WOODWORKING FOR BEGINNERS

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A Manual for Amateurs

BY

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"Know what thou canst work at and work at it like a Hercules."

CARLYLE.

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Cover the deck with canvas, fastened with small tacks to the coaming and to the sides. The edges of the canvas can be drawn down over the gunwale for about half an inch, the edge being finally covered by a gunwale strip screwed from stem- to stern-post. A piece of half-round $\frac{3}{8}''$ moulding is good, although any small strip will do. Dampen the canvas and then give it at least two coats of paint. A wooden deck can be put on if preferred.

Canvas-covered Canoes.—To make a really good canoe wholly of wood requires a degree of skill much greater than can be expected of the beginner, or than is attained by the average amateur. Any boy or amateur can, however, with the help of canvas and with a very few tools and at slight expense, make some simple varieties which will serve the purpose satisfactorily. The canoe is sharp at both ends, requires only a paddle, and is light enough to be easily handled ashore. If carefully made, a canvas canoe will be strong, durable, and not difficult to mend, though repairs are seldom necessary if proper care is taken. If canvas of good quality is used, it will not be easily punctured or torn as one might think, but will stand an amount of banging around, running into snags, dragging over obstacles, and abuse generally, that would badly injure any but the best of wooden canoes.

The variety of designs for canoes which has developed or been evolved from the more primitive forms is in these days almost endless, and the number of types from which to choose is confusing. The purpose for which the canoe is to be used will help you somewhat in selecting the type —whether for paddling only, or sailing, or for cruising and general use, and whether for a river or small pond, or for the deep and rough water of a lake or bay. All these matters must be considered in determining the beam, depth, shape of the midship section, the draught, degree of sheer,

whether to have keel, centre-board, or neither, and other points. This is too complex a subject to be treated in a hand-book on wood-working, and you can easily obtain the desired information, as well as detailed instructions for drawing the plans, from some good book on the subject.

A caution against making the framework too light and without sufficient stiffness may not be out of place. One frequently sees canoes, made by young boys, of such flimsy pieces and covered with such weak cloth that one is surprised that they can live in the quietest mill-pond, which is really testimony to the tenacious strength of a canvas-covered boat when properly made. A certain degree of flexibility is one of the desirable features of these boats, but they should always have sufficient stiffness to maintain their general shape in all weathers and in all waters to which a canoe is suited; therefore be sure to make a frame which will keep its shape of itself without relying upon the canvas to hold it together.

It is quite common to see these boats which (otherwise well built) lack stiffness lengthways—that is, in the longitudinal vertical section. Such boats after a little use become bent up in the middle, or "hog-backed." This is entirely unnecessary. Be sure, before putting on the canvas, that your frame is stiff enough lengthways to keep its shape permanently. If by any fault in your planning you find that it is not so, be sure to add extra stiffening braces inside before putting on the canvas, or your boat will probably be a failure.[1]

[1] Unless too heavily loaded, a canvas-covered canoe will float in case of a capsize, but some form of air-chambers is desirable and a safe precaution in any small boat. It is hardly safe to rely upon your ability to build water-tight compartments in the ends of canvas (or wooden) boats, as is sometimes recommended—that is, as a part of the regular construction of the boat. It is not easy for an amateur to do this. It is better to have the air-tight compart-

Canvas-covered boats should always be kept out of the water and under cover when not in use, as long-continued exposure to the water will be injurious.

An easily constructed paddling canoe, 14′ or 15′ long, and with beam about 30″, will first be described.

It should be understood by the novice that this first form of construction here given is not that adopted by the professional boat-builder. It is given simply as a process by which one untrained in the more regular methods of construction can turn out a cheap and serviceable canoe, and at the same time acquire experience which will be of use if he should later attempt the more scientific, but also more difficult, details of construction used by regular boat-builders.

Before beginning work read carefully *Marking*, *Rule*, *Square*, *Saw*, *Plane*, *Nailing*, *Painting*, in Part V., and look up any other references.

Care should be taken to select clear, straight-grained stock, free from knots, checks, and other defects, and thoroughly dry.

