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Some Hints on Model Making

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LAST month in THE RUDDER we had some discourse about making half models, and emphasized the importance of correctness of shape in these objects, but even if the sole function of the half model is to give or describe shape, there is no reason why the full or two sided model should not be nearly as carefully made. One often sees rigged or exhibition models (which represent much painstaking work) that have wretchedly haped hulls, and this fact has made these models nearly worthless. This misrepresentation of shape in rigged models is not at all a peculiarity of modern times, for, sad to relate, most of the models made before 1600 were quite ridiculous, and this discrepancy alone is one of the chief difficulties in unraveling the history of naval architecture. However many of the models made in England, France and Holland between 1600 and 1800 seem to be quite correct in their shape.

Model making is so much akin to sculpture that when well done it is a higher means of expression than the arts which are all on one plane, like drawing or painting. There is no doubt that sculptured objects which cast a shadow and can be seen from hundreds of points of view require much more skill to make correctly. Perhaps there

have always been but few with sufficient sense of shape to produce things in three dimensions, and the trend of today is almost entirely toward planographic art. Yes, today there are hundreds of millions making or taking pictures. While Mr. Eastman has made it possible for millions to take pictures who could not make pictures, still putting the camera in the hands of millions, and millions into his hands, seem to have accomplished little toward a true appreciation of form. Now that each boy scout, stenographer and what-not creeps from park to park, and slinks from bush to bush with his candid camera, the whole effort seems to be to reduce form to one plane. And if it were not that some objects of art with form have been made, there would be little of interest to photograph beyond the works of nature.

But model making can be a true manifestation of art and one within the means of most all who have a sense of proportion, so as a pastime for the sailorman during the winter months it has always been popular. Perhaps there are few undertakings that will keep a man happily at home more than model making, and certainly there are few that will give him a better understanding of ship construction and the history of naval architecture, and none that will give him a higher appreciation of workmanship.

The reader may wonder why I have used so many words before giving some hints about model making, but the reason for it is that I would like to see amateur model making looked on as a more artistic endeavor than it is at present, and that can be done easily by being more careful with shapes.

One of the great mistakes of the amateur model maker is to attempt a more complicated model than is practicable. A model with complicated rig becomes very tiring before it is completed, and then it must be kept in a glass case or it most certainly will be damaged in dusting, moving, etc., so that it is much the best to make the hull only, as was done with many of the so called Admiralty models. If one likes complication he will find that by the time he has made all the deck erections, fittings, etc., properly to scale he will have done quite enough. For instance if one made a sloop of war of around 1800 with her complete battery of guns properly mounted, the deck fittings alone would be a winter's work, and while such a craft could be a nice thing to have, still much more fun could be had by making several boats like our Block Island boats, or the Chesapeake log canoes, or the bugeyes, for the beauty of hull form in itself would make these types interesting.

However almost all models of any size must be hollowed out. If it is to be a sailing model or a model to tow, it must be quite thin, but even the exhibition model must be hollowed out some or else it will crack or warp

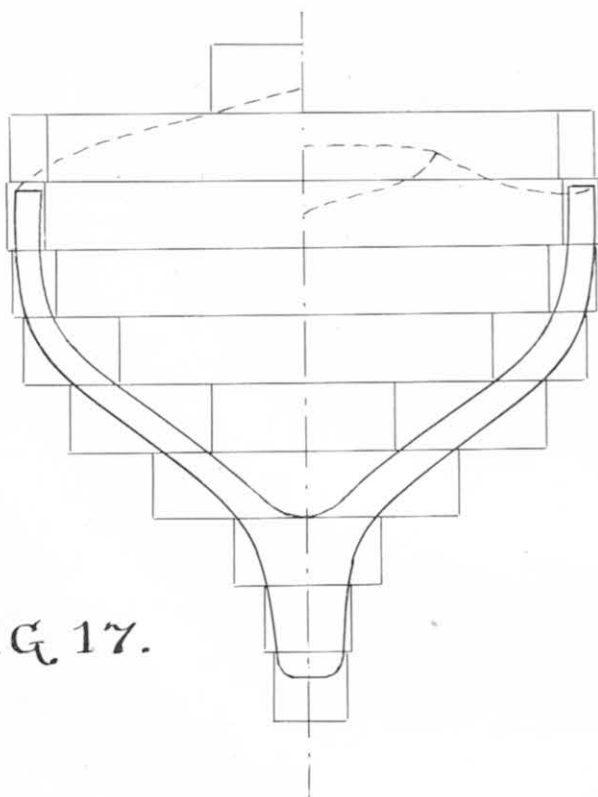


FIG. 17.

