a good grade of white paint and this finally topped off with a coat of white enamel. Do not put any ceiling inside the planking but keep it open so that there will be plenty of ventilation at all times. Nothing will start dry rot sooner than the closed in space in back of ceiling.

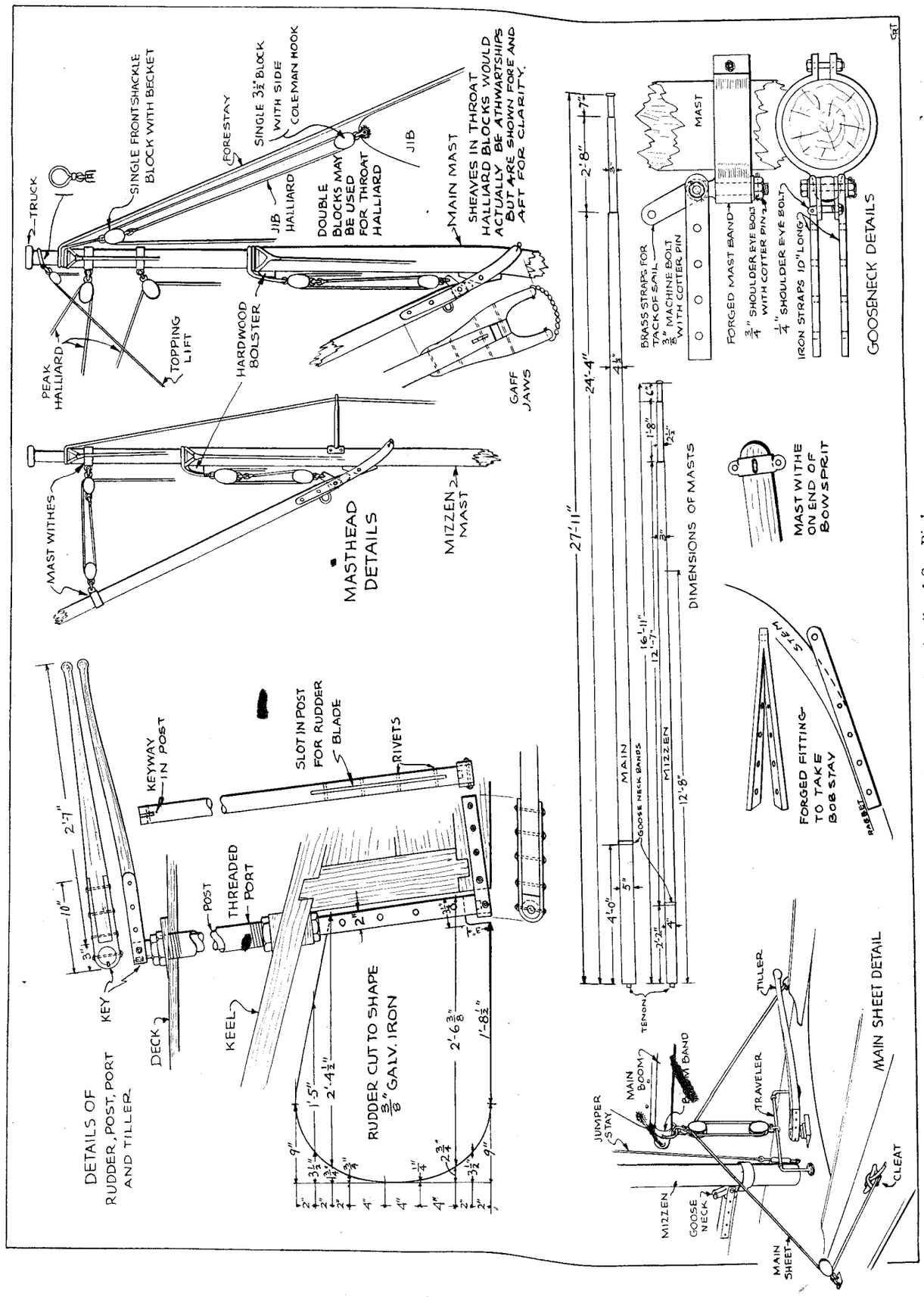
Many readers have desired Sea Bird with full headroom. It can't be done and we do not recommend that such changes be made. She is a small, shallow boat and as such she will not be capable of being sailed properly with high freeboard and a big box of a house. The headroom as shown is about 4 feet 3 inches under the carlins in the cabin house and this is quite sufficient to enable one to get about and there is plenty of room for sitting on the transoms. Raising the freeboard will ruin her sailing qualities and make Sea Bird look like a tub.

The spars and details of the rigging are clearly shown in one of the drawings on these pages. The draftsman has made one slight error in showing the throat halliards in that the blocks will actually have their sheaves athwartships instead of fore and aft as shown. Otherwise the rig is shown clearly. In the sail plan you will find dimensions not only for the sails but also for the necessary booms and gaffs, their lengths and diameters at various points. The dimensions are as complete as it is possible to make them. You will also find here dimensions for the bowsprit and the boomkin at the stern. The latter is made up of two pieces bolted through the deck and then run outboard in such a way that they gradually converge upon each other forming a vee. The ends are fitted together and bolted athwartships. A good sized ring bolt is inserted in the end to take the sheet for the mizzen. No horse is used at this point.

At the forward end of the bowsprit the various stays may be rigged to suit but the general arrangement is to have some kind of a gammon iron made up of strap brass with eyes welded to it for the jib stay, bobstay and bowsprit shrouds. There are several rigs that may be used here and you can take your choice so long as it is strong enough. In many Sea Birds, the bowsprit has not been in plank form at all but made round. This is a lot simpler to rig up and finish off but the plank bowsprit is much easier to get out on when you have to in a seaway.

As for the Marconi rigged Sea Bird, this plan has been brought out in response to popular demand and is said to work even better than the original rig. The total sail area is slightly larger than the gaff rigged plan but it is a whole lot easier to work as there are no complicated halliards to sweat up.

No changes have been made in the location of either mast as this was found to be unnecessary. Both booms



Rigging and other details of Sea Bird

remain the same length as in the gaff rigged sail plan and also the same diameters will work out properly. The mainsail is 28 feet 9 inches on the luff and 16 feet on the boom. The leech is 32 feet 6 inches. The mizzen is 20 feet 5 inches on the luff, 8 feet 10 inches on the foot and 21 feet on the leech. Dimensions for the staysail are given. Note particularly the spreader arrangement which is highly important if you expect the mast to stay put.

To sum up you will note that in the construction sections the sizes and materials that go into the Sea Bird are given. In some localities it may be difficult to get the right kind of wood and if such is the case, try to get something that closely resembles the specified material. In some foreign countries, oak cannot be secured for frames or keel and some local woods may be used that have about the same qualities. Many times you can consult with some local boat builder who will be able to help you out by telling you the kinds of woods that he uses for frames, planking, etc.

The fastenings for the keel should be at least ¼ inch galvanized iron rod and ⅜ inch will do no harm. Put in plenty of them. Drill for each a hole slightly smaller than the size of the rod and then drive the rod home. The end of the rod should be burred or riveted over galvanized iron washers which will form a head on each end. When finally in place, cut off the excess rod, slip a washer over the other end and then, with your assistant holding one end down with a heavy hammer, rivet over the other end. You'll be surprised how you can pull the various parts together by this process.

The lead keel itself is usually bolted in place, with the heads of the bolts underneath the keel (countersunk) and the nuts up inside the boat where you can keep an eye on them. Bronze bolts should be used, well countersunk, painted and plugged.

The various parts of the frames may be riveted, screwed or bolted together. Copper rivets over copper washers will probably be best although a great many vee-bottom boats have been built using ordinary stove bolts for this part. If the latter are used, they should be well painted before being put in place.

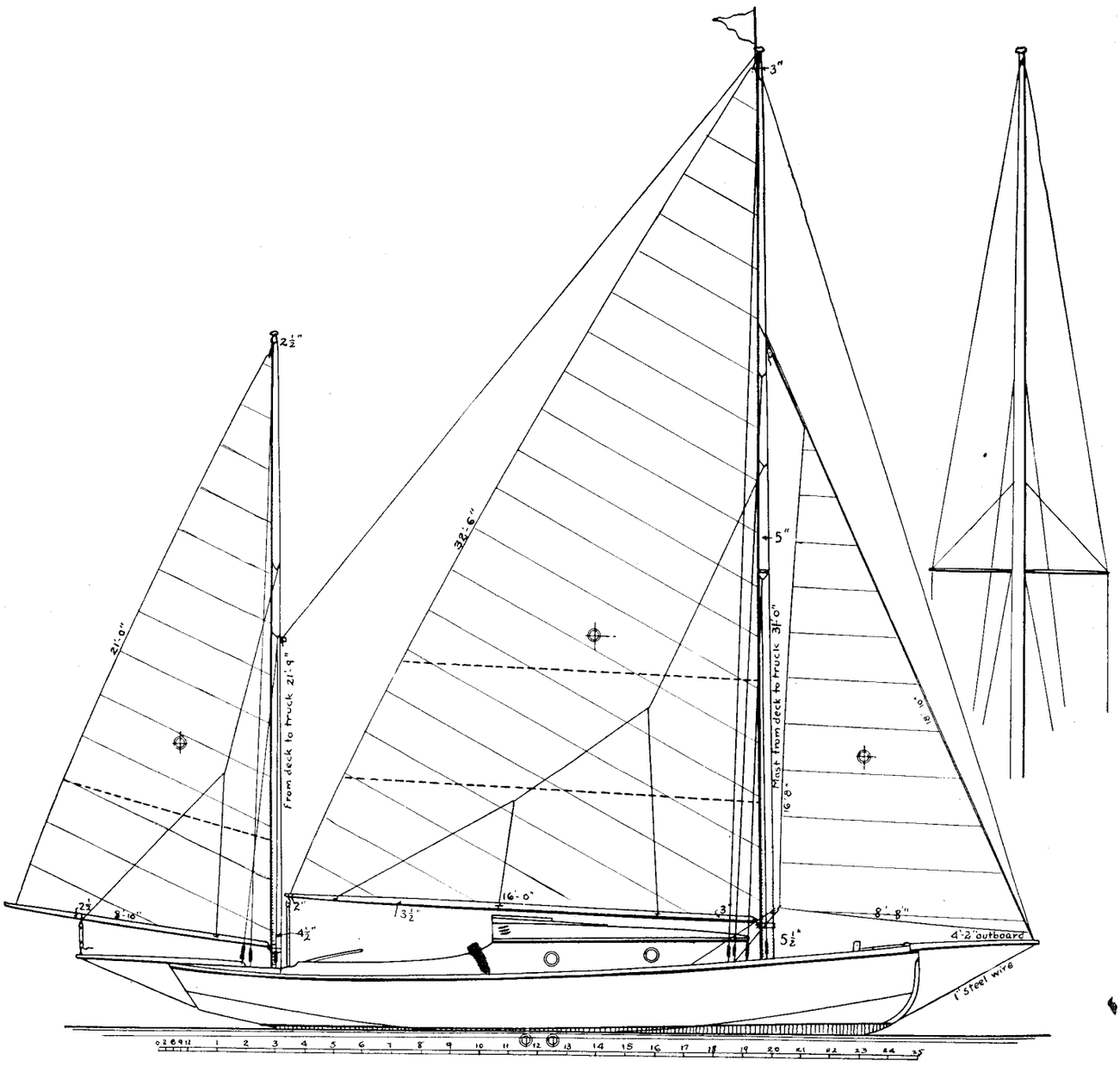
Do no stint on fastenings. We recall seeing one Sea Bird in which the stem was held to the keel by exactly one ¼ inch bolt. There should be at least four, staggered back and forth so that no two fastenings adjacent to each other come in the same grain.

