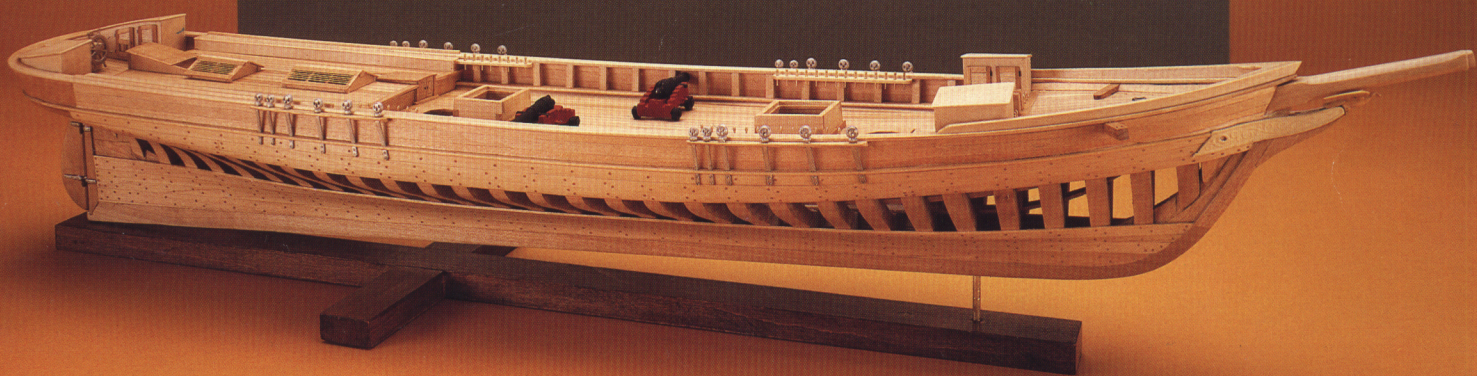


United States Revenue Cutter
JEFFERSON DAVIS



**A modeler's manual for plank-on-frame
construction of an 1853 Baltimore Clipper**
by Arthur C. Montgomery

United States Revenue Cutter
JEFFERSON DAVIS

A modeler's manual for plank-on-frame
construction of an 1853 Baltimore Clipper



**United States Revenue Cutter
JEFFERSON DAVIS**

by Arthur C. Montgomery

Schooner AMERICA building in plank-on-frame

Illustrated by the Author

BLUEJACKET SHIPCRAFTERS

Stockton Springs, Maine

1993



United States Coast Guard seal with the latinized motto "Always Ready." The 1790 date marks the establishment of the Revenue Marine predecessor.

United States Revenue Cutter **JEFFERSON DAVIS**

**A modeler's manual for plank-on-frame
construction of an 1853 Baltimore Clipper**



by **Arthur C. Montgomery**

Author of

Schooner AMERICA . . . building in plank-on-frame

Illustrated by the Author

BLUEJACKET SHIPCRAFTERS

Stockton Springs, Maine

1993



Copyright © 1984 by Arthur C. Montgomery
All rights reserved

Except for use in review, the reproduction or utilization of this work in any form by any electronic, mechanical, or other means, now known or hereafter invented, including xerography, photocopying, and recording, and in any information storage and retrieval system is forbidden without the written permission of the copyright owner.

Published by BlueJacket Shipcrafters
Stockton Springs, Maine 04981

Library of Congress Catalog Number 84-73062

Printed in the United States of America

Contents

Foreward	7
Origins of the Revenue Cutter	9
The Jefferson Davis	13
Introduction to Ship Construction	17
Model Prelimineries	23
Setting up the Keel	24
Framing	25
Deck Framing	31
Laying the Deck	32
Planking the Bulwarks	35
Planking the Hull	37
Painting and Finishing	44
Masting and Rigging	46
Displaying the Model	53
Plans	54
Useful Tables	57
Recommended Order of Hull Construction	58
Bibliography	59
A Shipmodeler's Glossary	60
Acknowledgments	61
Construction in step-by-step Photographs	63
Notes on Armaments	89
Where to See Ship Models	92

Note: Throughout this book, in describing construction sequences all drawings are indicated as "Fig" followed by its number; all photographs are indicated by a number alone.



The power and beauty of the Baltimore Clipper topsail schooner design is clearly dramatized in the photograph. This is Capt. Robert Douglas's *Shenandoah*, a modern-day Campbell class cutter which sails out of Vineyard Haven, Mass. Close-hauled on the port tack she is showing a good turn of speed in a gentle breeze. *Norman Fortier Photograph.*

Foreword

—or what this book is all about

Like the previous (1983) volume on the Schooner *America*, this book will take you through the process of building a handsome plank-on-frame model, the 1853 Revenue Cutter, *Jefferson Davis*. Or any of her sister ships. Those modelers who have had the experience of building the *America*, will find that this model will be quite as easy to construct and the instructions as equally clear and detailed. With the exception of the stern, the hull is very similar, so similar, in fact, that certain portions of the previous book have been repeated here with only minor changes.

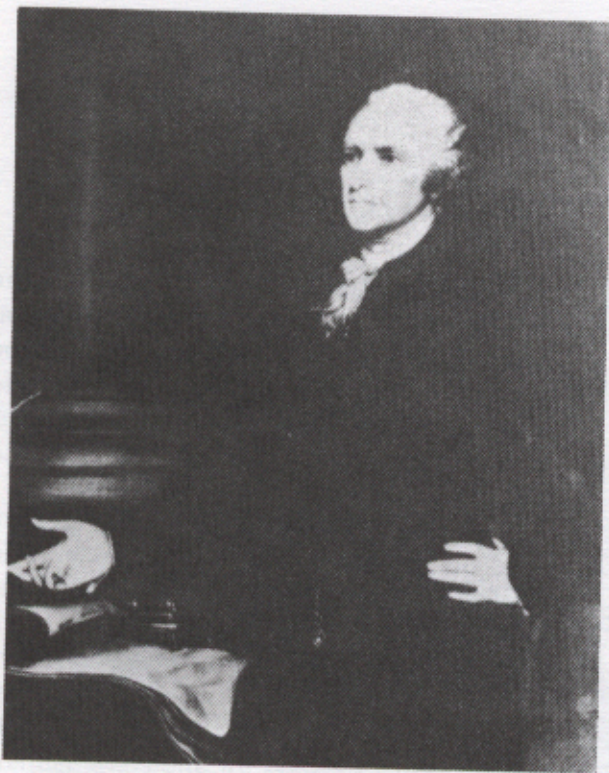
This book will guide the reader through all the phases of building the model, beginning with the history of the vessel, the fundamentals of ship construction, on through the techniques of framing, planking, decking, sparring and rigging.

Building a true plank-on-frame ship model has always been the ultimate for model builders. (By "true", it is meant solid wood frames, properly spaced and beveled to the curve of the planking, as in a real ship, as contrasted to the thin plywood spacers in most kits advertised as "plank-on-frame".)

However, thanks to a new, patent pending process, there is now a kit available that includes accurate full frames similar to those in the British Admiralty "Dockyard" models. Thus, the complexities and time requirements associated with this type of model have been greatly reduced.

So, whether you are an old hand at ship-model building, or a rank beginner, this book should enable you to show a good return for your efforts. And at the very least, you'll be able to exhibit what only a small number of ship modelers have ever done—a genuine plank-on-frame model.

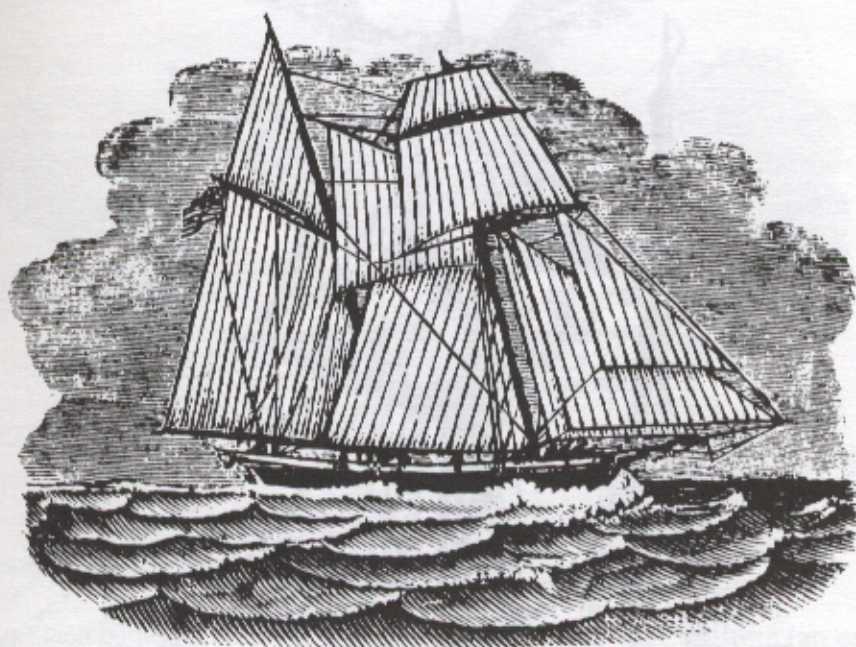
Good luck and smooth sailing
Arthur Montgomery



Alexander Hamilton, first Secretary of the Treasury. It was he, as the one responsible for collection of taxes, who persuaded Congress to authorize construction of a fleet of Revenue Cutters to control smuggling on the coast. This service was called Revenue Marine, later Revenue Cutter Service and, finally, in 1915, Coast Guard.