in a few years as the wood shrinks with age. So now we will consider the easiest ways to do the hollowing out. Previously most models were glued up of layers running horizontally, and this was generally known as the bread and butter system. The layers represented water lines, and thus were sawn out to the shape of the same. (See Figure 17.) This system had so many disadvantages that about 1920 I started gluing up models with the layers running vertically or on the buttock system. (See Figure 18.) Now many others are using this method of gluing up, for it has the six following advantages:

1. The layers may be sawn out on their inside as well as their outside, which cannot be done in the bread and butter system except with a jigsaw.
2. The layers may be clamped together much easier while gluing up, particularly if each half of the model is done separately.
3. The central seam makes a permanent center line that cannot be lost while paring down the profile.
4. The sheer line of the model can be sawn out on the layers, and the various port and starboard layers tested by laying them on the lines drawing and trimming down with a plane until perfectly correct, but acquiring the proper sheer line on both sides of a model glued up horizontally is quite difficult.
5. It is most convenient to hollow out both sides of the model separately before gluing the two sides together, for then one can use various gouges and round bottom planes in this work and cut down to an exact inside center line. Figure 19 shows a model hollowed out in this way as it appears after the two halves have been glued together.

6. When sawing out the layers or lifts of a model glued up on the buttock system, every other layer can usually be made from the piece sawn out of the second layer preceding. With the bread and butter system this seldom can be done.

There are many advantages to hollowing out the inside of a model before shaping up the outside, and this may be done perfectly well where there are several layers sawn out as guides to cut down to. (See Figure 20.) During this process the half can be held in the vise by a block of wood screwed to part of one of the layers that will be cut away later. (See Figure 20.) The first part of the hollowing out should be done with very sharp outside-sharpened gouges of various radii, preferably with long handles which very much help to control the cutting angle of the gouge. The gouges must be sharpened so that there is no so called wire edge at the cutting point, for if the edge is not clean and fair it will not be easy to control. The best way to get a clean fair edge is to polish the cutting edge on a rag wheel, first one side then the other, until all trace of wire edge is gone and the gouge is as sharp as a razor. The last part of the hollowing out may be done with small planes with curved soles, or a violin maker's plane. Then the inside should be carefully sandpapered and shellacked.

After the two hollowed out halves have been glued together, a block of wood like Figure 21 should be screwed on the inside of the model so that it can be securely held in the vise, when the shaping up of the outside may be done as was described for a half model. However if it is a model of one of the older types of ships which had a pronounced angle at the rabbet line, then it is best to make the model only down to the rabbet line, and after-

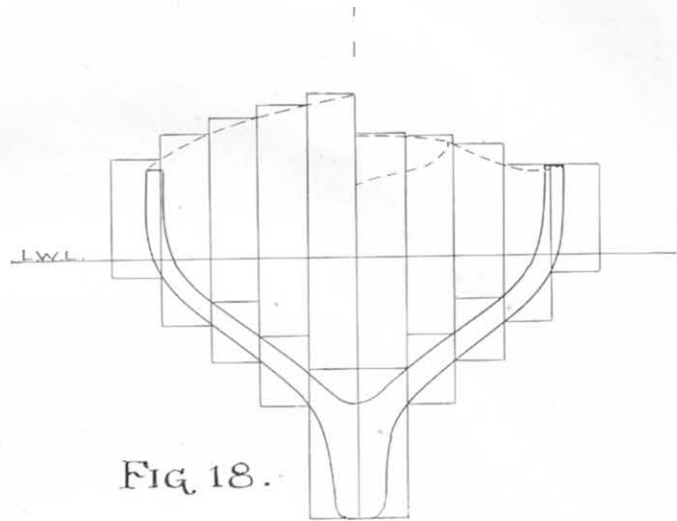


FIG 18.

wards make up separately the stem, keel, deadwood, etc., and fasten them in place after the shaping up of the model is completed. Sometimes in this case it is advantageous to fasten the keel on very securely by using several good size screws, and the model can later on be held in the vise by the keel itself.