On all surfaces such as where the keel and stem come together, it is usual to insert a stop-water to prevent leaks. A stop-water is a soft pine dowel which is drilled for and then painted and driven into a hole which halves the two surfaces. This pine stop-water will swell more than the oak and make an absolutely tight joint. They are used wherever the rabbet crosses the junction of two of the backbone members. In the construction profile, you will note a black dot at the forward end of the keel, where the rabbet crosses it and the stem. This is a stop-water. Another will come about half way between frames 7 and 8 where the rabbet crosses the junction between the keel itself and the deadwood. There would be another where the mortise in the rudder post crosses the rabbet and keel lines. They might also be added where the rabbet line crosses the junction of the keel and the center-board trunk.

The masts are wedged and there should be doubling under the deck in way of the mast openings as well as around the forward bitts and where the bowsprit is bolted to the deck. For instance on deck between frame 2 and 2½ (forward side of house) there should be a solid block with an opening for the mast but larger so that the mast wedges may be driven down into it. The deck itself might not be strong enough to withstand the strain.

Sea Bird was originally introduced in THE RUDDER many years ago and she has withstood the test of time. Hundreds have been built by amateurs and professionals in all parts of the world. She is a good little boat and when equipped with the keel, she is capable of going almost anywhere. Actually some Sea Birds have gone far to sea with only the center-board but we do not recommend this procedure as such a boat is not as good for sea work. The fact that the design is a tried and proven one is all the more reason why the plans should not be changed in the slightest. Of course, everyone who builds a boat is always thinking up ways in which to change or "improve" the design but we wish to warn builders in advance to stick to what is given in this booklet. There seems to be a type of man who loves to come around and watch an amateur build his boat and this type will usually make suggestion after suggestion as to how the boat could be improved. Generally such opinions are worthless because although the visitor may be more or less familiar with boats, he will not be familiar with naval architecture or the mathematics involved in designing a boat like Sea Bird. He may "guess" where the design has been carefully figured out. The chances are that his guess is all wrong and to follow such a guess may spoil your boat entirely. Also remember that Sea Bird is well known and has a definite second-hand value. Every time you make a change, you detract from this value as the boat is getting further and further away from Sea Bird.

As parting advice: Stick to the plans as given. Use good tools and lumber. Study the plans and thoroughly familiarize yourself with them before you do a single thing. Take plenty of time in laying down the lines full size. Don't try to hurry the construction but make a real job of it. Sea Bird is worth it. Use good paints. Use a good engine and do not even consider some worn-out, old auto engine. Last but not least, get the best suit of sails that you can afford and have them built by a professional sailmaker. Homemade sails have ruined many an otherwise good boat.



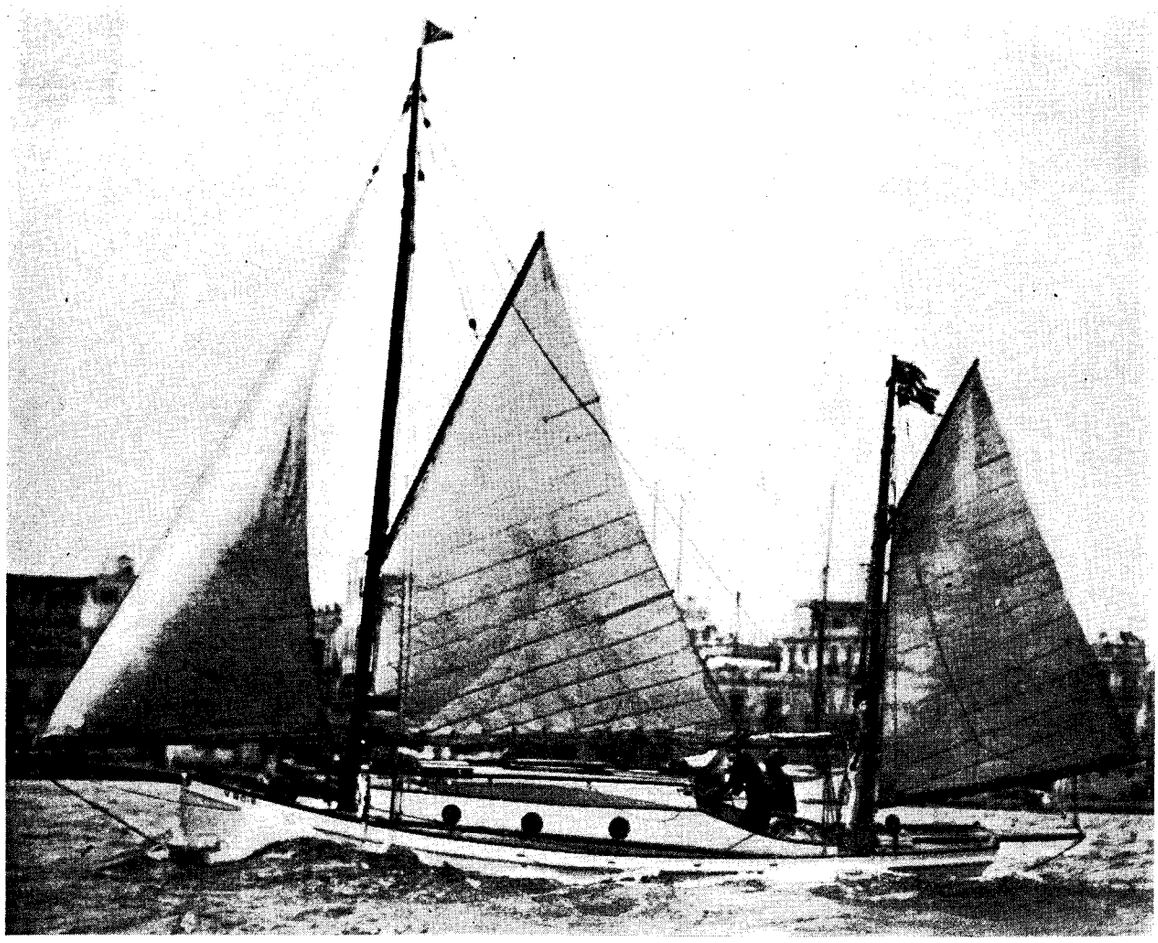
Sea Bird with jib-headed rig

Probably no cruising boat has had such wide popularity over such a long period of time as has THE RUDDER's famous Sea Bird, the little 25 foot yawl in which Captain Thomas Fleming Day crossed the Atlantic Ocean in 1911. The original plans of this little craft called for the usual gaff-headed rig and at the present time there are probably hundreds of these boats sailing the waters of the seven seas. However, there has been, of late, a distinct demand to bring Sea Bird's rig more up to date with the popular and easily handled jib-headed or Marconi rig. It is for this purpose that the drawing on this page is reproduced.

No changes have been made in the location of the masts, as it was found that she would balance properly if only the masts were heightened and the boom of the jigger lengthened a little. The main boom remains the same length. The main mast is a few feet longer than before, being now 31 feet from deck to truck, while the jigger is now 21 feet 9 inches from deck to truck. All dimensions for the new rig are shown on the plan.

The new mast requires a carefully worked out system of stays and shrouds, as will be seen in the drawing to the right of the sail plan. The scale at the bottom of the plan will aid in working out any dimensions not to be found on the plan.

The Sea Bird Maralen II starting in Havana race



Maralen II finishing at Havana under reefed main

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How to Build Seagoer

An Enlarged Sea Bird

Length O.A.	34 feet	0	inches
Length L.W.L.	27 "	6	"
Breadth—extreme	10 "	9½	"
Breadth—waterline ...	10 "	1	"
Draft to rabbet.....	1 "	10	"
Draft—extreme	5 "	0	"

Yawl Rig	
Jib	119.38
Main	394.31
Mizzen	120.59
Total Area.....	634.28

Schooner Rig	
Jib	113.62
Fore	185.40
Main	377.62
Total Area.....	676.64

THIS boat is a duplicate of the original Sea Bird, the lines being drawn out proportionately—length, breadth and depth of hull—making it 34 feet overall and 10 feet 9½ inches greatest breadth, the only changes being in increasing the sheer forward—making it 3 inches higher at the stem and making the keel a little straighter at the forward end of the waterline, thereby slightly shortening the forward overhang and making the forward sections a little sharper.

To those who have already built the original Sea Bird, but little instruction is necessary, but to anyone building for the first time, the initial step is to get the boat laid down full size on the floor.

In this case it will be a comparatively easy job. The necessary outfit to do this will include a long and a short straightedge, a long fairly stiff batten, a short more pliable one for the curve of the stem and a chalk line. A box of finishing nails will also come in handy.

First lay down the baseline—snapping it in with the chalk line and then going over it with a pencil, using the long straightedge.

Perpendiculars are erected at either end and the waterline marked 5 feet 3 inches above. The waterline is then snapped in with the chalk line and gone over with a pencil as described above.