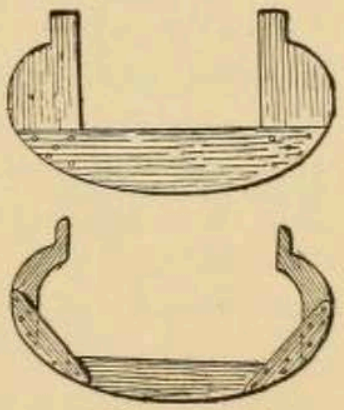

FIG. 433.

Having made your working drawings for a canoe of the size and proportions which you may think best to adopt, begin the actual work by getting out moulds (Fig. 433) upon exactly the same principle as in the case of the flat-bottomed canoe just described, except that they will be of curved outline, as this is to be a round-bottomed

ments made separately and independent of the boat itself. Copper boxes or air-tanks fitted to the space at the ends are the best and the only really reliable expedient, but they are expensive. Light wooden boxes covered with canvas and thoroughly painted can be used, as well as galvanised boxes or even varnish cans sealed and painted. Any such contrivance can be made tight at first, but is always liable to become leaky (except by the use of copper tanks), particularly as it is usually concealed from examination.

boat. Get out also a bottom strip or keelson with stem- and stern-pieces, which can be alike.

The arrangement and method of fitting these parts is evident from the illustrations. The keelson can be laid along the edge of a plank or some flat surface and blocked up towards the ends to give the desired degree of curvature or rocker. First fit in place the centre mould and then the two at the ends of the well-hole (Fig. 434), with the stem- and stern-posts (Fig. 435). These can be temporarily tacked or stayed in place until you are sure the positions are right. The coaming frame or wash board around the well-hole can now be put on, which will hold the three middle frames securely, and the two deck-strips running lengthways from the well-coaming to the tops of the stem- and stern-posts can be attached (Fig. 435). Next fit the two gunwale-strips, putting in also the remaining moulds or frames. After this the lengthways ribbands are to be fitted around the moulds from bow to stern (Figs. 435 and 435a, showing section at end of well). This will complete the shape of the boat.

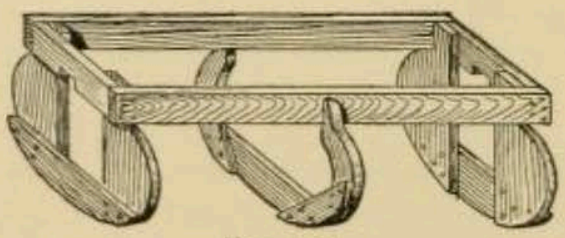

FIG. 434.

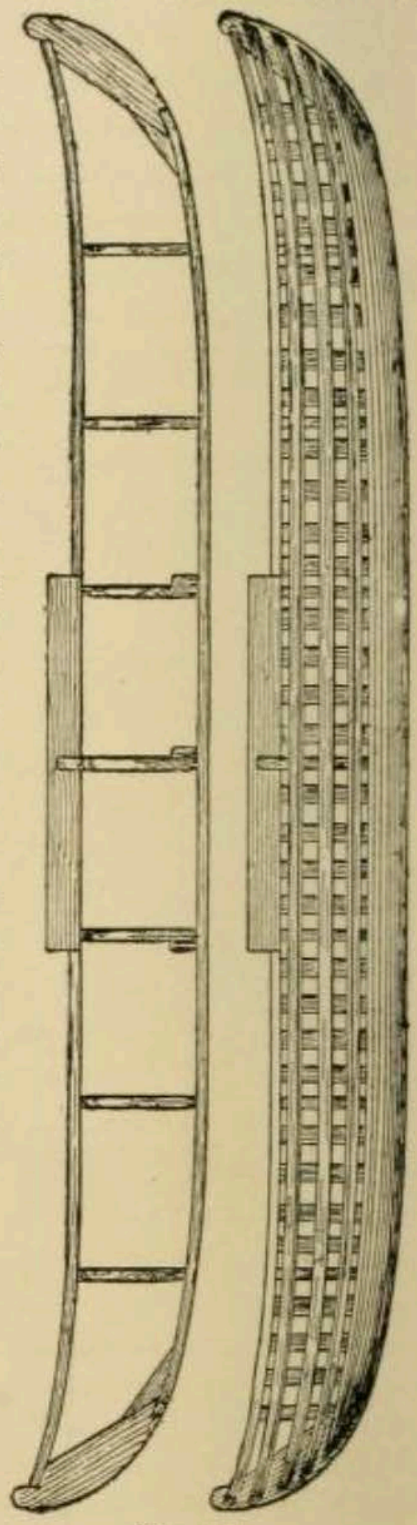

FIG. 435.