If the model is to have bulwarks, or the shape of her hull is to be carried up above the deck level, then in order to get the proper shape it is best to make the model right up to the level of the rail cap. This will insure the proper flare forward and tumble home aft. With a carpenter's gouge scratch lines along each side where the deck should come, after which, either with a very sharp knife or the blade of a hacksaw held between the fingers you can saw or cut along the line until the bulwarks are removed. Now fair up this line with a small plane, and to get the proper bevel along the sides to fit the crown of the deck you must make a so called beam mold, that is, a small piece of wood curved like the deck beams. Rub this beam mold with chalk and slide it along the sheer line so it will mark the bevel to which the sides should be cut. After this is completed you are ready to lay the main deck, and you will find in most cases the saw cut and the fairing up of the sides have lowered the freeboard about an eighth of an inch, which is apt to be approximately the thickness of the deck.

The next job is to set in the deck beams, which is usually done by cutting notches in the inner side of the model at each side to receive the beam ends. In my younger days I used to fit the beams snugly and either glue or fasten the ends in place, but I found that later the deck either cracked in dry weather or buckled up in damp weather. You see, wood shrinks and swells across the grain but not with the grain, and the grain of the deck ran fore and aft while the grain of the beams was athwartships. So now I set the deck beams in so they have some athwartships play, then as the deck shrinks



Fig 19

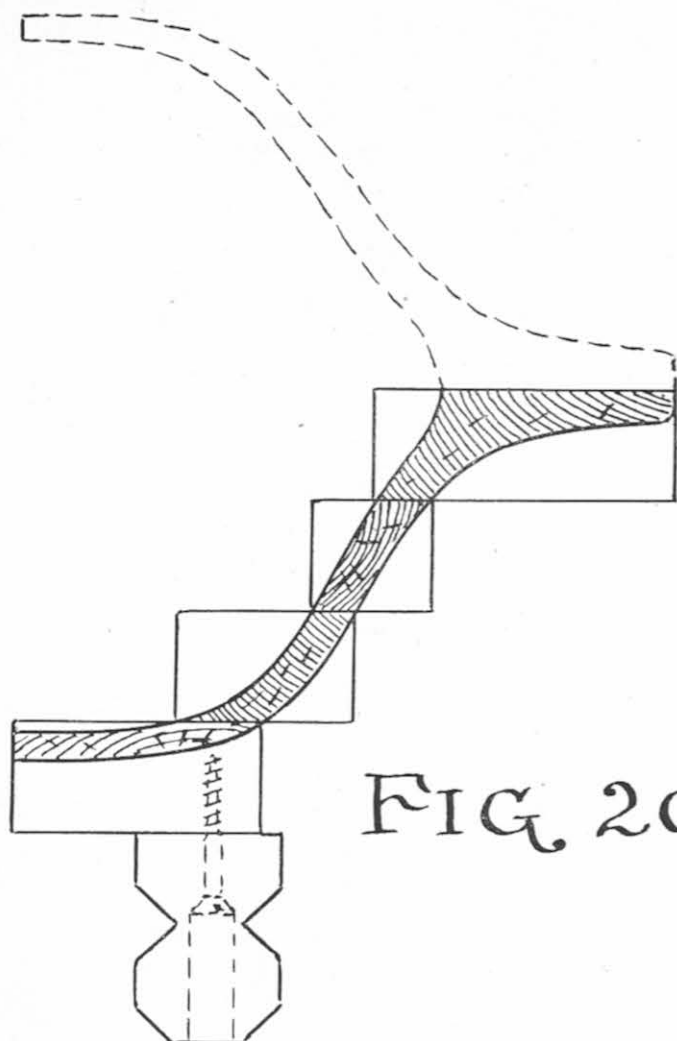


FIG 20

and swells it will spring the side of the model without resistance from the deck beams and the deck does not crack. Figure 22 shows a model with the beams in place and the two strips which will represent the gunwales later. This construction is strong and neat and, after the rail cap has been put on top of the gunwales or bulwarks, is most realistic looking.

Another operation that bothers some model makers and often spoils the looks of the model is marking or laying off the water line. Even if it is a glued-up model built on the bread and butter system with a seam at the actual water line, the painted water line should be somewhat higher.

One good way to scratch in the water line is to place the model upside down over a smooth flat plane like a table top or drawing board (as shown in Figure 23) and scratch in the water line with the point or scribe of a surface gouge. I find that it is well to use a chisel shaped point on the scribe which, when properly sharpened, will cut a very neat line in the shellacked surface of the model. Of course the model must be blocked up with sundry small pieces of wood and wedges so that it is not only level athwartships but so that the gouge will mark the right height fore and aft. Other lines for curved painted stripes can at times be marked with the gouge by having the model tipped the proper amount, but if you are to scratch in lines which represent planking, copper sheathing, etc., it is best to tack a thin batten on the model for the guide

of the scratch awl. The holes that the brads through the battens have made may be filled up generally by touching them with the end of a toothpick that has previously been dipped in fairly thick shellac, and of course sandpapered down after the shellac has dried. I myself am not very skilful at painting models, but have found various colored shellacs (which you can mix yourself) quite satisfactory, for they dry quickly and as many coats as desired may be put on with little trouble. If the model is to go in the water the final coat should be a transparent varnish that will keep the water from the shellac.