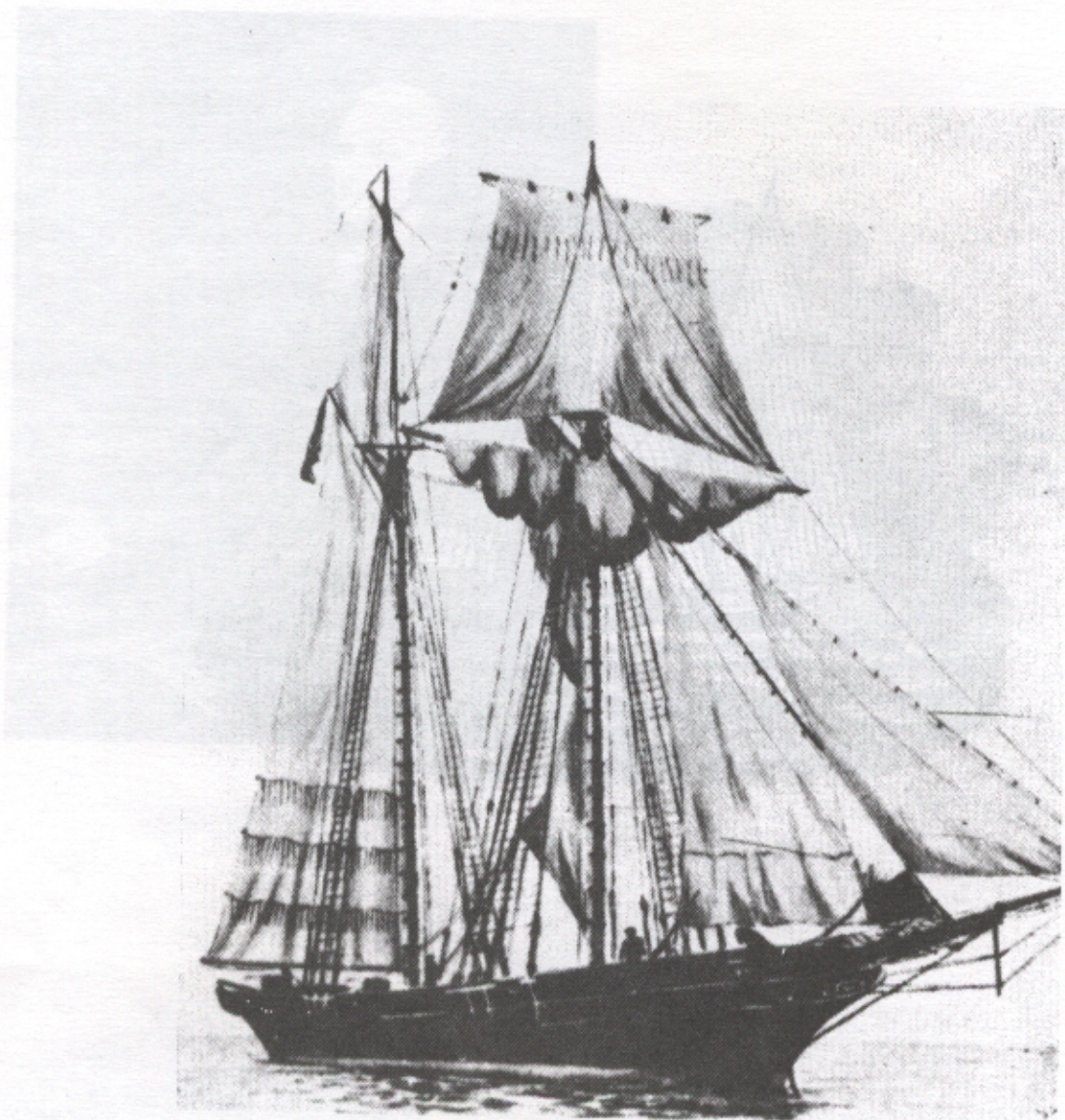
Massachusetts, first of the Revenue Cutters authorized by Congress was launched at Newburyport, Mass. She had an Indian figurehead and a square cut stern, and was 50 feet in length. She was armed with six swivel guns and was manned by a master, three mates, four marines and two boys. Pay ranged from \$30 monthly for the master to \$4. for the boys.



The Origins and Development of the U.S. Revenue Cutter

If a poll were to be taken as to what rig best typified the American sailing vessel, there is little doubt that the overwhelming vote would go to the schooner. And for the honors of the most beautiful, the nod would probably go to the topsail schooner.

This should cause no surprise, for beauty is the handmaiden of function. And the topsail schooner, as the rig of the Baltimore Clipper, gradually developed over the course of the eighteenth and nineteenth centuries as one of the most successful rigs ever to go to sea.

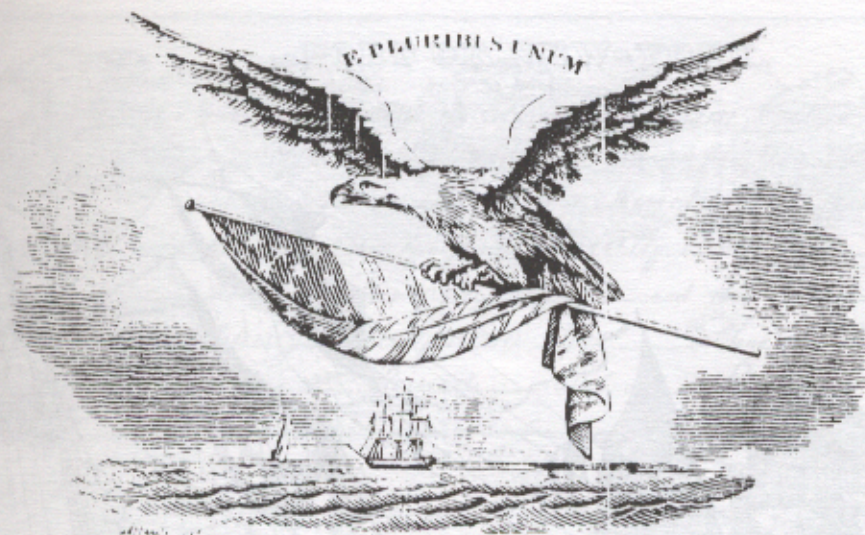


James Madison was one of nine cutters that fought in the War of 1812. She captured the 300-ton brig *Shamrock*, and a schooner carrying \$20,000 in gold. Built at Baltimore in 1808.

Although the origin of the schooner rig is clouded, most experts agree it had its beginnings in New England in the early 1700s. Trade with the southern states, Bermuda and the West Indies led to its adoption in the Ches-

apeake region where builders refined the hull and rig.

By the Revolutionary War, the Baltimore Clipper had developed into a positive and distinctive type. It was characterized by a



relatively fine bow, slack bilges (that is, the hull section proceeding directly from the keel to the waterline with little or no fullness), a certain amount of drag to the keel (having more draft aft than forward) and having low freeboard (distance from waterline to deck line).

Fore and main masts raked sharply aft. (This was required to move the center of effort of the sail plan aft and thus balance the center of lateral resistance of the hull which moved aft as a result of the increased draft aft.) The foresail was large, overlapping the mainsail, and was loose-footed. Square topsails were fitted to the foremast—and sometimes to the mainmast. And a huge square fore course could be fitted that was extremely powerful in downwind passages, as in the tradewind belts.

They were fast and weatherly and early proved valuable to both the British and American navies as patrol and dispatch vessels.

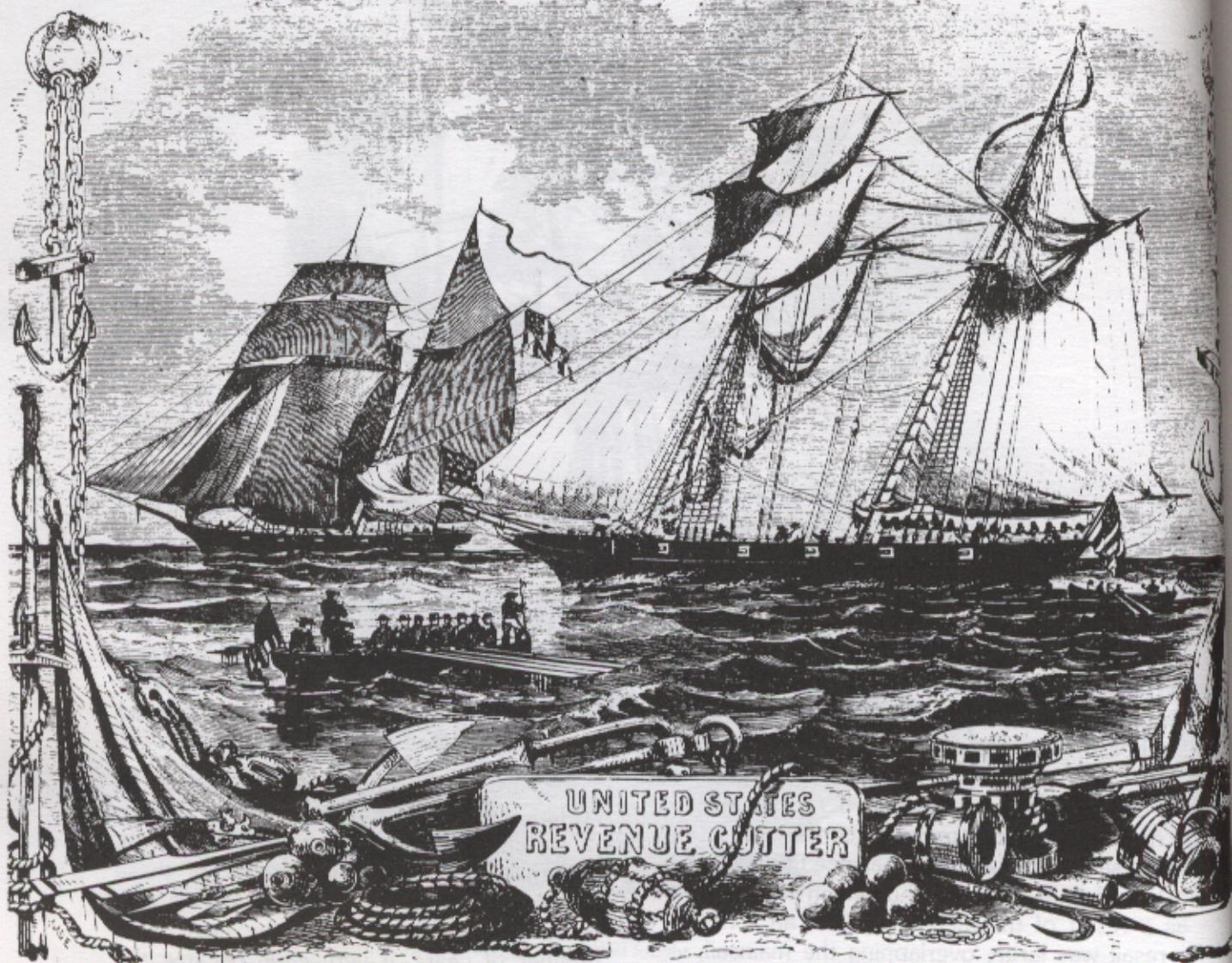
Thus it was, when in 1790 the fledgling United States of America turned to Alexander Hamilton, first Secretary of the Treasury, to create a Revenue Marine Service to police the coasts and control smuggling. The vessels chosen were the Baltimore Clipper topsail schooners.