The stations are next spaced off 2 feet 6 inches apart, starting 1 foot 8¾ inches from the stem, and these lines drawn in perpendicular with the baseline.

The profile of the lines—sheer, chine, rabbet and keel —are then spotted off, using a steel tape—for accuracy—and these lines drawn in with a long batten. The angle of the rudder post and stern are drawn and the stem also finished. The latter is dimensioned enough so that it can be made exactly as shown.

The deck width, chine and half-siding of rabbet and keel are next drawn. If there is not room to draw them below the profile as shown, the baseline may be used as a centerline and the above drawn over the profile. These lines are also drawn in with the long batten and should be faired up. Any little discrepancy in the measurement given in the table of offsets should not be given preference over the fair line as sprung in by the batten.

*Note: The plans of this boat are the same ones used by Harry Pidgeon when he built his famous 'round the world cruiser Islander.

TABLE OF OFFSETS.
"SEAGOER."

Dimensions given in feet, inches & eighths to outside of Planking.

	Stations	0.	1.	2.	3	4.	5.	6.	7.	8.	9	10.	11.	12.
Heights.	Sheer Line	9·1·4	8·9·5	8·6·1	8·2·7	8·0·1	7·9·7	7·8·1	7·6·7	7·6·3	7·6·3	7·7·1	7·8·5	7·10·7
	Edge of Chine.	7·1·7	6·7·6	6·2·1	5·9·3	5·5·6	5·3·2	5·1·7	5·1·6	5·2·7	5·5·2	5·9·1	6·2·2	6·8·4
	Rabbet Line.	5·8·0	4·10·4	4·3·7	3·10·7	3·7·2	3·5·3	3·4·7	3·6·0	3·8·6	4·1·1	4·7·1	5·2·4	5·11·1
	Bottom of Keel.	5·4·4	4·6·6	3·8·3	2·8·6	1·7·6	←	See Profile of			Lines.	→	5·1·7	5·10·4
Half-breadths.	Sheer Line.	1·3·5	2·8·6	3·9·3	4·6·2	5·0·1	5·3·3	5·4·5	5·4·3	5·2·4	4·11·3	4·6·7	4·0·6	3·5·1
	Edge of Chine.	0·11·3	2·1·6	3·1·5	3·10·7	4·5·5	4·9·7	5·0·1	5·0·2	4·10·4	4·7·2	4·2·3	3·8·0	3·0·2
	Rabbet Line.	0·2·2	0·2·4	0·3·2	0·3·7	0·4·0	0·4·0	0·4·0	0·4·0	0·4·0	0·4·0	0·3·7	0·3·4	0·2·5
	Bottom of Keel.	0·0·3	0·0·3	0·0·3	0·0·3	0·0·3	0·1·6	0·4·0	0·4·0	0·4·0	0·3·5	0·2·4		
Miscellaneous.	Base Line 5'-3" Below L.W.L.													
	Stations spaced 2'-6" Apart. Fred'k Wm. Goeller, Jr. Del.													
	RUDDER Publishing Co.													

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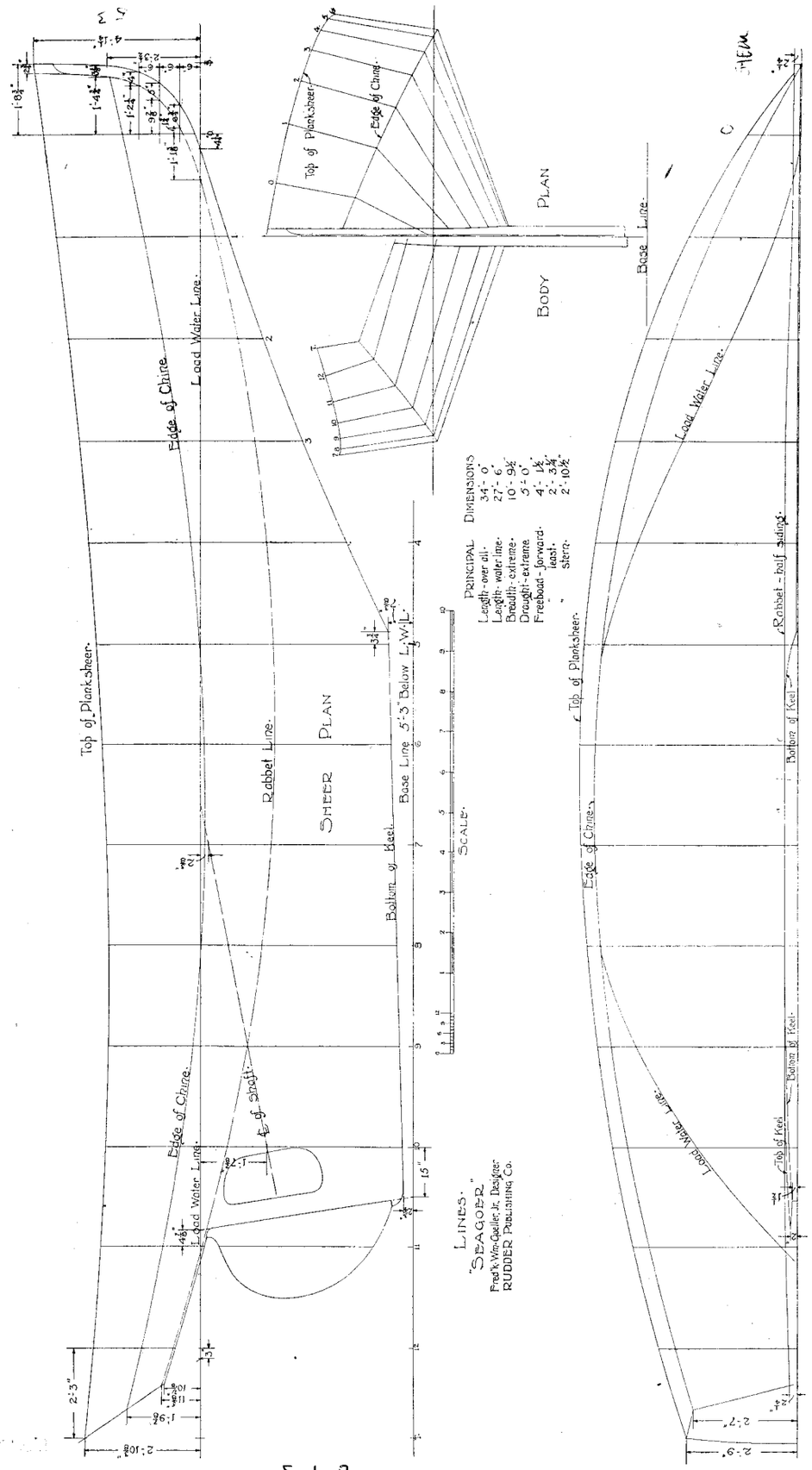
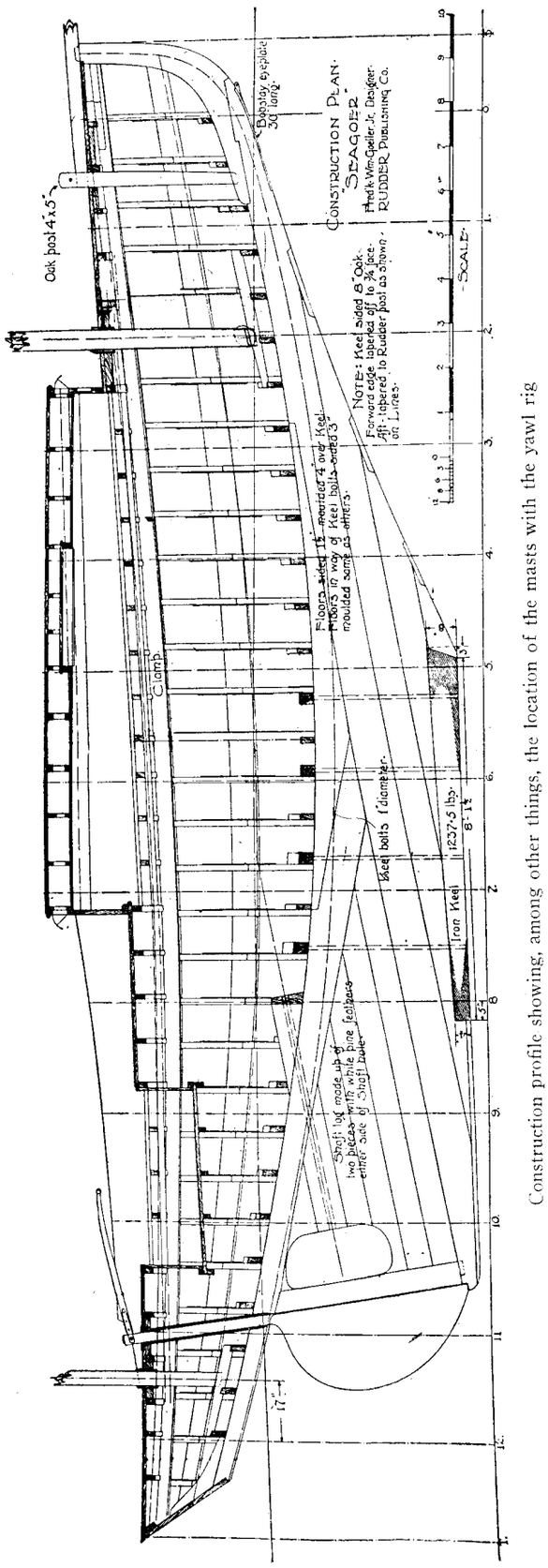


HALF-BREADTH PLAN.

Lines of Seagoer, which with the table of offsets on the opposite page, the boat may be laid down full size



Construction profile showing, among other things, the location of the masts with the yawl rig

If it is possible, to save confusion, the body plan—sections—should be drawn separately and not over the other lines.

Take a stick, say 9 feet 6 inches long, and bevel off one edge—just like a common ruler—and starting, say at the sheer line, keeping one end even with the baseline, make a mark at the sheer height at each station.

You will now have thirteen marks on the stick. They should be numbered to correspond to the sections. Then on one side of the centerline of the body plan mark off the heights of these stations forward of amidships. The same is repeated aft; in fact, this process is followed throughout, the heights and widths spotted off. When they are done the heights are drawn out parallel to the waterline and the widths perpendicular to it. Where they cross is the point desired and the section lines drawn through them.