Great care must be taken with all this adjusting of the framework, measuring, sighting, and testing in every way you can think of, to see that all the curves are "fair," without sharp or irregular turns, and also to see that both sides of the boat are alike. This is very important. The pieces may be all of the correct lengths, but still the boat may be one-sided, or twisted, or have a list.

A glance at Fig. 436 will show (as an exaggerated example)

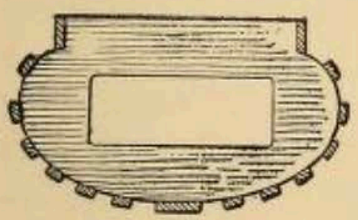

FIG. 435a.

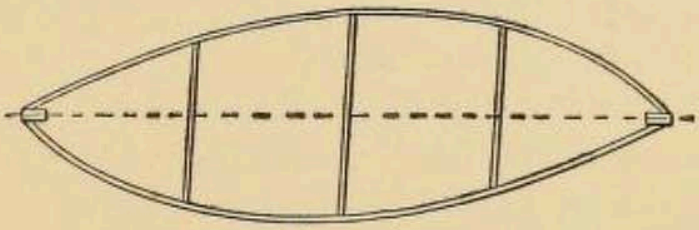

FIG. 436.

that pieces of the right dimensions can easily be put together in such a way that the boat may be ill-shaped,—an unfortunate result which is sometimes seen in home-made boats, due to lack of care in testing the angles and curves when putting the work together.

The ends of these strips will be more securely fastened to the stem- and stern-posts if depressions or "gains" are cut in the posts to receive them (Fig. 437), but this is not absolutely necessary if the ends are properly bevelled and carefully screwed to the stem- and stern-posts.

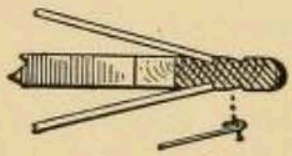

FIG. 437.

For additional stiffness, insert a series of ribs (Fig. 435), from 3″ to 6″ apart, according to their size and stiffness, from bow to stern. Barrel-hooping can be used and if sound is excellent, or strips of ash, oak, or elm, about $\frac{3}{8}$″ x $\frac{1}{4}$″, can be used. It will not be necessary to bend these around a form. Those near the middle can be at once bent into place. As the ends of the boat are approached, the ribs will require to be rendered more pliable before being put in place (see *Bending Wood*). The ribs can be nailed or screwed to the keel and finally be fastened to the rib-

bands, at their intersection, with copper nails clinched or riveted. Cheaper fastenings can be used, however, but copper is the best.

To hold such pieces in place temporarily, clamps can be easily made which will be sufficiently strong for the purpose (see Fig. 548).

When all these parts are fastened together, the frame will be complete.

To make a first-class job, the entire frame should be thoroughly painted, or at least given a soaking coat of oil, or it can be varnished.

For the canvas, get firm, closely-woven duck or sail-cloth of good quality and of sufficient width to reach from gunwale to gunwale. It is not necessary or advantageous to get the heaviest-weight grade, but beware of covering your boat with light drilling or the like, which, although you can make it water-tight, will not be sufficiently durable for anything but a boat for temporary use.