As for brushes, I find fairly broad ones with short hairs are satisfactory, but for painting up to or along a straight line sometimes a very old or much worn down brush is the best, and if you can have quite a little of the brush lie on the wood it will steady the hand. Of course you must have just the right amount of paint on the brush, and the paint must be thinned to run exactly right or the job will be a mess. It is always best before putting the brush on the model to try painting up to a line on a piece of wood that has a shellacked surface just like the model. Then when the brush and the paint are just right you can do the painting quite rapidly, and that is usually necessary with shellac or it will show brush marks. A camel's hair brush seems to work well with shellac, and although they are expensive they will last for years with care.

The brush should always be kept with its hairs in alcohol or else cleaned at once after using. The first can be accomplished by tying a string onto the top of the brush handle that is just the right length to hang the brush in a milk bottle without touching on the bottom. At the top of the bottle there should be a cork or plug with a hook for the string, then if the bottle is filled with alcohol to a level that will cover half the length of the hairs the brush will always be ready for instant use. I might mention that I have kept a brush this way for over twenty years, but the modern denatured alcohol has a tendency to eat the ferrule of the brush even if it does not damage the hairs.

To clean a shellac brush that is to be put away dry you proceed as follows: first squeeze the shellac out of the brush by holding it between the thumb and fingers inside a folded paper. Wash the brush in a little alcohol and

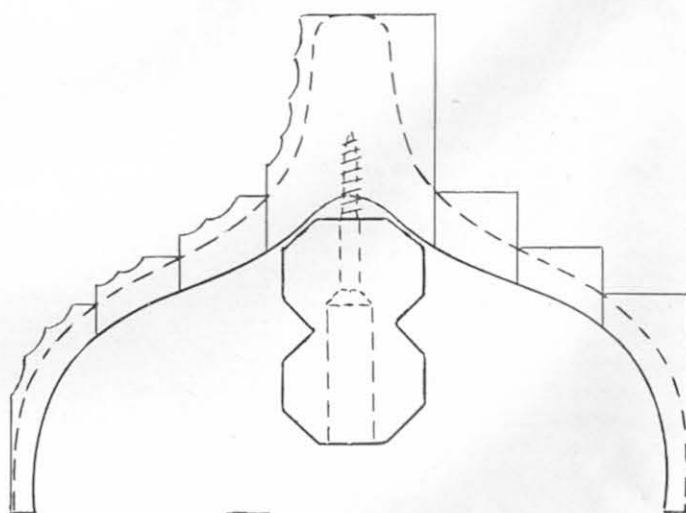


FIG 21.

squeeze it out between paper again, repeating this process several times. Then put the brush in a mixture of Oxydol and water, about equal parts, for an hour or so, and wash out in cold water. After it has dried, the brush should be soft and flexible. But the shellac brush that is kept hanging in alcohol is the best. It is always ready to use and can be put away instantly.

I speak at some length about the painting, for perhaps nothing will spoil a model more than poor painting, and certainly from an artistic point of view the painting is only next to shape in importance. Few amateur model makers realize the great amount of skill that is necessary to do a good painting job, and often ruin their models with hasty or inartistic painting. If you happen to dislike painting, then it is best to make up the model of contrasting materials, which can often be done with marked success. The older bone models are an example, and some of the finest models in existence, the so called Admiralty models, are fine grained wood simply finished in shellac or lacquer rubbed down.

The making of the small metal fittings for a model is a fascinating undertaking, but unfortunately it requires many tools and some of them are quite expensive. Most of the tools have to be obtained from the houses which supply the jeweler, the watch maker and the dentist. The small cutters and burrs used by the dentist in his flexible shaft arrangement are wonderful tools to use in the milling attachment of a watch maker's lathe, and cut wood or brass very well. While a whole book could be written about making model fittings I will now only mention a few common errors.