The keel is sided 8 inches straight down from top to bottom, the forward edge simply being sharpened as shown in the plan of the bottom of the keel. The after end of it is tapered off to the stern post, the dimensions of which are shown on the line plan.

All of the section lines and in fact all shown are drawn to the outside of the planking and when they are drawn—the sections—the planking is taken off 1⅛ inches for the side planking and 1¼ inches for the bottom. The lower frames should also be drawn and an inch above where they touch against the keel is the top of the latter.

The molds are gotten out to the inside of the planking and are notched out to fit over the keel.

The construction plan shows the best method of building the keel and deadwood. At best this sort of plan is used more as a guide, the lumber procurable really governing the way it will go.

The bow and stern timbers, stem and the filling piece where the bow and stern timber join, should be of oak, but the rest may be of yellow pine.

The shaft log is made up of two pieces hollowed out with white pine feathers either side of the hole. It is set in position and just before the stern post is put in position the shaft hole should be bored through the stern timber and block on top of the keel using the shaft log as a guide.

In getting out the keel, deadwood, stem, etc., a pattern of some light wood, say ½ inch thick, should be made for each piece of lumber to be gotten out and all should be laid on the floor together to make sure they will fit. In this way each piece of timber may be marked out and sawed at a mill, saving hours of back-breaking toil trying to rip it out by hand.

A full-size pattern should be made for the iron keel, all dimensions for this being increased in proportion of ⅛ inch to 1 foot to allow for shrinkage. As soon as this is made it should be sent to the foundry so as not to delay the building of the boat by having to wait until the foundrymen get a chance to make it.

The holes for the keel bolts should be cored out. As the keel is of iron all the bolts should be also of the same metal galvanized.

When the keel, stem and sternboard are all out, they should then be bolted together and laid on the floor and the position of the frames marked on. From the body plan the depth of the heel of the frames is found and also marked. A notch is then cut in the keel at each frame, as shown by the dotted line in the construction sections. This is the best way to cut this notch, as a nail may then be driven—at an angle—through the heel o

the frame into the keel. Then the backbone is ready to set up.

In setting up, the waterline should be marked where it crosses the keel and it is placed so that a line stretched between these points will be perfectly level.

This is done so that when the molds are set on they may be plumbed up and will set as shown on the lines in relation to the rest of the boat.

The keel should be well braced to the floor and the stem and sternboard to something overhead to allow room to work around.

The molds are next set in place and fastened to the keel and well braced with cross braces overhead.

They should be plumbed up true and a centerline stretched from stem to stern and the molds carefully centered to this line.

They should also be tied together on top from one to the other to keep the outside ends from moving forward or aft.

The next step will be to mark out for the sheer strake and the bilge clamp. The simplest way is to draw a parallel line the proper thickness, ⅞ inch, for the sheer strake and 1¼ inches for the bilge log—along the side of the mold.

When starting amidships mark off the proper height along this line—7½ inches for the bilge clamp and 6 inches for the sheer strake. A mark is made on the forward and after mold the proper height (given on the plans), this being measured on the pencil line and not the edge of the mold. The long batten is then used to draw a fair line, making the mark on each mold. This line should be made fair and easy, as it will be impossible to make any sharp bends in these heavy planks. In fact, it will be a good job to get them in place, but once they are there they will make a job that cannot be beaten for strength. It is impossible to fasten them too strongly at the ends, so take time and do this job thoroughly.

It is not necessary to finish off the lower edge of the bilge clamp nor the upper edge of the sheer strake until they are in place, but the other edges should be done before they are put in.

The position of the frame is then found from the keel, squared across and marked on the inside of the bilge clamp and sheer strake. It is not necessary to mark both sides, either the forward or after one being sufficient.

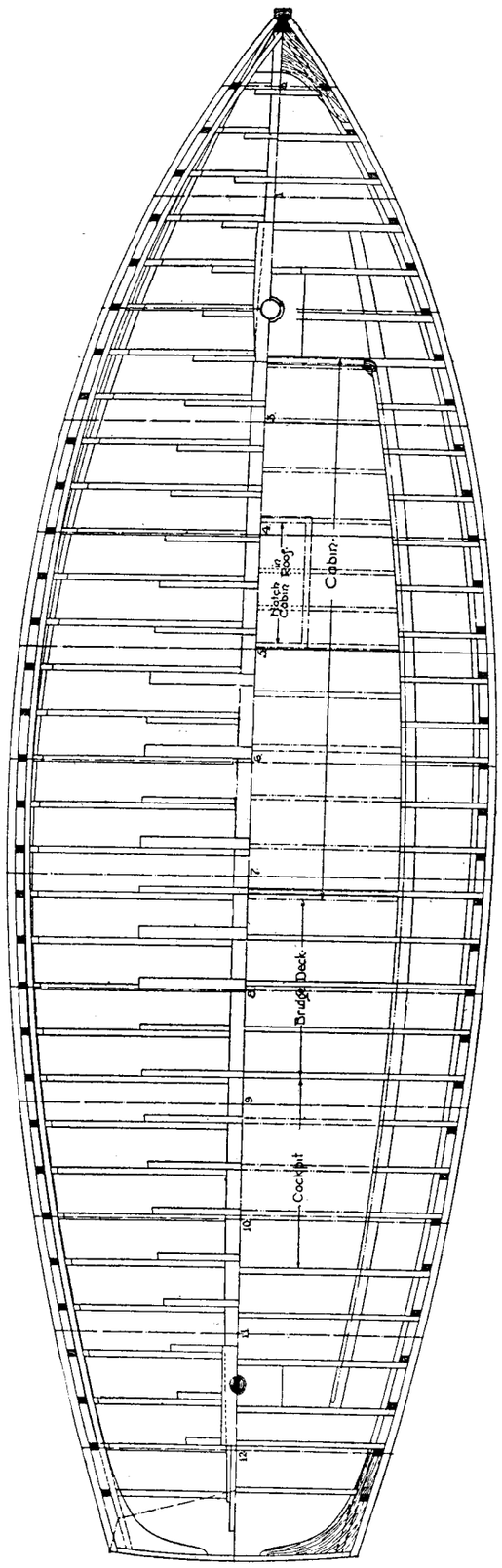
Now comes a job which is not difficult, but should be carefully done—that of fitting the side frames. The notches should be cut so that they fit nicely around sheer strake and bilge clamp, and the outside face should come just flush. If it projects beyond it should be planed off even at this stage and not wait until you start planking.

The side frames are then fastened to the sheer strake with a large wood screw. After the inside clamp has been put in, a bolt should be put through all three members.

At the bottom they are fastened to the bilge clamp with a bolt and large wood screw.

The underside of the bilge clamp is beveled off even with the bottom of the molds. Aft it is carried right out even but forward it is worked out as shown in the No. 1 construction section.

The bottom frames can now be put in. The heels are beveled off to fit the notch in the keel and at the outboard end they fit against the side frames as shown. At the heels a single nail is driven up through into the keel and where they join the side ones they are fastened together with a 3/16 inch metal knee as shown.



Framing plan of Seagoer—yawl rig

The way to do this latter is to get all the frames in and then make a paper pattern for each one—on one side—and then have two made from each pattern—one for each side.

After these knees have been bolted to the frames the boat will then be ready to plank. The sides are held, so we will start on the bottom. The first plank—the garboard—should be 8 or 9 inches wide amidships, tapering at bow and stern. The next plank is a little narrower and the next not as wide as the last. After this one the remaining space is divided up evenly amidships and at some frame near the bow and stern so as to make each plank fair and even.

Aft of course this planking will be easy, as it finishes out flush and there is plenty of room for fastening on the bilge clamp.

As these planks go forward beyond Station No. 3 a little care will have to be exercised in fitting the ends into the notch. However, with a little care this may be readily accomplished.

On the side planking the space between the bilge clamp and sheer strake is divided up evenly, as is also the space, say, on the first frame from the stem and from the sternboard. Also halfway between these points.

The planks are then laid out so that they fit around and run about uniformly all the way down, making a clean, workmanlike job.

The planking should be riveted to the frames, and now is the time to finish up this riveting. When it is done the molds may be taken out, but not before cross braces have been put in just below the sheer strake and braces put in overhead, keeping these latter just far enough in from the side so that they won't interfere with putting in the clamp.

Before putting in the clamp make a deck beam mold to the proper crown—on the underside of the mold so that when you fit it down it gives you the correct bevel for the sheer strake—and make sure that outer edge of the sheer strake is true and the sheer is correct as given in the plans.

After the sheer strake is beveled off to the crown take a short piece of wood the exact size of the deck beams and placing one end against the inside of the sheer strake, with the top even and at about the same angle as the crown, mark the underside on, say, every third or fourth frame. A mark is made ½ inch above this and it is to this latter mark the top of the clamp will come.

Every other frame is notched over the clamp while the clamp is notched out for the ones between. This ties the boat both ways—fore-'n'-aft and sideways.

As told previously, this clamp is bolted through the frames and sheer strake.

The clamp should run the full length and finish against the stem and sternboard. In the event of a jar on either end, it is distributed throughout the boat and little damage done.

The next step should be to get the engine bed in and lined up. If it is possible, have the engine on hand at this stage to set it and have everything lined up true, as it will be rather awkward after the bridge deck beams are in.

No arrangement is shown for getting in the beds and installing the engine as this will vary somewhat according to the type and size of engine selected.

A breast hook is fitted between the clamp forward and the space between the latter and the sheer strake blocked out solid and the whole through-bolted. An additional one is fitted inside the sheer strakes, on top of the clamps, the top even with the former to afford a landing place for the deck forward and as an additional tie.

A stern knee is put in aft, as shown, fitted against the sheer strake, over the last frame and is fastened through both and to the sternboard.

The deck beams are next put in and fastened in position. These are sawed to shape, of the sizes shown on the plans, and are put in starting forward.

In the way of the mast a block is fitted, as shown, and the mast hole is cut through this. The deck beam which lands on the middle of this block is the regular size but the ones at the forward and after ends are at least ½ inch heavier in width—the same depth, as are also the ones forward of the bitt, at the forward and after ends of the cabin and at the after end of the bridge deck and the cockpit and forward and aft of the mizzen mast.