Find the middle of the canvas, lengthways, and stretch it on this line directly along the keel, the frame of the boat being placed bottom up. Tack at each end, and then, starting at the middle, strain the canvas around the boat, working along a little way at a time towards each end alternately and tacking to the top or inside of the gunwale as you proceed. Do not try to cover the top with the same piece as the bottom. If you can get a large needle and some stout cord, you can pull the canvas into place by lacing the edges across the top or deck of the boat, working from the middle towards the ends. In lieu of a needle use an awl or a nail. By lacing in this way and by manipulating the canvas with the hands you can, if you are careful, stretch it to fit the frame so that it will be smooth to a point considerably above the water-line. At the upper part, as you approach the deck line or gunwale, you may be unable to prevent some fulness, which you can dispose of by pleating if necessary. At the ends some little folding under may also be required, but you need have no great difficulty in adjusting the canvas neatly and so as to make tight joints. It is a good plan to cut a shallow rabbet on

each side of the stem- and stern-posts, just deep enough so that when the edge of the canvas is folded under and tacked, the surface of the canvas will be flush with the side of the post (Fig. 437). Small tacks should be used—not large carpet-tacks. Copper are best, but galvanized ones can be used. In all parts where leakage could occur, the tacks should be driven closely together, so that their heads touch, seeing that a good coat of lead is laid on the wood underneath. After the bottom of the canoe has been covered, the deck can be treated in the same way.

When the canvas is all on, dampen it slightly and paint thoroughly, painting, also, the coaming around the well-hole and the exposed parts of the stem- and stern-posts (see *Painting*). The dampening is supposed to cause the first coat of paint to penetrate the canvas more thoroughly than if the canvas is quite dry. Oil is sometimes applied before painting. After it has dried thoroughly, apply another coat. Do not spare the paint, for though the canvas absorbs a great deal, which adds to the weight of the boat as well as to the cost, it is really essential in making a good canvas-covered boat that it be well painted.

A light removable flooring, or grating of slats, should be placed on the bottom of the well, resting on the frames.

To make a canvas canoe with a keel, you have only to make the keel of a piece of $1\frac{1}{4}''$ or $1\frac{1}{2}''$ stock (with a depth of, perhaps, $1\frac{1}{4}''$ or $1\frac{1}{2}''$), thinning it somewhat towards the ends so that it will join smoothly with the stem- and stern-posts. It can be fitted to these posts as shown in Fig. 438, and screwed directly to the keelson.

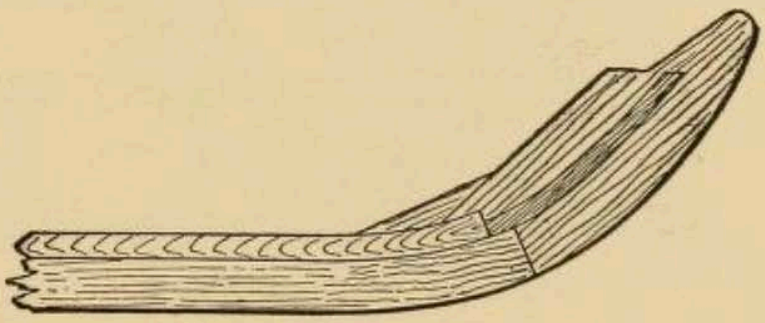

FIG. 438.

Particular care must be taken that the keel be got out straight and that it be fitted exactly on the centre line. In this case the canvas may be put on in two parts, being nailed to the keelson on each side of the keel; or the canoe can be made as previously described and the keel simply screwed on outside of the canvas, the latter being first thoroughly painted. Oak is excellent for a keel, but is rather heavy for a light canoe. Ash will do. Pine can be used. The keel will wear better if got out so that the concentric rings (annual rings) of the wood will be horizontal or parallel with the bottom of the boat and at right angles to the screws with which the keel is fastened on. If these layers incline slightly upward at the bow the keel will wear better.

A more advanced form of construction, and one more in line with the methods of a regular boat-builder, is shown in