The first vessel, termed a "cutter" after the

British Revenue Cutters (an entirely different type of vessel) was the "Massachusetts". She was one of 10 vessels authorized by Congress. Requirements were to be 36 to 40 feet on the keel, armed with six swivel guns and crewed by a captain, a lieutenant and six seamen.

Dimensions are known for only six of the cutters, and this lack of information, right at the beginning, establishes a continuing problem that plagues any researcher of these vessels. Although the Revenue Marine predates the establishment of the navy by a number of years, it very early became the navy's "poor cousin"—much as it is today. Funding was always hard to come by, so little was spent on record-keeping. Most of the documentation was handled by local Collector of Customs offices.

Tracing a specific vessel can be a lengthy, frustrating, and usually fruitless experience—many vessels have nothing in the record but their names. Some of the best research of these vessels was done in the 1930s by marine historian, Howard I. Chapelle. His books, "The Baltimore Clipper" and "The History of American Sailing Ships", available in most libraries, are two of the finest sources of information.



United States Revenue Cutter Morris, sister ship of the *Jefferson Davis*, is shown here in a remarkably detailed engraving. She is hove to, possibly preparing to anchor for there is a hand on the foredeck. Her fore sail is partly brailed and all halyards have been eased. Her round stern and knuckle line are clearly seen, as is the eagle figurehead. An awning with scalloped flaps is rigged below the main boom. In the background, a sister cutter has her huge fore course set.

PORT OF NEW-YORK.



I do Certify, That the American Revenue Cutter
~~Jefferson Davis~~ *David* has *two* Decks
 and *two* Masts, that her length is *Nine* ~~four~~ *feet*
 and *two* inches her breadth *Three* ~~two~~ *feet*
 her depth *Nine* ~~feet~~ *two* inches and that she measures
One Hundred and Seventy ~~two~~ *tons* ^{61/95} that she is
Named ~~Two~~ *Howard* Tack, and *Eagle*
 head: and her name painted on her stern, according to law.



GIVEN under my hand and seal, this *Twenty fourth* day
 of *August* one thousand eight hundred and *Fifty three*.

179 ^{61/95} Tons.

John Coburn SURVEYOR.

I do agree to the above description and measurement.

Jefferson Davis measurement certificate, issued at the Port of New York, August 24, 1853. A reference to her name painted on the stern has been crossed out, but her Eagle figurehead is noted.

The Jefferson Davis and her Campbell Class Sisterships

As the years passed, a continuous stream of Revenue Cutters came and went; some leaving hardly a ripple to mark their passage through history. Nor is this surprising, for, like a policeman on his beat, a patrol vessel lives each day much like the day before. True, there are incidents, and there is excitement, but little of such magnitude as to survive in the history books.

However, the passing years did bring change. As the country grew, so did its water-borne commerce. Increasingly greater demands were placed upon the Revenue Marine. As a result, the cutters became larger, with crews up to 30 and with heavier armament. Moreover, the west coast was beginning to be developed and by the 1840's, the Revenue

Marine had two oceans as patrol responsibility. It was this increased challenge that produced the ultimate development of the Baltimore Clipper: the Campbell class of Revenue Cutters.

The first of this class was the cutter *R. C. Campbell*, built in Gosport (Portsmouth) Virginia in 1849. She was renamed the *Joseph Lane*—usually referred to as *Joe Lane*—after the Governor of the Oregon Territory. Quickly following were the *William J. Duane*, *Crawford*, *Morris*, *Lawrence*, *Samuel D. Ingham* and *Harrison*.

In 1853, ten additional cutters were ordered in response to the needs of the west coast following the discovery of gold. These were the *James C. Dobbin*, *Caleb Cushing*, *James*

The excess wood below the keel must now be cut away. Don't try to cut it all away in one pass—it is too risky. Take it down a bit at a time and check both sides frequently to be sure your cuts are even. The safest way is to make saw cuts every inch or two no closer than $\frac{1}{16}$ " away from the bottom of the keel and cut away a piece at a time. The last wood should be removed with a sanding block and No. 80 sanding paper.

The forward edge of the stem should be tapered to $\frac{1}{8}$ " width as a cutwater and the trailboards and eagle figurehead fitted beneath the bowsprit. (Photo 64). The next construction step is to fit the channels and the deadeyes with their chainplates and, of course, the steering wheel.

This is the time to make the rudder. It is made of two pieces: the blade and the shaft. The shaft is worked out of a length of $\frac{1}{4}$ " dowel, tapered on the end. Tapers are best made by chucking the piece in an electric drill and spinning against a folded pad of medium sandpaper held in the fingers.

The rudder blade is cut and tapered as shown and grooved at its upper end to receive the rudder shaft. The post is offset from the blade so that its centerline will match the centerline of the hinges—the gudgeons and pintles. This is necessary so that the rudder will swig when the rudder shaft is turned. (Fig. 3, Photo 65).

It is very important to keep this principal in

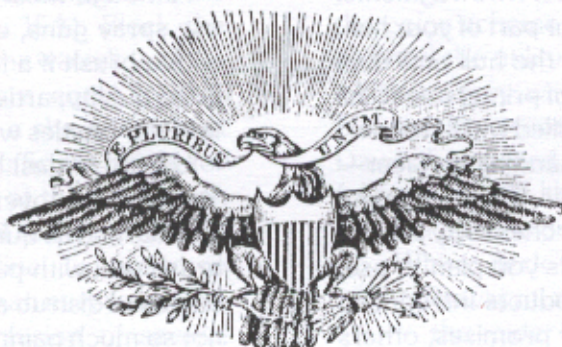
mind when fitting the gudgeons and pintles. The rudder absolutely will not function unless the centerline of all the pintles, and all the gudgeons line up with the center axis of the rudder shaft. With that in mind cut the mortises for the pintles (the ones with the pins) in the forward edge of the rudder, and similarly, mortise the stern post for the gudgeons (the ones with the holes). It will take considerable time and tons of patience to cut and fit everything. The hardware pieces will need much filing and fussing, too.

Note that the gudgeon mortises are below the pintle mortises. Note, also, the additional depth of the mortise on the rudder edge. This is equal to the depth of the pins, and its purpose is to provide the needed clearance when shipping or unshipping the rudder. Small blocks of wood were fitted into these spaces to prevent the rudder from unshipping accidentally at sea.

After all the mortises have been cut and the hardware installed, hang the rudder. It is possible a capstan may have been fitted, so you have an option to fit it or not. Its likely position is shown on the plans.

Mounting holes may now be drilled in the keel (careful—drill smaller pilot holes first) and after a mounting base is made, and whatever finish desired is applied, your hull is completed.

Sit back and regard it with satisfaction. You cannot feel other than pride in what you have done.



Puget Sound, early in 1855.

Records of her service are scant. Not that this is surprising; Her duties were essentially that of a patrolling peacekeeper and as such, characterized by routine. Her value lay in making a show of force where required, discouraging smugglers and keeping a lid on the raids by the native Indians (termed "savages") on the white settlements. At one point, the entire crew, excepting the captain, became caught up in the gold fever and deserted to a gold strike on the Fraser River, but all soon returned to duty.

In 1861, her timbers having become soft, she was authorized to be sold out of service. A brief reprieve was given for her use as a hospital ship, but on January 10, 1862, she was sold at auction to Grennan and Cranney, sawmill operators of Utsalady, for \$2920. She was refitted, took aboard as cargo a dismantled, flat-bottomed steamboat and set sail for China. She was never heard from again.

Her replacement in Puget Sound was the *Joe Lane*. She, in turn, was sold out of service in June 1869 and was converted to a small steamer, renamed *H.W. Hutchinson*, and became an Alaskan coastwise trader.