When the forward deck beams are put in aft to the cabin, and the bridge and after deck beams are in place and all securely fastened, the deck stringer, shown on the construction sections, the inner edge of which is flush with the inside of the cabin and of the size as indicated, is put in. This stringer, however, may be tapered forward and aft of the house.

It starts at the deck beam forward of the foremast and carries aft to the after side of the jigger.

The stringer is sprung around to the shape shown and the inner edge of it is flush with the inside of the house and cockpit coaming. It is fastened to the beams forward of the house, the bridge deck and the after deck and braced between these places while the rest of the deck beams are placed in position and fastened.

The cockpit floor beams are then put in and the cockpit finished up, the floor laid and the sides and ends completed. In the forward end of the cockpit it will be a good plan to insert a couple of dead lights, either round or rectangular, well set in white lead and made perfectly watertight, for light around the engine.

The main deck is then laid. If it is to be finished bright it should be laid in narrow widths, not over 1½ inches, and carried around the shape of the side of the boat.

For service and a plain tight job it is just as well to cover the deck with canvas. If this is done, tongue-and-groove pine may be used not over 2½ or 3 inches wide and laid straight—parallel with the centerline of the boat.

The canvas finishes out to, and is covered by, the top rail, which holds and protects it from being torn.

On the inside it is lapped over the house opening and when the sides and ends of the house are in position it is turned up on the inside, about 1½ inches high and tacked all around.

This is finally covered over with the ½ inch facing strip, shown on the sections.

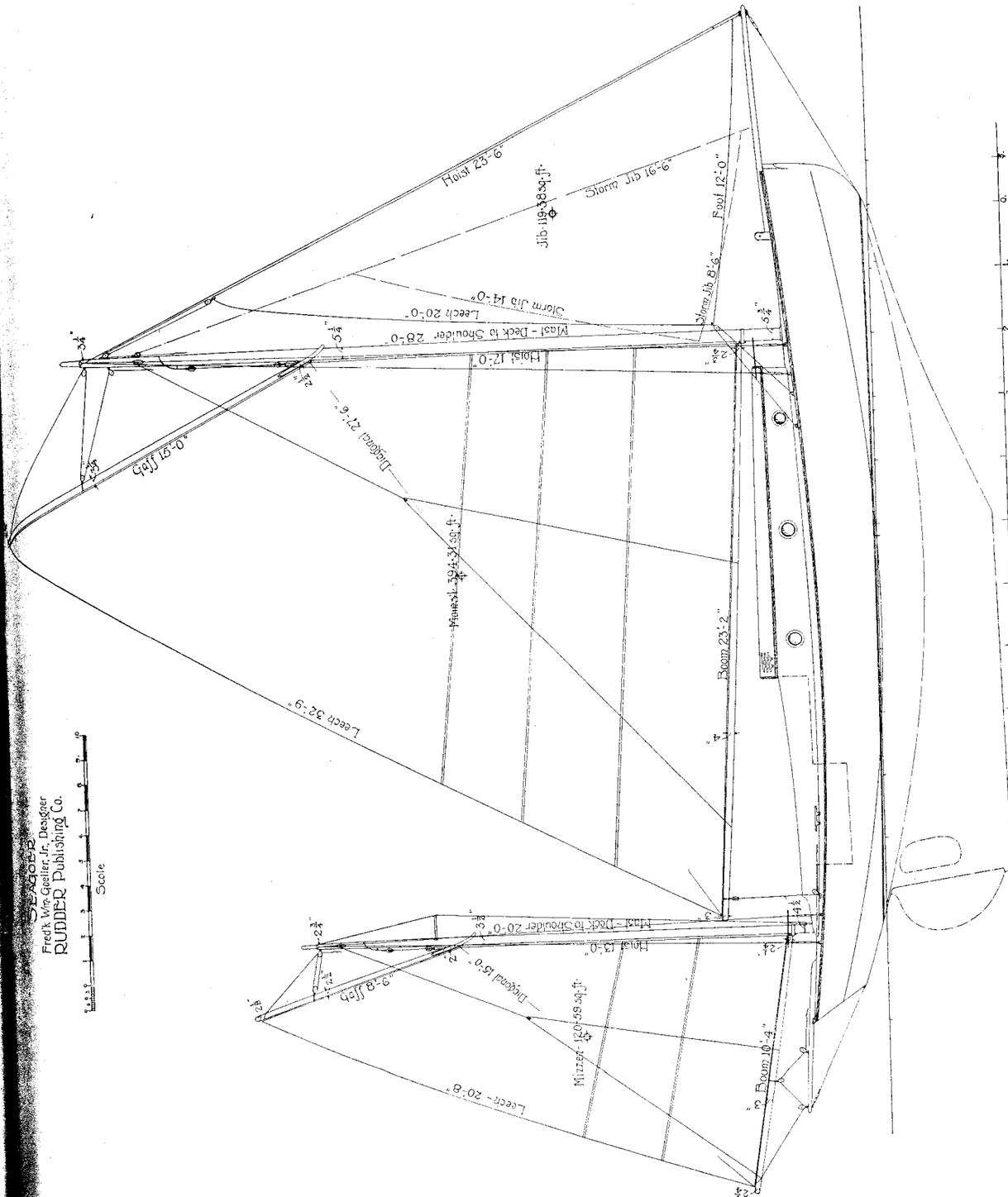
Around the mast openings it is all tacked down and should be covered either with a wooden or brass ring.

At the forward and after end of the cockpit it is turned down and covered with a facing strip with a flat cap across to protect the edge. Along the coaming in the way of the cockpit it is turned down and covered with a strip to match the rest.

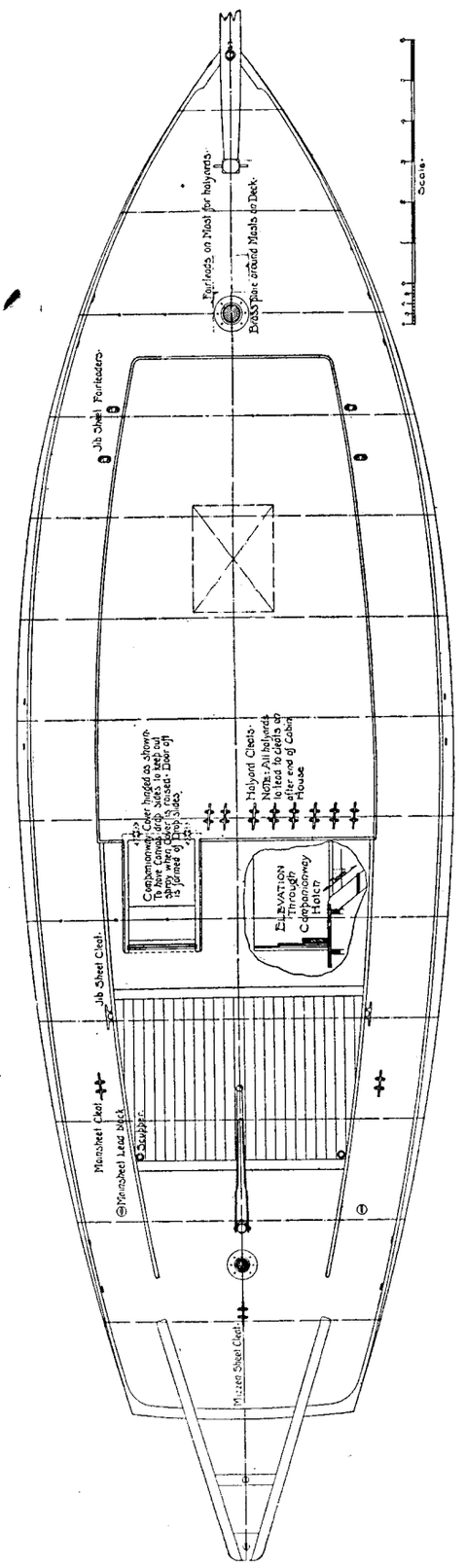
It of course goes across the bridge deck and is finished around the companionway opening exactly as the main house was done.

The sides of the house are one solid piece each, bent slightly, as shown, and carried aft to form the cockpit coamings. The forward end is solid and is carried square across.

SAIL PLAN SEAGOER



The yawl rig for Seagoer. When ordering sails give the sailmaker the gaff and boom dimensions as shown (not forgetting the diagonal dimensions of the main and mizzen) and let him make the proper allowances for the sails. Mention specifically that the dimensions given are *spar* dimensions



Deck plan of Seagoer with the yawl rig

There are two shallow drop doors on either end of the house placed high, as shown, to afford the ventilation for the house. These doors, forward, are as wide as possible, starting, say, 3 inches from either side with a 3 or 4 inch solid roof support between. Aft, of course, it will only be possible to have one on account of the companionway, but this should be made as wide as possible.

All these flaps are hinged on the bottom and should have a rest so that they remain horizontal when open. This, so that in the event of a wave boarding the ship it will lift and close it and prevent any water from entering.

The next step is one which is one of the particular features of this boat.

It is making the cabin absolutely water-tight even in the worst weather and getting good ventilation at the same time.

This scheme has been submitted to a great many experienced people, one of whom is chief engineer of a large steamship company, and we have yet to meet or hear from anyone who does not approve of it.

The whole scheme is simply a double roof with a 6 inch air space between with a large hatch in the lower one. This hatch is lifted up and shoved to one side and the ports and the ends of the cabin being opened, create a draught which draws the air up through the hatch. Even in the event of having to close the forward one the after one may be left open and the same result accomplished.

It may seem like a very difficult task to do this, but if the following instructions are carefully followed all that will be required are the necessary materials and a little patience.

All of the deck beams are crowned the same so the material required will all be 6 inches wide. The crown is marked on the top and bottom—making either end the same height—and the length of each beam marked. In the way of the mainmast on the schooner the deck beams are considerably heavier, but of course with the yawl rig where there are no masts going through the cabin they are all the same.

The lightening holes are then cut out (see the construction sections) and the beams may be fastened in position, that is, all except those in the way of the hatch. The ones at the forward and after ends are put in and the hatch coaming built in. After this the intermediate ones are put in and fitted to the coaming.

The hatch cover should be made at this stage and fitted carefully as it will be too late after the roof is on.

The partner blocks are put in between the heavy beams and the hole cut for the mast.