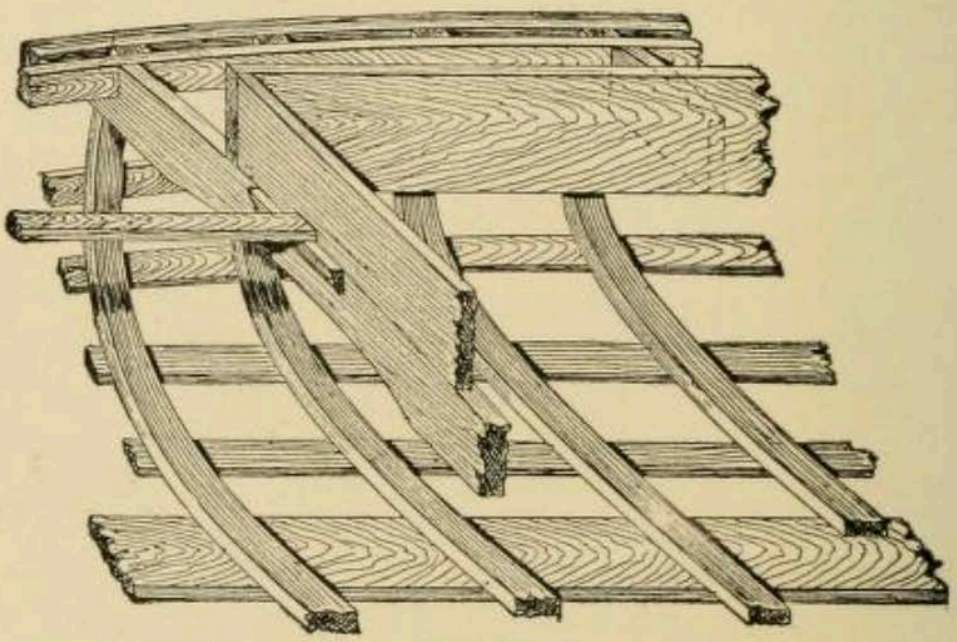

FIG. 439.

Fig. 439, the essential difference between this and the form previously described being that regular bent ribs are substituted for the frames made of board, and the latter, after serving as moulds around which to build the boat, are

taken out, the bent ribs being sufficiently stout to ensure strength and stiffness.

If you attempt this method the ribs must be carefully bent (see *Bending Wood*). Oak, ash, or elm is suitable for ribs. If a cooper's shop is within reach you can get the material there. It must, of course, be of good grain and free from flaws.

The process of construction is similar to that already shown. A suggestion for the arrangement of deck timbers (which can be of oak, ash, spruce, or any strong wood) is shown in Figs. 439 and 440, and for putting in a curved wash board or coaming in Fig. 440. For the latter a thin piece of straight-grained oak, elm, or ash can be used.

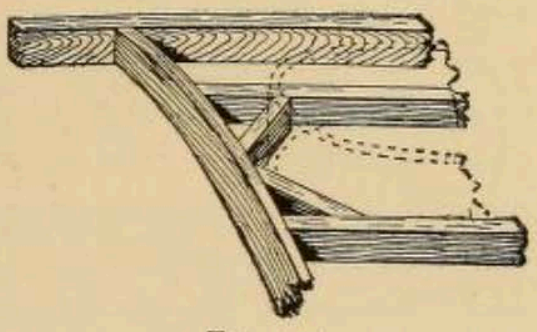

FIG. 440.

An excellent way to make a canvas-covered canoe is shown in Fig. 441. The essential principle of this consists in having a stiff gunwale, stiff keelson (inside the ribs), and ribs stout and numerous enough to ensure a permanently strong and stiff framework without the assistance of the lengthways ribbands. The outside is then sheathed with very thin strips of basswood, pine, or any reasonably strong and light wood (perhaps $\frac{3}{16}''$ thick and 2″ or 3″ wide), fitting them carefully to the shape, but without any attempt to make water-tight joints. If this boat, which is complete in all respects except that of being water-tight, is then covered with canvas as already described, the result will be a strong, smooth boat, without the irregularities of surface which are a necessary feature of the unsheathed form.

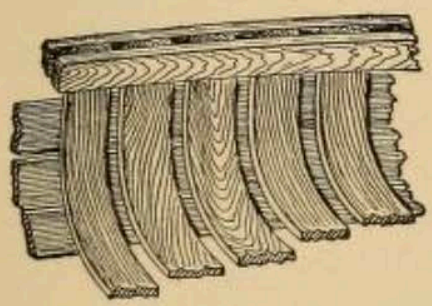

FIG. 441.

This method is adopted in making canvas-covered canoes after the model of the birch-bark canoe, and the result is an admirable boat, which, while perhaps hardly equal to a genuine "birch" of Indian manufacture, is certainly the next thing to it for an open paddling canoe. Of course, if you can work up your design after the model of a real birch, you will have accomplished as much as you could wish in this line—but to design and construct a good canoe upon the birch model is not an easy thing for the beginner to do, and had best not be attempted until after considerable experience in simpler and less graceful forms. This mode of construction can well be applied, however, to a canoe of almost any type. The sheathing can be painted and the canvas laid on the fresh paint.