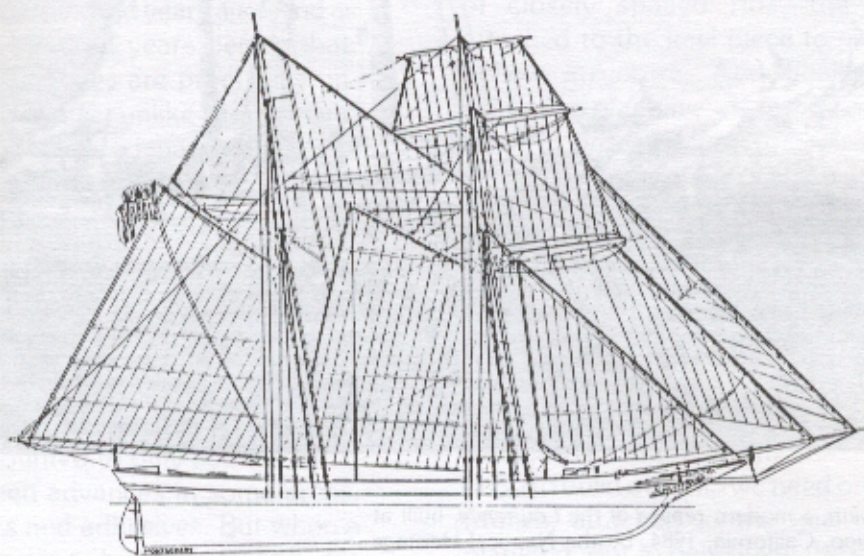
Readers who seek additional information on

specific vessels of the Campbell cutter class are encouraged to invest some time in the sources listed in the rear of this book. Each additional piece of information adds to the jigsaw picture and brings a fuller understanding of these fine vessels.

However, for a firsthand appreciation of these topsail schooners, you are fortunate to be able to see two excellent replicas—one on the east coast and one on the west coast.

On the east coast is the *Shenandoah*, built by Captain Robert Douglas in the mid 1960's and operated as a vacation cruise vessel in southern New England waters. During the summer, it is possible to book passage and enjoy the experience of sailing and helping to crew this fast and beautiful ship. Write Coastwise Packet Co. Vineyard Haven, Mass.

On the west coast is the *Californian*, replica of the cutter *Lawrence*, which was wrecked at San Francisco in 1851. Plans for her, at this writing, are not finalized, having just been launched, but it is expected that she will be a sail-training vessel or a vacation cruise vessel, or perhaps a combination of both. For information, contact the Nautical Heritage Museum, Dana Point, California.





Californian, a modern replica of the *Lawrence*, built at San Diego, California, 1984, by the Nautical Heritage Museum, Dana Point, CA. She is shown getting underway, raising her mainsail. © Gary Fenton Photog.



Introduction to Ship Construction

This is an age of technical miracles. We can jet across the Atlantic in a few hours. We can show action pictures of an event, as it is happening, clear on the other side of the world. We can heat our houses with solar energy. We can make a calculator the size of a wrist watch. We can even walk on the moon.

But when we build a wooden ship, we do it just as it was done a hundred years ago. And as it was done five hundred years before that. The tools, the techniques are practically unchanged. That's because, unlike the new and developing sciences of aerodynamics and electronics, the science of naval architecture has been in development since man first straddled a log in the water, many thousands of years ago.

As proof of this, we can examine the comment of a prominent designer of 12-meter cup defenders, that despite the many millions spent on 12-meter development over the past thirty years of racing, the actual speed increase has probably amounted to only about 1%.

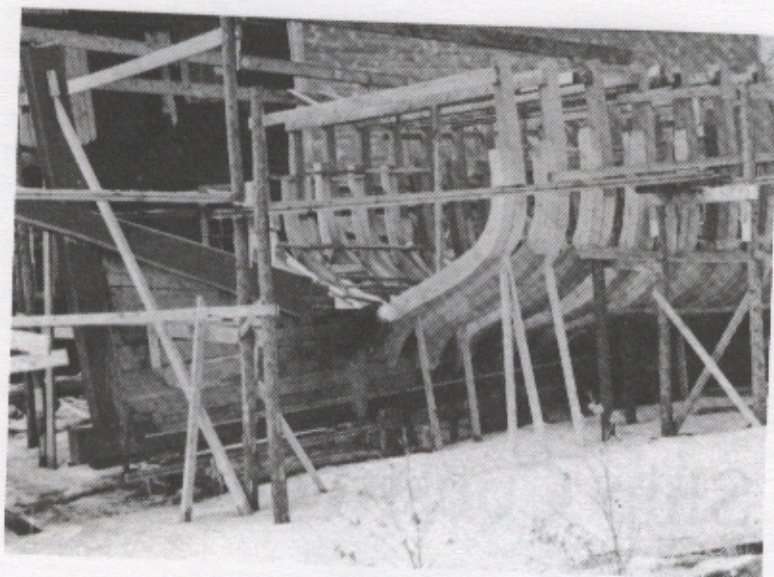
There have been advances in some areas, notably in plastics and adhesives. But when a ship or large vessel is to be built of wood, it is built essentially the way it has always been done.

And this is the way.

A backbone—the keel—of suitable size is set up. It will probably need to be pieced up of a number of wood timbers, as few as possible. In recent years large keels have been laminated in the manner of a 7-layer cake. Next, a series of closely spaced ribs—the frames—are attached to the keel piece to give the hull its hollow structure. And finally, a covering skin—the planking—is fitted over the framework in order to keep the water out so the vessel will float.

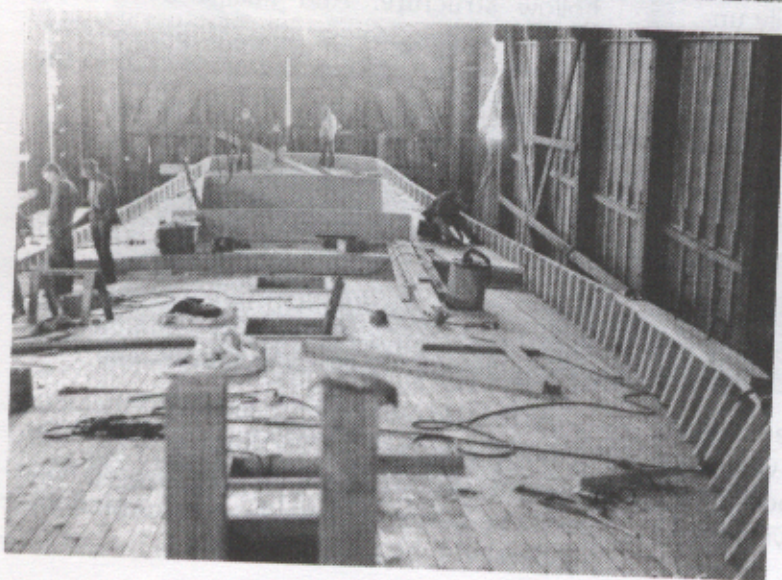
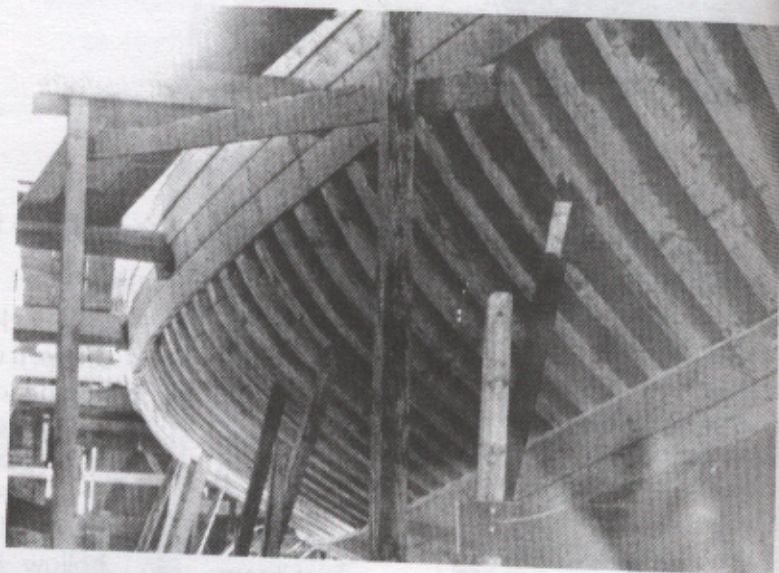
These are the three major parts: keel, frames, and planking. All other parts are supplemental to these three. Where the keel turns up, at the bow to make the stem—or cutwater—it is still essentially the keel. And when the stern is given its box-like structure, the pieces that give it its form are essentially frames in an altered form.

So to build our ship we need only remember: frames, attached to the keel, covered with planking. But to determine the size and shape of these parts, we must be able to read and understand the plans.

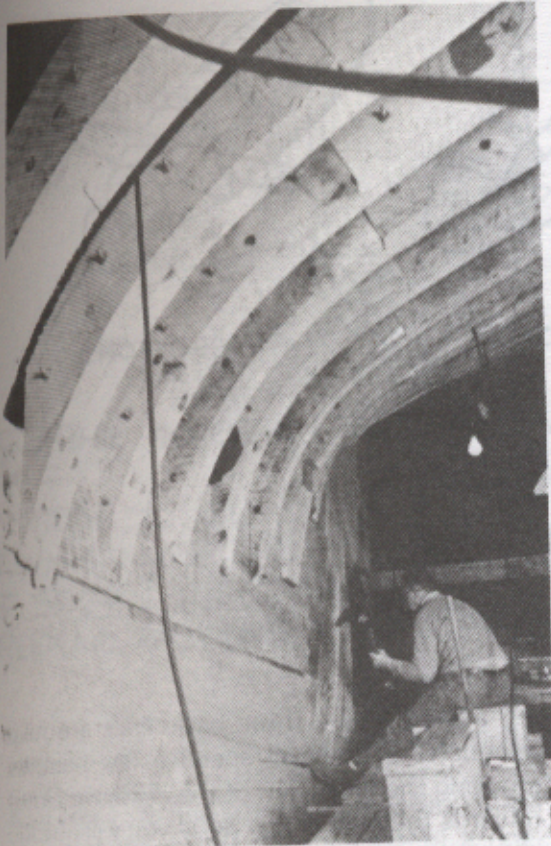


Setting up stern framing on a schooner at Thomaston, Maine. Easily identified are the sternpost, horn timber and rabbet line. The author, seen at the heel of the aftermost frame, gives an idea of the scale—this is a hundred-footer.