Then take some copper wire netting and tack it up against the underside of the house beams, after which a light sheathing, say ¼ inch or ⅜ inch thick, tongue-and-groove pine is nailed up under it. This will make the interior of the cabin roof absolutely smooth with no beams or projections to knock your head against.

Next take some good varnish and give the netting several coats of it, letting each coat dry first before applying the next, until the openings in the netting are all closed up. This will make an absolutely watertight job and in the event of any water getting into the space between the double roofs, it won't leak down into the cabin.

The corners, down against the cabin side, should be well filled up and a small scupper cut in each beam to allow any water to run through. Then a very small hole may be bored in the ends of the house to allow for its escape.

The hatch and partners being all finished up, the ees, as shown in the way of the mast, against the tner and the side of the house, are then put in.

There should also be two hanging ees, as shown in the section, on each e against the side of the house, one der each heavy beam in the way of mast.

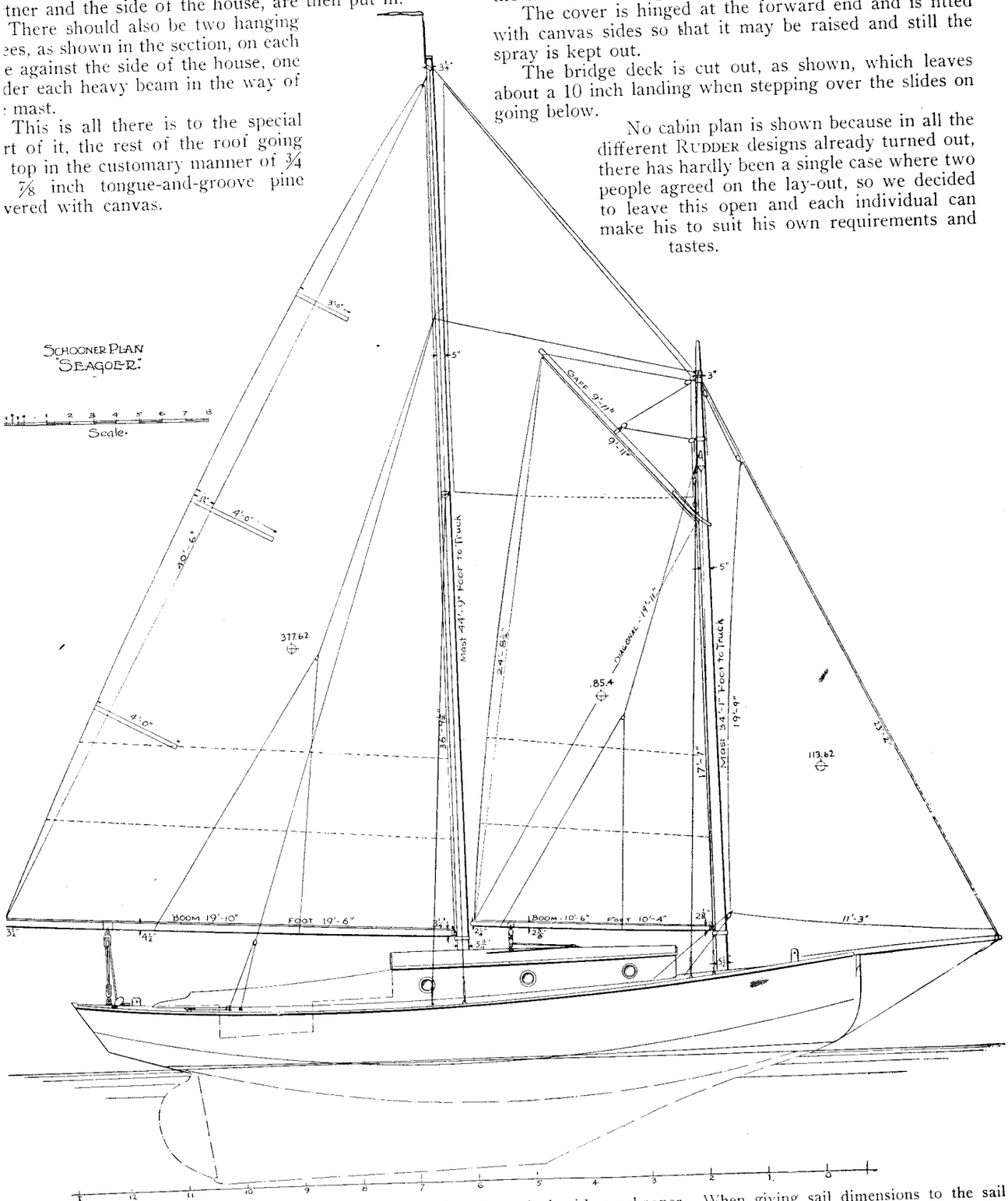
This is all there is to the special rt of it, the rest of the roof going top in the customary manner of ¾ ⅞ inch tongue-and-groove pine vered with canvas.

The companionway hatch is also an interesting rig. The sides are built out as shown on the deck plan and the end has the drop slides indicated.

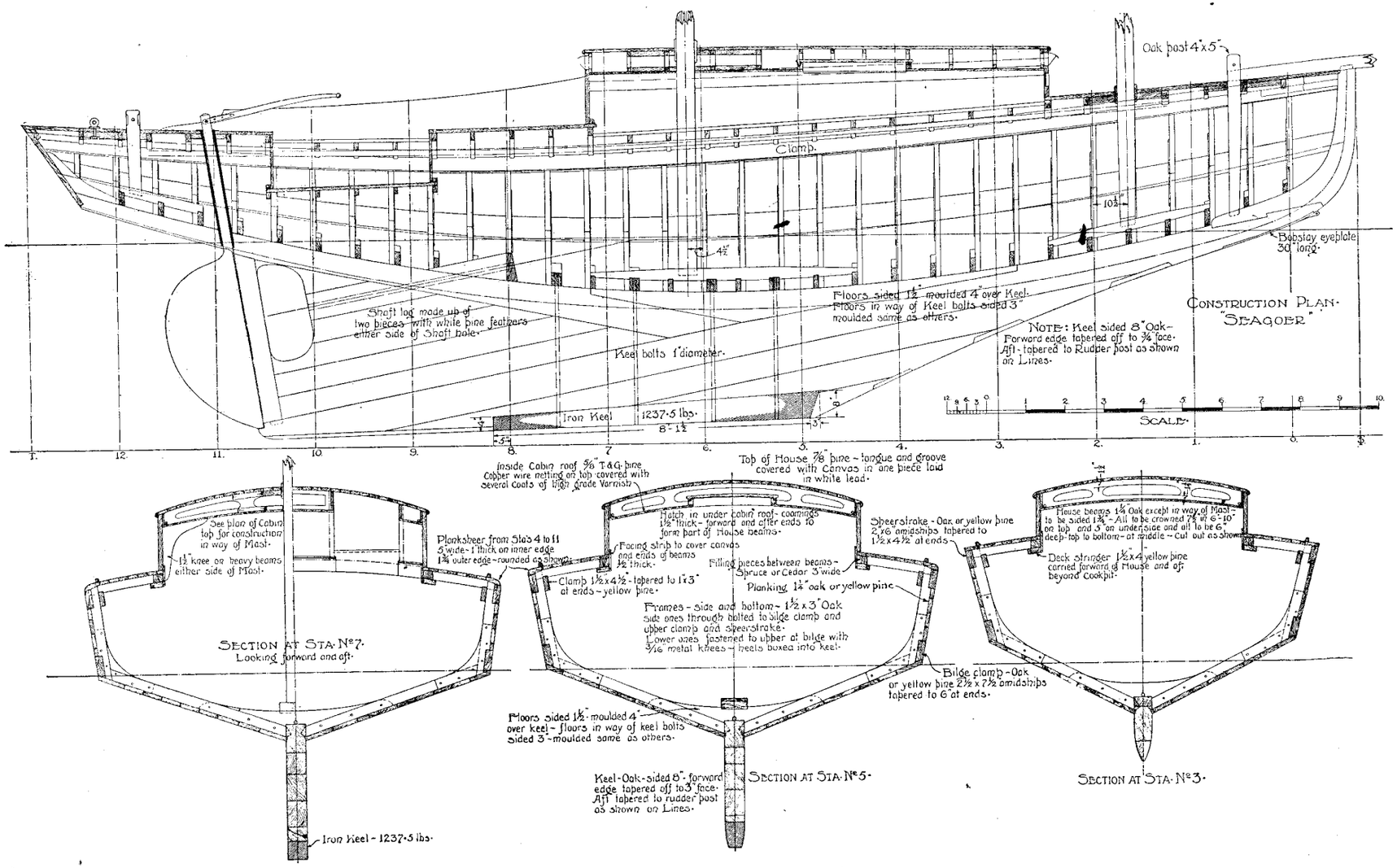
The cover is hinged at the forward end and is fitted with canvas sides so that it may be raised and still the spray is kept out.

The bridge deck is cut out, as shown, which leaves about a 10 inch landing when stepping over the slides on going below.