Another form of construction is to omit the keelson and fasten the frames and ribs directly to the top of the keel, having previously cut a rabbet for the canvas (as in case of the stem- and stern-posts) on each side of the keel at the top; the canvas by this arrangement being put on in two parts, one on each side of the keel.

It is, of course, possible to construct a canoe with nothing but two gunwale-strips, stem- and stern-posts, a strip for a keelson, and a number of barrel-hoops for ribs; and such affairs are quite often put together by boys, but they are apt to be of light and flimsy construction and to lack sufficient stiffness to keep their shape after being used for a while. A certain degree of flexibility and lack of rigidity is desirable in a canvas-covered boat, and, in fact, it is to this quality that it owes much of its merit; but it should have enough stiffness to hold its general shape permanently.

An extremely simple method is to omit the stem-pieces and simply bend the keelson up at each end to meet the gunwales at bow and stern, where all the lengthways pieces

can be fastened to a block, canvas being stretched over the whole as already described. A canoe which turns up so excessively on the bottom at bow and stern has some disadvantages, but still a useful and cheap boat can readily be made in this way. It should have a quite flat cross-section in the middle.

Most canoes can be sailed on the wind, often very successfully, by having a deep keel—which can be rockered or increased in depth towards the middle—or by adding a centre-board. But the latter is quite a nice operation, particularly so in case of making your first boat (see page 330).

The holes and the steps for the masts should be arranged before the canvas is put on, fitting extra thwarts across if needed, and it is a good plan to fit tubes for the masts. In case of sailing, the steering can be done with the paddle, or a rudder can be used (in which case a straight stern-post should be put in, for which a knee is good) and lines be led forward to the well-hole from a yoke at the top of the rudder. Many arrangements have been devised for steering sailing-canoes, but these details, as well as those for the rigging, can be found in any good book on the subject. If you are a novice, begin with a simple leg-of-mutton sail (Fig. 448).

It is better to buy oars than to try to make them. You may, however, have occasion to make a paddle. A good shape is shown in Fig. 442, but you can choose from a variety of forms.

FIG. 442.

The length can readily be determined from some paddle which suits you or you can experiment with a strip of wood. Five inches is a good width, and 5′ to 5½′ a good length, but these are matters of individual preference. Spruce is a good wood for

your first attempt at paddle-making. It makes a good paddle and is easier to work than birch, beech, or maple, or any of the harder woods. Pine can be used. Use a centre line in making your pattern. After the pattern is marked on the wood have the outline sawed at a mill or do it yourself with the turning-saw, or make a series of saw-kerfs to the line with the hand-saw and remove the superfluous wood with the draw-knife, spokeshave, or chisel (see *Paring*). Having the outline correct, mark a line along the middle of the edge of the blade, and gradually and carefully shave the surfaces down towards this middle line, also tapering the thickness towards the ends. The draw-knife, spokeshave, plane, rasp, file, scraper, and sandpaper can be used (see all of these tools in Part V. and also *Paring* and *Rounding Sticks*). Great care is needed to trim a paddle nicely to shape. A little hasty cutting may ruin the work.

The double-bladed paddle can be made of a single piece, or two pieces can be joined by a ferrule (Fig. 443). The double-bladed paddle can be from about 7′ to 8′ or 9′ long and the blades are made broader and shorter than that of the single paddle. A couple of round rubber rings on each end of the handle will stop some of the dripping of water from the blades as they are raised.

FIG. 443.

Small Sail-boat.—The boat shown in Fig. 444 is a good form for the amateur to attempt, and makes a serviceable craft for sheltered waters. From twelve to sixteen feet is a good length, and the beam should be wide, as shown. The depth can be from twelve to sixteen inches.

Before beginning work read carefully *Marking*, *Rule*, *Square*, *Saw*, *Plane*, *Nailing*, in Part V., and look up any other references.

Care should be taken to select clear, straight-grained stock,