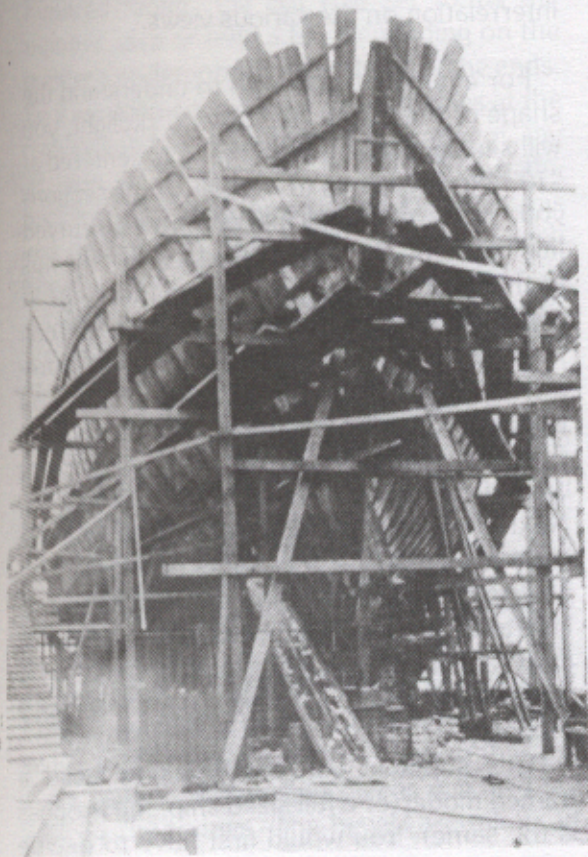
Harvey Gamage, another 100-foot schooner being built at South Bristol, Maine. Planking is being worked up from the garboard and down from the sheerstrake. The final plank which will close the gap is called the "shutter" plank. Scaffolding is shifted and replaced as the work progresses.



Deck view of the *Harvey Gamage*, looking aft. The gradual flaring outboard of the bulwark as it approaches the bow is clearly demonstrated. The row of tufts in the deck shows that her deck caulking is nearly completed. Then the seams will be payed with hot pitch. The uprights in foreground are the bitts.



Stern frames of the *Harvey Gamage*. The ends of the frames will be trimmed to flow into the deadwoods without any breaks or steps. In background, the "dubber" is cutting down the deadwood with a ship's adze. He is working a gradual slope from the heels of the frames to a line marking the rabbet.



Bow view of a large schooner in frame. Temporary ribbands hold frames in place while planking takes place. Note the closely fitted timbers on either side of the stem. These are joined into a single solid piece, making up the knightheads and hawse timbers.

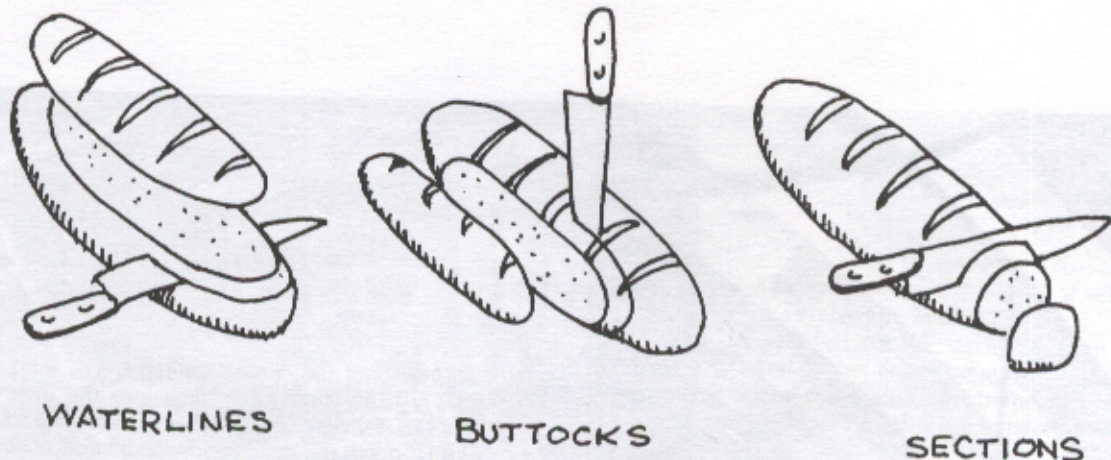


FIG. 1 EASY WAY TO REMEMBER THE LINES OF SHIPS

Three views of a ship are always shown on plans and each view will show three sets of lines. 1. The plan or half-breadth view, looking down from above the deck showing the longitudinal curves of the various waterlines and the spacing of the sections and buttocks. 2. The profile or sheer plan, which shows the curve of the buttocks and the spacing of the waterlines and sections. 3. The sections, or body plan, showing the curve of the sections of the bow and stern halves of the ship, as well as the spacing of the buttocks and waterlines.

Now, this may sound confusing in print, but if you examine a set of lines, you will quickly see how remarkably simple all this works. You will also see how easy it is to check the exact dimension of any part of the ship and then to check the measurement on another view for confirmation. It will help in your orientation in the beginning to think of the hull as being a loaf of bread and each type of line representing a slice with a large knife made through the entire loaf. (Fig. 1) The waterlines would be cut with the knife blade held flat. The buttocks would be cut lengthwise with the blade held at right angle to the waterline. And the sections would be cut like bread slices for a sandwich.

Usually there are additional lines added to plans called "diagonals," which provide further reference points but for our purposes—build-

ing a model—the three basic lines are fully adequate. If you will spend a few minutes studying the lines plan of the *Jefferson Davis* towards the rear of this book you will quickly identify the various types of lines and see their interrelation on the various views.

For example if you wish to understand the shape of the hull at the forward skylight, you will see on the plan view that it is centered at "10". Now if you go to the plan of the sections you will see on the half marked "bow", a curved line marked "10." This is the shape of the hull at that point. If you wish to find the shape at any point between the stations shown, you can plot the curve you want by means of measurements taken from these three plans. You would do this by adding a new station line on the profile and half-breadth plans at the point where you wanted to establish the new station. Next, on a piece of tracing paper laid over the body plan, transfer the points of intersection where the new station line crosses the waterlines and buttocks. Then, using french curves, draw a fair line through all the points just transferred and you have your new body section.

Let's suppose you are going to build a framed model (or a full-sized ship; the process is the same). You would first have to decide

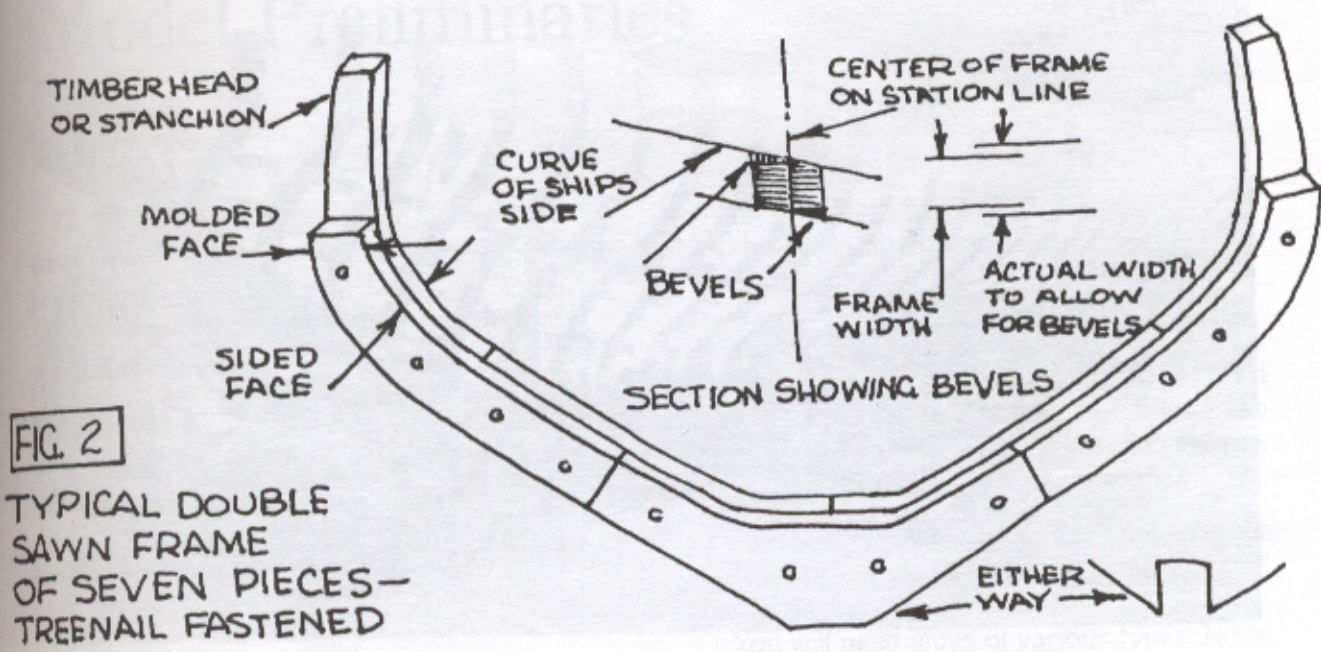


FIG. 2
TYPICAL DOUBLE SAWN FRAME OF SEVEN PIECES—TREENAIL FASTENED

how many frames you wanted in the entire length of the vessel. In our case of a one-hundred footer, the old rule set 37 as the number, give or take a few depending on the builder's preference and the shape of the ends. So if we don't consider the short frames at the transom and the bow and set a number of, say 31, you would mark off 31 stations on the profile and develop the required 31 sections as just described to give you the shape of each frame.