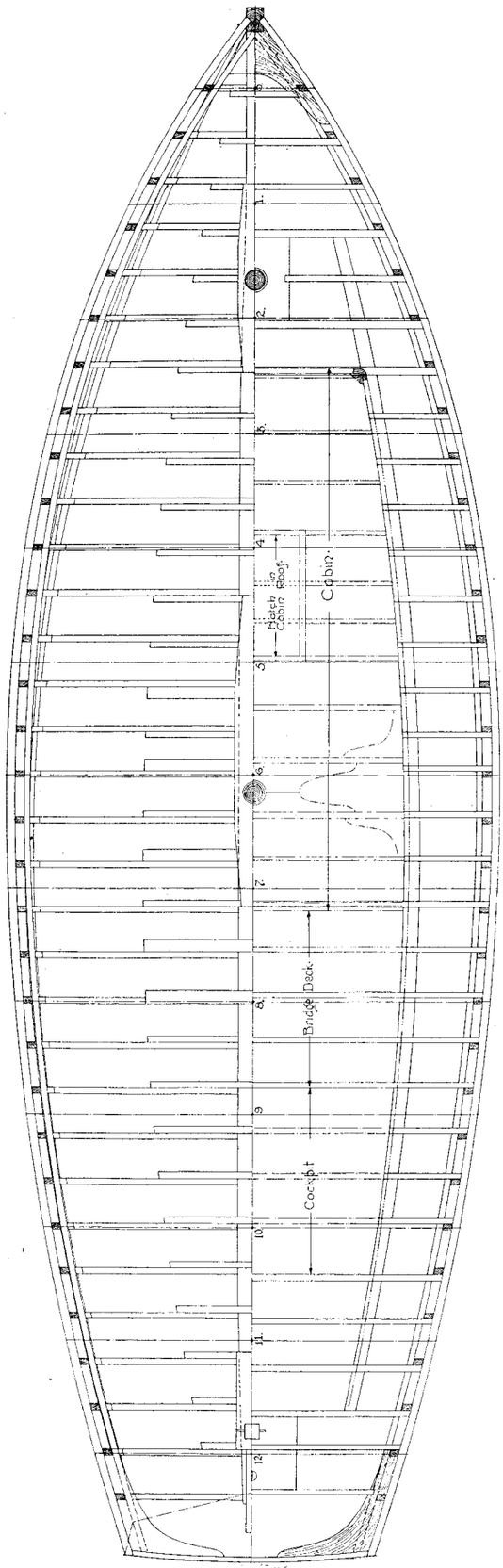
No cabin plan is shown because in all the different RUDDER designs already turned out, there has hardly been a single case where two people agreed on the lay-out, so we decided to leave this open and each individual can make his to suit his own requirements and tastes.

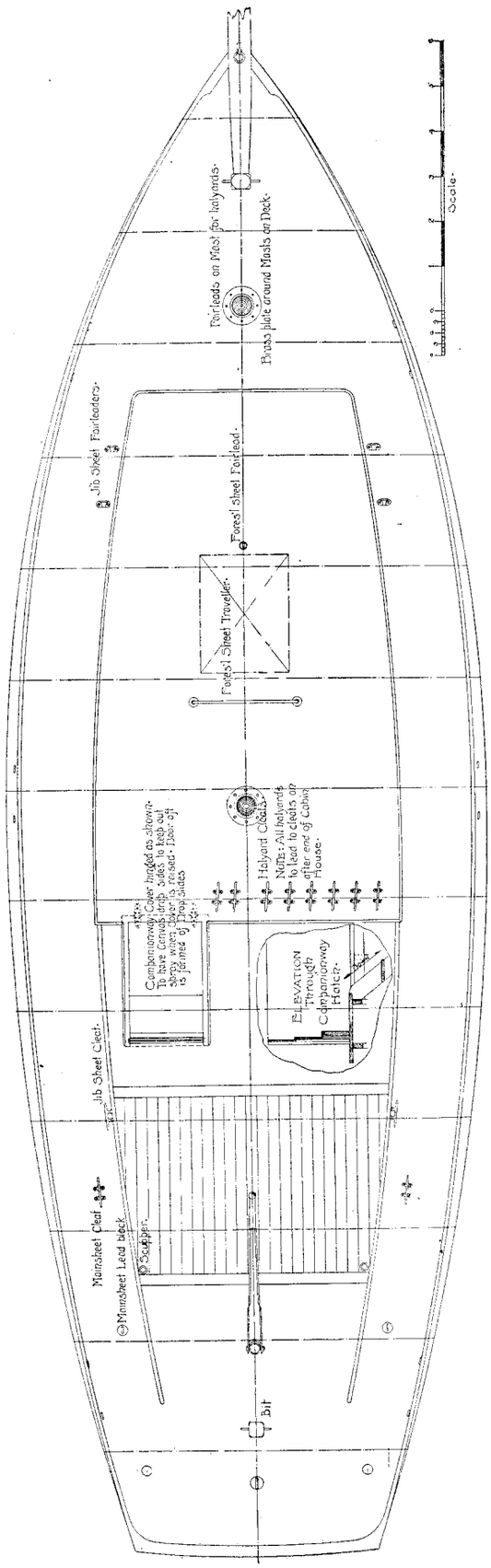


Schooner sail plan for Seagoer. The boat will handle well with this rig but if maximum speed and windward ability is desired the builder had better use the original yawl rig. In a 27 foot waterline boat the schooner rig will never equal the yawl or sloop for efficiency, but it is true that more sail combinations can be had with a schooner. When giving sail dimensions to the sail maker give him the spar dimensions of the fore and main so that he can make proper allowances. The sails should be sufficiently short of the spars when new so that they may have room to stretch out later on



Construction drawings for Seagoer with the schooner rig





Framing and deck plans of Seagoer with schooner rig

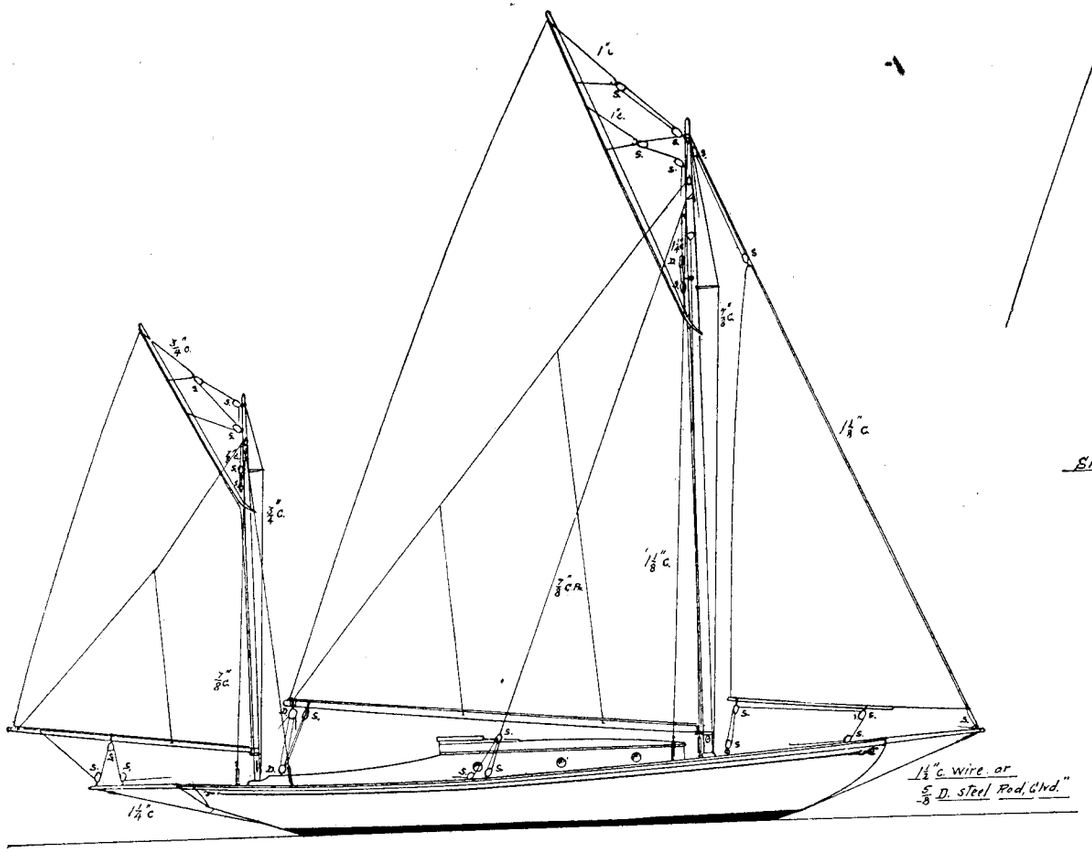


Fig. 1.
"Rigging Plan. 25ft. W.L. Yawl."

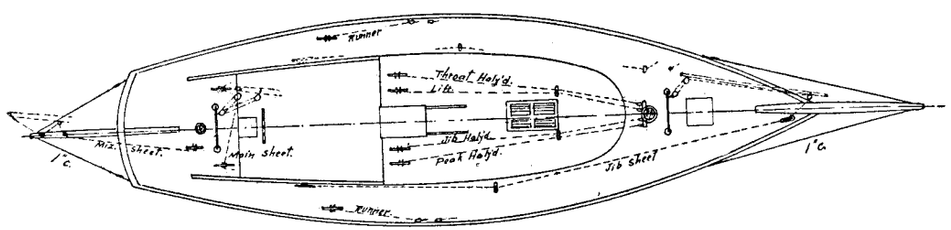


Fig. 2.
"Deck Plan, with Sheet and Halyard Leads."

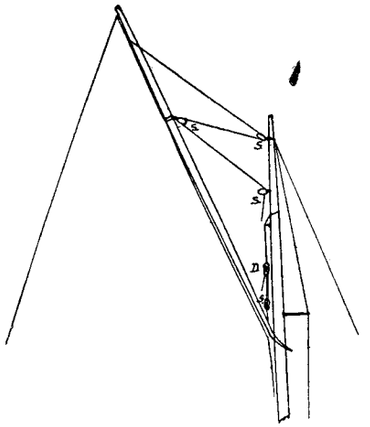


Fig. 3.
Simple Peak Halyard Lead.

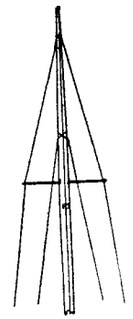


Fig. 4.
Mast Head Plan.

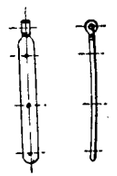


Fig. 5.
Correct form of Chain Plate.

"Standing Rigging"

Jib Stay.	1⅛"	Cir.	Steel Wire.	
Bob Stay.	1½"	"	"	or ⅝" Diam Steel Rod.
Main Shrouds.	1⅜"	"	"	
Miz'n. "	⅞"	"	"	
Boomkin Stay.	1½"	"	"	
Main Gaff Bridle	1"	"	"	Flex.
Miz'n. " "	¾"	"	"	"
Main Throat Pennant	1¼"	Cir.	Steel	Wire.
Miz'n " "	⅝"	"	"	"
Main Strut Stay.	⅞"	"	"	"
Miz'n. Strut Stay	¾"	"	"	"
Runners.	⅞"	"	"	" Flex.

"Running Rigging."

Main Halyards.	1⅛"	Cir.	Manila
Miz'n. "	1"	"	
Main Sheet	⅞"	"	
Miz'n "	⅛"	"	
Jib "	1"	"	
Jib Halyd.	⅛"	"	
Lifts. (main)	⅛"	"	(miz'n) 1" cir.
Jack stays	¾"	"	
Down Haul	¾"	"	
Runner sheets	1"	"	

R.M. Haddock. Del.
New Rochelle, N.Y.
Scale ⅜" = 1ft.