First, turning and drilling speeds. It is a common mistake when turning small objects in the watch maker's lathe to have the lathe going too slowly. If, for instance, the object is $\frac{1}{8}$ or $\frac{1}{16}$ inch in diameter, then the lathe should revolve either eight or sixteen times as rapidly as a piece 1 inch in diameter, and the same is true of small drills. Their speed should be in proportion to their size. In turning small objects one need only take a very light cut, really only a sort of scraping action with a very sharp graver not sharpened too obliquely, for the small object, if revolving rapidly enough, will bring its various surfaces under the cutting tool very frequently. In fact one piece revolving sixteen times as rapidly as another need not take off a shaving more than one-sixteenth as thick in order to be cut down at the same rate. This small cutting tool or graver, and the small drill, must have their cutting surfaces sharp and correctly shaped or they will heat up the work. The small drill must be removed from the hole it is drilling very frequently or it will clog with shavings, heat up, drill oversize or break. The cutting tool in a small lathe should never bear on the work with a broad surface, in fact not much more than a sixteenth of an inch of its edge should bear on the work or it will chatter, but the art of turning in the small lathe must be almost entirely acquired by practice. When done right, the surface will be so smooth that it cannot be improved by the fine file or sandpaper.

Second, materials. Some of the small rods, steel, bronze and Monel, become very tough when drawn to small sizes, and these should not be used for small turnings except where strength in the finished article is required. Instead you should use a free turning brass which in most cases will be strong enough. However if the object is to be bent or forged much, Everdur bronze is most excellent. The other materials that turn well are bone, boxwood, lancewood, white holly and pearwood. The woods, of course,

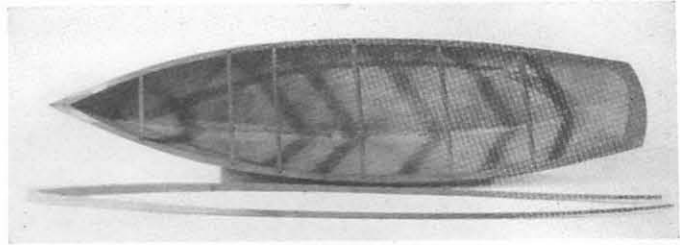


Fig. 22

must be finished off with sandpaper, then shellacked, and when the shellac has dried it can be given a French polish which is easy to accomplish in the lathe by simply pressing against the revolving work a piece of flannel that has both raw linseed oil and shellac on it, but keep the rag moving about, for if it is left in one place long it will heat and spoil the finish.

There are a surprising number of small files made today and at very cheap prices, so the model builder can make many of his small fittings entirely with these various shaped files, all of which have special uses, but he should have both a pin vise and a small highgrade jeweler's vise at table height where he can sit comfortably in a chair during his intricate work, and it is quite worthwhile to arrange the light just right.

All files naturally get dirty soon, or have their teeth filled up, and that is particularly so if oil or grease gets on the file, so it is necessary to clean the files often. The small files can be temporarily cleaned by pushing the end of a small stick of wood along the teeth parallel to the way the teeth are cut, and this will always remove a surprising amount of dirt, but it is well once in a while to wash all the files out in hot water and fairly strong dishwashing compound, using a stiff brush parallel with the teeth. Then dry the files at once either in a stove oven or on a radiator, and sometimes they will cut almost like new again. However it is very foolish to waste your time with a worn or dull file since, as I have said, the small ones are very cheap today. I highly recommend the sets made by the American Swiss File and Tool Company of Elizabethport, New Jersey. A set particularly adapted to model making is called "Sets of Knurled Handle Needle Files, $6\frac{1}{4}$ inches long, cut #2." This set consists of twelve files of very useful shapes in a wooden box that holds them from biting one another.

I hope these few hints on model making will be helpful and make pleasanter the winter pastime of some sailor-man, which they will if his work is shaped to give lasting satisfaction to the eye.

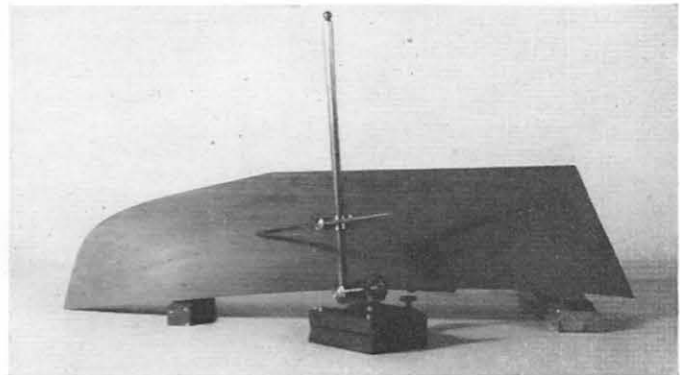


Fig. 23