Next, using the rule of "room and space" proportioning, the frames would be slightly narrower than the spaces between frames.

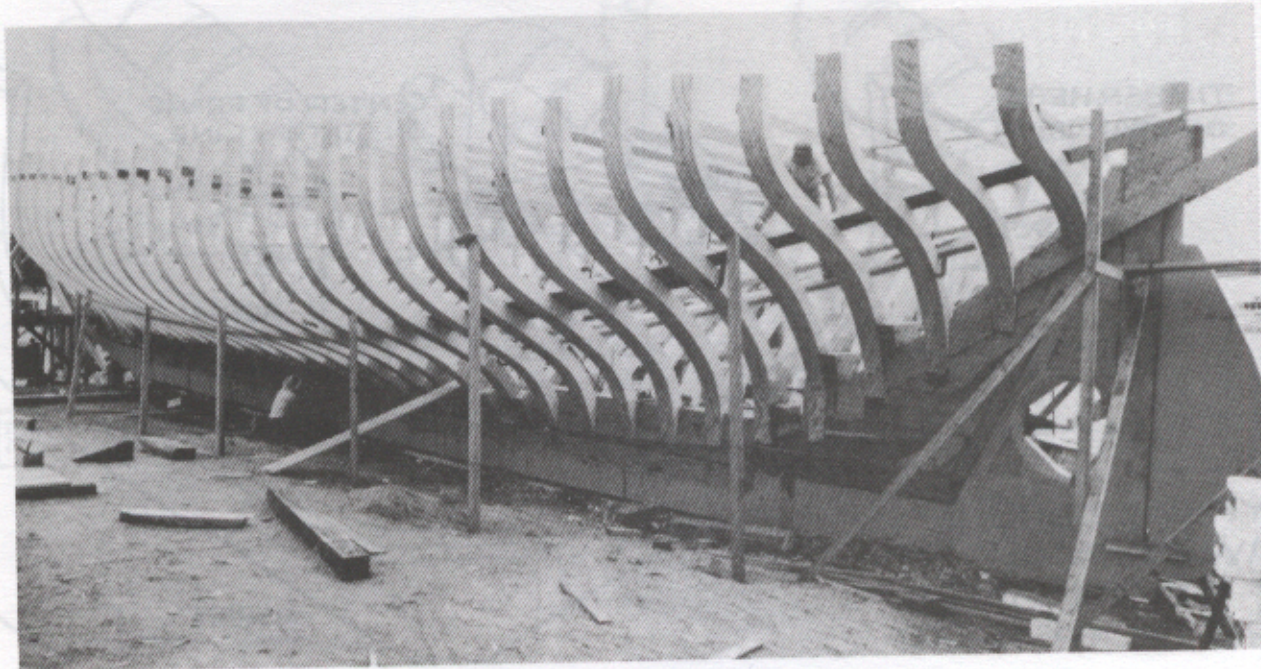
If the frames are 45% of the distance between stations and the spaces 55%, this would be about right. (The rule is actually 47% and 53%.)

You will have to remember that the frame stations position the center of the frame, and where there is considerable fore and aft curve to the hull, you must allow for sufficient bevel on both sides of the station line so that the planking will lay against the frames. (Fig. 2) This allowance for bevel must be applied to the inside faces of the frames as well, so that the inner clamps and ceiling pieces will also lay flush to the frames. The bevels are taken off

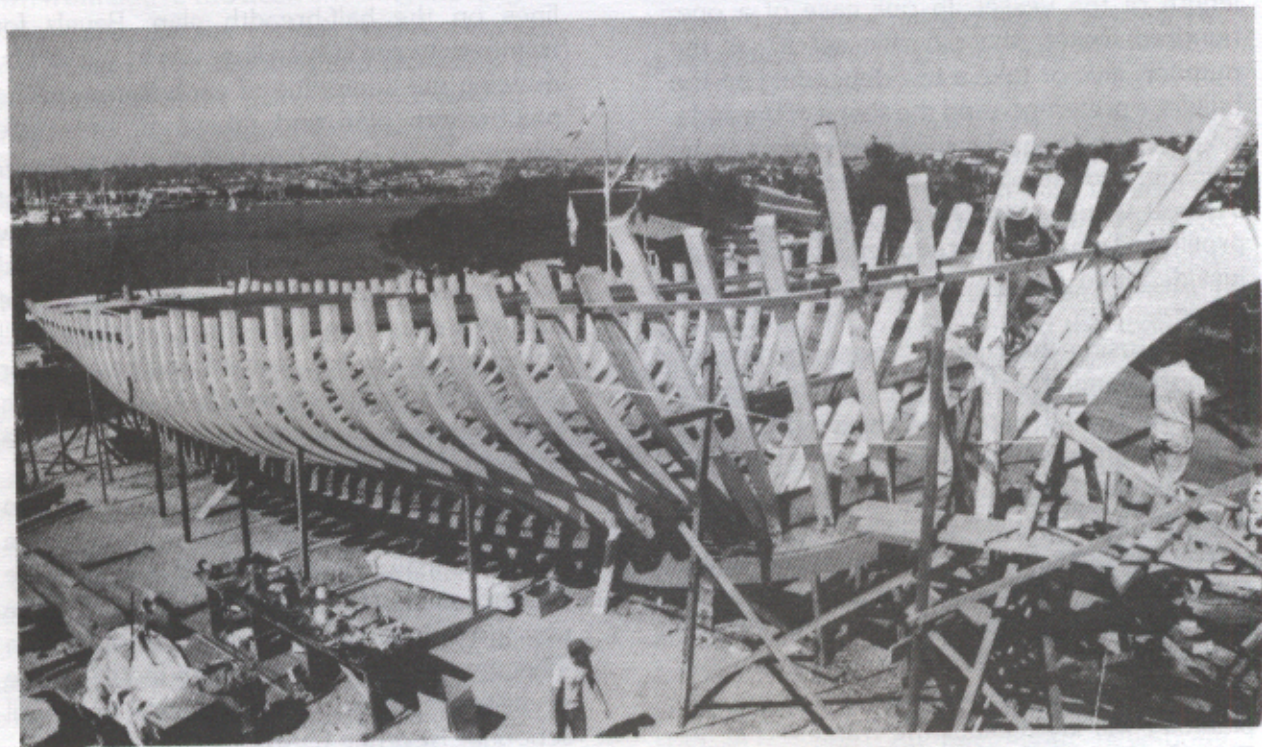
the waterlines where they cross the station lines on the half-breadth plan. Bevels for frames between station lines can be plotted by drawing the centerline of each frame on the half-breadth plan and taking off the angle where it crosses each waterline.

The bibliography suggest some excellent works on this process. However, the new Bluejacket plank-on-frame kits, developed and patented by the author, eliminates nearly all of the work in making and setting up frames. All your frames are cut, shaped and beveled for you, ready to set up on your keel—all of which will save you untold hours (and probably a considerable amount of frustration).

So let us assume that you have opted to skip the weeks of making your own frames—fun though it may be—and have before you the Bluejacket kit of the *Jefferson Davis*. We'll take you through the entire process of building a museum quality plank-on-frame model of one of history's most famous ships: a topsail schooner Revenue Cutter.



These views of a ship are always shown in perspective. The frames here are lighter and very widely spaced. This is because, instead of the usual double sawn frames, laminated frames are being fitted. They are lighter and stronger and scantling rules permit much lighter framing. © Gary Fenton Photog.



Stern view of the *Californian* in frame. The bilge stringers are in place, but not the sheer clamp. An aperture has been worked into the deadwood for a propeller, since she will have an auxillary engine. The horn timbers have been fitted, as has the rudder, but the stern framing has not begun. © Gary Fenton Photog.

Model Preliminaries



This book is intended to teach the construction of a plank-on-frame model of the U.S. Revenue Cutter, *Jefferson Davis*, either by a "scratch" builder, working only from the plans, or by a builder utilizing the kit with pre-cut frames produced by Bluejacket Shipcrafters.

It presumes no experience or previous nautical knowledge on the part of the builder. But knowledgeable or not, we are confident that with the guidance of this book, every serious attempt to build this model will result in success, even if it is the builder's first attempt.

So let us begin.

First off, set up your workplace. A roomy table, desk, top or workbench will do—even a card table. But try to get at least 4'X5' clear space in a well lighted corner where you can leave things for a few days, or a few weeks, without anything being disturbed.

You will need tools, but surprisingly few will get you by.