Typical yawl rig showing details. See opposite page for information on rigging a boat of this type. While these plans have no connection with those of Sea Bird or Seagoer, they are appended in the hope that some of the hints given may be useful in rigging the two boats described in this book

Rigging Plan for a Small Cruising Yawl

Typical yawl rig showing details. See opposite page for information on rigging a boat of this type. While these plans have no connection with those of Sea Bird or Seagoer, they are appended in the hope that some of the hints given may be useful in rigging the two boats described in this book

IN laying out the rigging plan for a cruising yawl of about 25 feet waterline, or for that matter of any size of boat, simplicity and consistent regard for strength of the different members, is always the keynote of a well-balanced design.

In shrouds and other standing rigging where turnbuckles are used, the weakest point usually develops in the threads of the buckle screws. It is useless to use a heavy shroud or stay if the turnbuckles, as is frequently the case, are too small and light, on the ground of neatness of appearance. This is especially true with racing craft where everything makes for lightness and reduction of windage aloft.

While this is an all-important item for these boats, it is not at all needful or even desirable in a cruiser. As a matter of fact, the use of slightly larger dimensions of standing rigging than are absolutely necessary to withstand the stresses, gives an air of solidity and strength, that is more pleasing to the eye and in keeping with dimensions of the spars themselves.

In threading the screws of the turnbuckles the diameter is reduced by double the depth of the thread, and this inside diameter is further weakened by the nicking of the threads, as it were, over what the strength would be if the diameter were that of a smooth rod. The loss is such that from 20 to 25% reduction in tensile strength results under these conditions. That is to say, with a tensile strength of 20 tons for the full size unthreaded rod, one would only be safe in using 15 to 16 tons tensile strength, in calculating the stress on the diameter inside threads.

Taking, for example, a ⅜-inch diameter shroud of mild steel, the breaking stress is about 2.25 tons. With a factor of safety of 6 the safe working load would be .37 ton. The safe working load for a ⅜-inch iron bolt —as given by "Mackrow"—is .15 ton, and a 9/16-inch —outside diameter—thread in a turnbuckle would be required to equal the strength of the ⅜-inch shroud. This calculation is for wrought iron of about 20 tons tensile strength, but with steel of abou. 26 tons tensile strength ½-inch diameter would be sufficient.

Manganese bronze is about the same tensile strength as the steel generally used in making turnbuckle threads, Tobin bronze about 30% stronger, and phosphor bronze about the same as iron.

A very frequent cause of breakage in the lower screw thread of turnbuckles is due to a lack of play in a thwartship direction. The chain-plate standing fore-and-aft, and the clevis of the buckle screw being a close fit and set up tight, a severe strain ensues when the mast head goes over under wind pressure—as witness the large amount of slack always found in the lee shrouds—even in moderate weather.

Eyes in chain-plates should stand athwartships—that is, so that the pins in the buckles stand fore-and-aft—to allow the buckle to readily adjust itself to the lead of the shroud under all conditions. Should the eyes stand fore-and-aft it is better to interpose a shackle between the buckle and plate.

All eyes in wire rigging should be spliced around thimbles, and the strands worked full of tallow or grease before parceling and serving. Dipping in melted tallow is a good plan to insure its penetrating to the core.

Eye splices for the mast head can be—and usually are in small work—sewed up in rawhide; but parceling, serving and painting is better treatment for the deck ends of standing rigging, as water running down tends to keep the splice always damp. After serving the grease should all be carefully removed by washing in gasoline before painting, and the paint worked well in around strands where they go under the serving. A good grade of yacht marline or hard laid cotton cording is best for serving and should be put on under considerable tension.

Undoubtedly the splice would last longer uncovered, but besides a poor appearance it tears hands and clothing on contact, as the ends of strands are always very sharp and cannot be tucked under.

For the running rigging a good grade of manila rope such as "Plymouth" is preferable for yacht use, and either 3 or 4-strand can be used. The 3-strand rope is more flexible than the 4-strand, rendering more easily especially when wet—a desirable feature when endeavoring to shorten sail in stormy weather. While 4-strand is smoother and will wear slightly longer, having more surface, it is apt to get very hard and stiff when wet.

A good quality rope should be light in color, have long yarns of a silky, oily fibre and be smooth and free from short fibre ends so common in cheap grades. Rope should be coiled down right-handed or with the hands of the clock, and should always be well dried out before stowing below. All ends should be whipped with sail twine or neatly pointed and sewed up with a hitch stitch.

Eye splices should be neatly made and tapered off, a whipping of twine being placed at the end of the last tucked strands, and close up to the eye of the thimble. It is better not to cover or serve the eyes in manila rope, as doing so tends to rot it.

All running gear should be reversed end for end at least once each season, as this adds greatly to the life of the rope.

In the matter of blocks the tendency is to select too small a size. As a rule when selecting blocks for a certain size manila rope, having found one that just fits snugly, take the next larger size.

Of late years, due to refinements and saving of weight and windage aloft, the old-fashioned lignumvitæ blocks with the patent or roller-bearing sheaves have almost disappeared from the rigs of yachts of under 60 feet overall length; a bronze block of small size and cast with very thin cheek pieces having come into general use. Some of the more expensively made kinds of these

blocks are very satisfactory, but the market is filled with a cheaply made product that gives poor service.

As a rule these metal blocks have plain pin sheaves with no bushings, and in many cases the pins themselves are cast one-half integral with each cheek and are seldom in alignment when put together. As the material itself is apt to vary in quality one pin wears faster than the other, thus throwing the sheave out of line after short use.

For the cruiser there is, happily, no need for such saving of weight, and the wooden block is much to be preferred, for with its roller-bearing sheaves it is practically frictionless, and by reversing the pins once in a while it will give as good service in the years to come as when new.

To the veteran sailor the sound of these patent sheaves clacking in their blocks—"Orators" we used to call them—as the racing fleet got ready to leave their moorings, was a joy forever. While today the same maneuver reminds one of a parrot's prayer-meeting.

The size of a wooden block is designated by the length of the shell or cheek in inches, and the unit is the circumference of the rope to be rove. Three and one-half times the circumference is the rule for hauling tackle such as halliards, sheets, etc. For example: For ⅜-inch diam. rope which is 1⅛-inch cir., multiply 1⅛ by 3½, which gives 3.93 inches, or a 4-inch block.

Proper sizes of standing rigging for the yawl under discussion in this article would be about as follows: Jibstay and main shrouds 1⅛-inch cir., bobstay 1½-inch cir., mizzen shrouds and main truss-stay ⅞ inch cir., boomkin-stay 1¼-inch cir., main gaff bridle 1-inch cir., mizzen gaff bridle ¾-inch cir., both flexible wire. Mizzen strut-stay ¾-inch cir., main throat pennant 1¼-inch cir., mizzen throat pennant ⅞-inch cir., and runners ⅞-inch cir., also flexible. Side stays to bowsprit and boomkin 1-inch cir. For the running rigging, all manila, main halliards, jib sheets, mizzen sheet and main lifts 1⅛-inch cir., mizzen halliards, jib halliards and mizzen lifts 1-inch cir., jib down-haul and jack stays ¾-inch cir., main-sheet 1½-inch cir., 1¼-inch would be sufficiently strong for this latter, but the larger size gives a better hauling grip on this much used sheet.

The crew in boats of this size being frequently short handed, it is very desirable to have the jib sheet so arranged that it is self-tending when beating, and that all halliards and lifts lead so as that they can easily be reached by the man at the wheel. To accomplish this there should be a traveler or horse for the jib—which also should have a club on the foot—and the sheet should lead aft along the deck to within easy reach of the helmsman.

The main and jib halliards lead through cheek blocks on the foot of the mast or swivel blocks attached to a saddle to cleats each side of the companion slide on the after end of the cabinhouse. In placing these cleats do not have them directly in line with the lead of the halliards, but turn the forward end outboard about 15 or 20°, which will greatly facilitate belaying. This also is true of jib-sheet cleats on side of coaming.

The main-sheet can either have one standing and one hauling part or both ends hauling parts. This latter permits of always trimming this sheet from the weather side on either tack.

The main-boom of a yawl should be from 15 to 20% heavier than that of a sloop of the same size, and the fullness carried well into the ends, as the strain coming only at the extremities of the spar tends to bow it upwards badly when trimmed down hard, spoiling the set of the sail—in many cases permanently—for fine windward work, and the average yawl certainly needs all the advantage it can get on this point of sailing.

If the gaffs of the main and mizzen sails are long and rather light it is better to use the bridles as shown in the rigging plan, Fig. 1. If they are shorter and heavier the more simple lead, as shown in Fig. 3, will answer equally as well.

Likewise if the masts are sufficiently stout and well proportioned the truss-stays can be dispensed with.

The main and jib halyards and one lift are brought aft over the house roof as shown and the other lift belays on a cleat at the foot of the spar, or on a pin if a pinrail is fitted. The mizzen halyards belay on cleats or pins as the case may be at the foot of their spar, a gooseneck band in combination with belaying pins being a good fitting here.

Deck fairleaders are used to guide sheets and halliards clear of house sides, skylights, and other obstructions.

On the starboard side of deck plan, Fig. 2, is shown the lead for the self-tending jib sheet, and the lead for the conventional double head sheet is shown on the port side.

Hinged spreaders about 20 inches in length and a strut about 12 inches are shown on the main mast above the jaws of the gaff, and a strut only on the mizzen mast about 9 inches in length.

The main-sheet lead has one double and one single block on the boom and one double block on the traveler and belays cleats on each side of the same. If main-sheet with one standing and one hauling part is desired a double block on boom, with a becket, and a double block on the traveler is needed. The final part belaying on a cleat placed athwartships on the centerline, just aft of the steering gear housing. Cleats for the halliards lifts and sheets should be about 7 inches long at least, and that for the main-sheet 9 inches where two are used and 10 inches where only one. The hollow type of metal cleats is by far the best for all uses, and in placing cleats see that there is plenty of room to belay quickly without danger of skinned knuckles and jammed fingers. In placing cleats and hauling parts always think of the poor user and "have a heart."

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