As starters:

- Small Xacto knife with extra blades
- Large Xacto knife with assorted blade shapes
- Modeler's saw with replaceable blades
- Wood files: 8" coarse half-round and assorted needle files
- Long-nosed pliers
- Side-cutting, diagonal cutters
- Small wire drills, Nos. 60 to 80
- Pin vise to hold drills
- Assorted fractional-inch drills
- Small scissors—such as manicure scissors
- Tweezers
- Spring clamp clothes pins
- Assorted sandpaper—open coat, grit Nos. 80, 100, 150, 220, 320

You should also have a pair of draftsman's dividers and pencil compass, a 6" rule, a 24" rule or tape rule and 4H and HB pencils.

There are other tools that, while not absolutely necessary, will make the job easier, as well as faster. Depending on your funds, you

might consider:

- Small clamp-on vise
- Tilting circular saw
- Bandsaw or scroll saw
- Power grinder, hand drill

All of the above can be obtained from good hobby shops, or have them shipped in a few days to your door from Bluejacket. Check their catalog.

Paints, good brushes and possibly a small spray unit would round out a nicely fitted model workshop.

You will need glues of various types: Resin glues, such as "Elmer's" will cover most of your needs. There are two kinds of resin glue, white and yellow. The white will dry clear and transparent, and should be used for parts that will not be painted. You can use it for wood paper or fabric. Apply a thin coating to both parts and squeeze together for a few minutes until it begins to set—full-bond strength will take overnight. Be sure to scrape off all excess before it hardens. The yellow type is faster setting and slightly stronger. It is the choice to use for wood joining.

Epoxy cements are tremendously strong and are used for metals and wherever there is a poor joint that requires filling. There are several types: Clear, fast-setting, such as the "5-minute" brand, which sets up in a few minutes, but requires 24-hours to achieve full bond-strength. Clear normal setting takes half an hour to set up, but is stronger than the fast set. Strongest of all is regular epoxy; it is white or grey in color.

Cyanoacrylate—so called "instant" glues are helpful in certain difficult areas. It is fast and handy, but can also be tricky. *Don't* get it on your fingers—it could take long applications of nail polish remover to get them unstuck. It's a good idea to cover your fingertips with masking tape for protection against this embarrassment.

Setting up the Keel

If you are building from the Bluejacket kit, your backbone is a single piece with keel, stem and horn timber combined with all guide lines neatly in place. This is a great time saver.

But if you are building from scratch, you must glue up a wood stock blank using $\frac{7}{32}$ " x 2" strips.

Begin by laying the keel piece on a sheet of wax paper and join the stem and stern pieces to it with clear epoxy. (Photo 1) Check the position of all pieces against the construction drawing-sheet No. 3. Clean off all excess before the cement starts setting up. When hard, sand joints smooth with No. 100 paper wrapped around a block of wood.

The next step is marking the backbone piece with the rabbet and bearding lines, and the frame-spacing guidelines. Use tracing paper and typewriter carbon paper to transfer these lines from your plan to the wood pieces. It is very important that all edges match. It is helpful if you secure your wood piece to your work surface so that it won't shift. Some artist's rubber cement will keep it in place. Use a number of dressmakers pins through your tracing to be sure you have proper alignment (a drop of water on the pinholes will swell the wood closed again when you are finished). Use the pins and masking tape to hold your tracing in place, then with a sharp 4H pencil and pressing firmly, trace over the relevant lines. Because you are working "blind," you may find that your first attempt misses the mark in some way. In that case, just erase your marks and try again.

When you are sure your markings are right, cut away the waste wood along the line above the frame spacing marks. This line marks the upper face of the keel and deadwood on which the frames will sit, termed the "cutting down" line. Cut out the horn timber at the stern and also cut away the face of the stem down to the lower, 2-inch keel piece. Do not cut into your marks. Come up to the mark as close as you can, but leave your marks intact. (Photo 3)

Although not a "must," your model will look better with a proper sternpost with the wood grain running vertically. Cut away the wood as shown on your construction plan and a stern post piece to fit. (Photo 4) Work a groove into the afterface of the sternpost to nest the forward face of the rudder, following around to match the curve for the rudder stock. (Fig. 3)

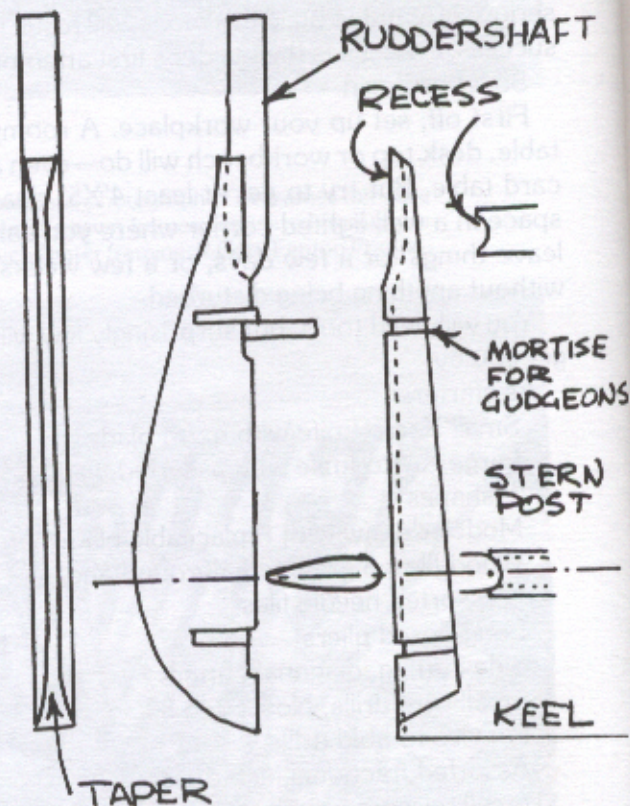
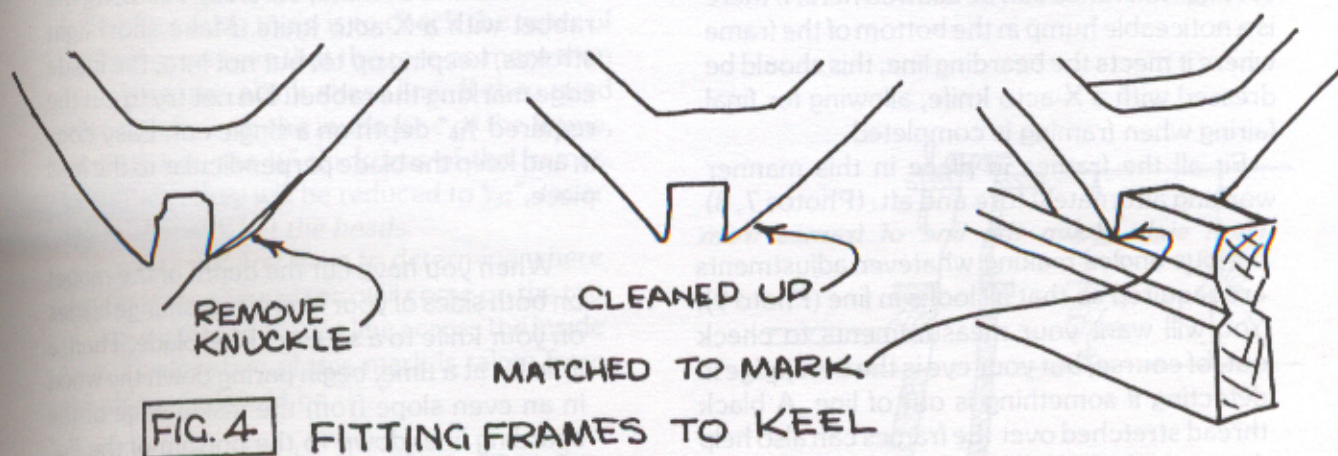


FIG. 3 RUDDER & STERNPOST

If you are using the single piece from the kit and prefer vertical grain at the stem, this modification is easily made using waste wood from your keel piece, gluing up and transferring marks as above.

If you plan a working rudder to swing on the gudgeons and pintles, do not glue the sternpost in place yet. Later, when your transom framing pieces are in place, you can drill it for the rudder shaft and then fit the sternpost back into your keel piece. (Photo 5)

At this point you can make a temporary jig to hold your backbone upright, while you set up the frames, or, much simpler, fix a 3" C-clamp to one or both ends of your keel.



Framing

Now turn to the frames. These are made of select basswood, a beautiful, closed-grain American hardwood that is easy to work and finishes to a rich honey color with linseed oil or sealer. Make sure the identification markings are strong and clear. You might repeat them in soft pencil.

Each frame will require light sanding. First wipe off the "feathers" of the saw cut with No. 100 sandpaper. Wipe away from the outside face of the frame, as if you were stroking the feathers of a bird. Then sand the inside and outside frame faces with No. 100 or 120 paper. You will note that there is some spring to the pieces, and you may break one or two until you learn how far they can be sprung. When this happens, just glue them together with yellow Elmer's glue and set aside for a bit. This will cause no damage whatever and a clean joint will not be seen—just don't use more glue than necessary.

Now we are ready for the first trial fitting of each frame to the keel piece. Begin with a frame somewhere approximately amidships, say in the general area of the R or 18 frame. Lightly dress the inside corners of the notch using a small file or a strip of $\frac{3}{16}$ " x $\frac{3}{16}$ " stripwood that has been tightly wrapped with a small piece of No. 150 or 220 sandpaper. (Fig. 4) Do not make more than a couple of wipes or you may destroy the fit. Remembering that the numbered side of the frame will always be on the port side (that is, the left-hand side looking forward), gently press the notch down over the space marked for it. If it won't seat using moderate pressure, remove and check for any irregularity in the slot. If so, dress the opening a bit with your file and check again. Repeat as required. What you are seeking is a snug—but not necessarily a tight-fit, so that the frames will stay in position by friction alone. If any frames have too loose a fit, you can pad out

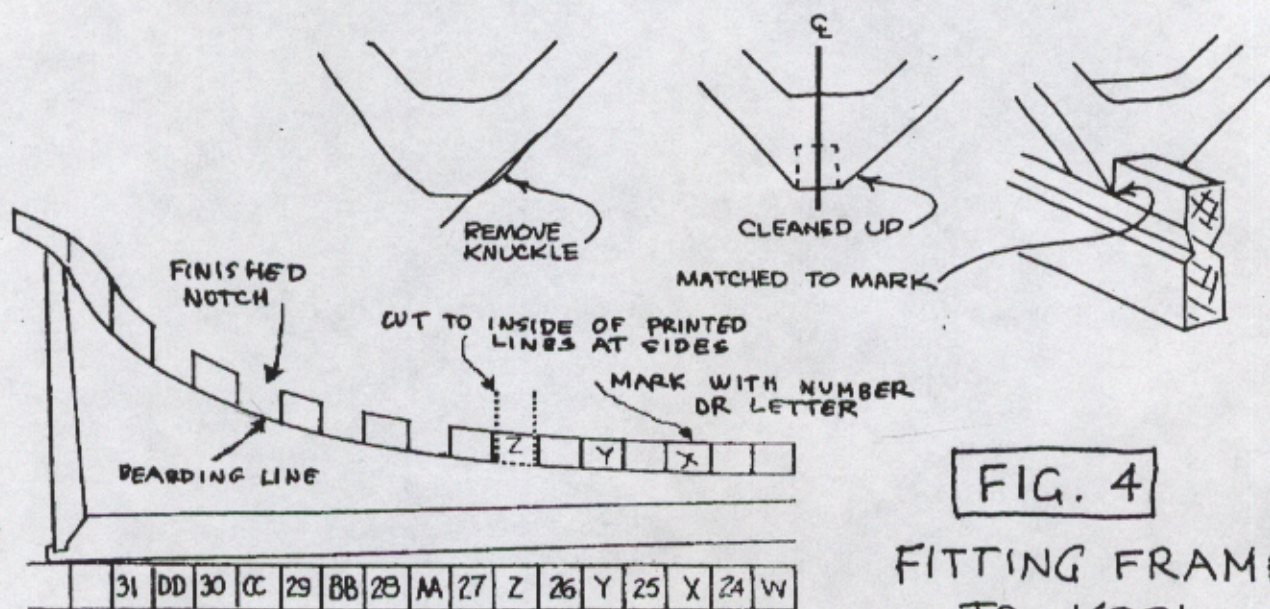


FIG. 4
FITTING FRAMES
TO KEEL

Revised Keel Notes

The last step in preparing the keel is to cut out the notches for the frames. Earlier versions of this kit supplied notched frames, as shown in the photos at the back of the book. Now you must cut notches in the keel. Depending on whether your frame set is marked with numbers or letters, identify the appropriate position above the printed identifications on the keel piece, and cut approximately 1/4" wide notches to the bearding line, keeping your saw cuts *inside* the printed lines on the keel. (See Fig. 4 above.)

Framing

Now turn to the frames. These are made of select basswood, a beautiful, closed-grain American hardwood that is easy to work and finishes to a rich honey color with linseed oil or sealer. Make sure the identification markings are strong and clear. You might repeat them in soft pencil.

Each frame will require light sanding. First wipe off the "feathers" of the saw cut with No. 100 sandpaper. Wipe away from the outside face of the frame, as

if you were stroking the feathers of a bird. Then sand the inside and outside frame faces with No 100 or 120 paper. You will note that there is some spring to the pieces, and you may break one or two until you learn how far they can be sprung. When this happens, just glue them together with yellow Elmer's glue and set aside for a bit. This will cause no damage whatever and a clean joint will not be seen—just don't use more glue than necessary.

Now we are ready for the first trial fitting of each frame to the keel piece. Begin with a frame somewhere approximately amidships, say in the general area of the R or 18 frame. Remembering that the numbers or letters on the frames will always be on the same side, gently press the frame down into the notch. If it won't seat using moderate pressure, remove and check for any irregularity in the slot. If so, dress the opening a bit with your file and check again. Repeat as required. What you are seeking is a snug—but not necessarily tight—fit, so that the frames will stay in position by friction alone. If any frames have too loose a fit, you can pad out

one of the sides of the notch with a fine wood shaving glued in place, or one or more thickness of brown wrapping paper. Do a neat job and dress down the edges with a razor blade and it will be invisible.

The bottom of each frame must touch the bearding line marked on the keel piece. (Photo 6) A $\frac{1}{64}$ " tolerance can be allowed here. If there is a noticeable hump in the bottom of the frame where it meets the bearding line, this should be dressed with a X-acto knife, allowing for final fairing when framing is completed.

Fit all the frames in place in this manner working alternately fore and aft. (Photos 7, 8) Then sight down the line of frames from various angles making whatever adjustments are required so that all looks in line (Photo 9). You will want your measurements to check out, of course, but your eye is the best judge in detecting if something is out of line. A black thread stretched over the frames can also help detect high or low spots. When you are satisfied that your frames make a perfectly symmetrical "rib cage," remove all the frames and temporarily set them aside in a box.

Now we'll go back to the keel piece and cut out the rabbet.

This is an area that frightens most model builders, but that's only because they don't understand it. A rabbet is simply a mortise cut into the keel, deadwood and stem to recess the margins of the planking into the backbone timbers so that the surfaces are flush. Depending on the angle that the planking makes when it meets the heavier timbers, this angle is long, as at the sternpost, or short, as at the mid-length of the keel. A bit of study of the section drawings on the construction plan will make this clear. The part that troubles modelers most is cutting the changing angle from the rabbet line down to the bottom of the mortise where there is an inner, or middle, line.

Well, on a full size ship, this certainly is important to get right, for in order to get a joint that can be caulked tight, the inside edge of the plank must fit tight against the middle line of the mortise, while the outside edge of the plank must set away just enough to let the caulking be driven. But on a model, we do not

have to worry about a caulking joint. Rather, what we want is a neat, uniform joint with no gaps or irregularities. So in cutting the rabbet, simply concentrate on getting the proper depth of the mortise cutout (this will be $\frac{1}{16}$ ", since this will be the thickness of our planking). And also we will want clean, even edges along the rabbet line.

With all this in mind, carefully cut along the rabbet with a X-acto knife. Make short light strokes, keeping up to, but not into, the inside edge marking the rabbet. Do not try to cut the required $\frac{1}{16}$ " depth on a single cut. Easy does it; and keep the blade perpendicular to the keel piece.

When you have cut the depth of the rabbet on both sides of your keel piece, change blades on your knife to a square chisel blade. Then, a little bit at a time, begin paring down the wood in an even slope from the inside edge of the bearding line, down to the bottom of the $\frac{1}{16}$ " cut just completed at the rabbet. (Photo 10) Be careful coming to the rabbet so you do not damage the clean edge of the rabbet cut. Work slowly and carefully, changing to a new blade if the cutting becomes difficult. Work the slope from bearding line to rabbet smooth and uniform with no high spots or low spots. (Photo 11). No. 150 sandpaper wrapped around small blocks of wood will do a nice finishing job (careful of the sharp edge of the rabbet).

The timberheads (also called rail stanchions) are the parts of the frame that extend above the deck to support the bulwark or rail. Sometimes the frames ended just below the deck and the stanchions were separate pieces fastened to the heads of the frames, or more likely, slipped between the sheer plank and sheer clamp and through-bolted.

There is always a problem in keeping a tight seal where timberheads come through the waterway. Fresh water (the enemy of ship timbers) leaking here, quickly sets up rot that can run the length of the frame which is difficult to repair. The remedy when rot is discovered is to cut off the timberhead under the waterway and fit a "sister" piece alongside the frame to the depth of several planks, and

then throughbolt the sister through the planking and sheer clamp. These could easily be replaced should they in turn develop rot.

Sometimes, in anticipation of this problem, ships are built with sisters as the stanchion pieces, rather than the timberheads, but not knowing in the case of the *Jefferson Davis*, we will proceed with the timberhead extensions of the frames.

The first thing to do is to check the taper of the frames and see that they are no more than $\frac{3}{16}$ " above the plank sheer line. If they need thinning, do it on the inside face of the frame, tapering into the $\frac{1}{4}$ " thickness of the frames. Eventually, they will be reduced to $\frac{5}{32}$ ", tapering to almost $\frac{1}{8}$ " at the heads.

Next, we will first have to determine where the top of the sheer clamp will come on the top of each frame and mark a line across the inside face. The location of this mark is taken from the plans—it should be $\frac{13}{16}$ "

This distance will be the same, since the height of the bulwark is the same all along the waist and in the well deck aft. (Later, additional clamps will be added in the quarterdeck and forecastle deck areas.)

A simple jig, as shown (Photo 12) will help keep the marks uniform.

Make another mark on the inside face of each frame, extending longitudinally from the first mark to the head of the frame. (Photo 13) What you will be doing is cutting away half of the frame in order to have a timberhead that measures $\frac{3}{16}$ " on all four sides. In all cases, the piece to be cut away must be on the after side of the frame. It is wise to check and double check and when you are sure, mark the part to be cut away with small x's as shown so as not to make a mistake cutting them down. (Photo 14)

If you have marked the frames correctly, you can see that you have isolated a bulwark stanchion on the end of each frame, port and starboard. Your pencil should be kept sharp in order to have narrow marks. The stanchion dimensions you are looking for are $\frac{7}{32}$ " square at the sheer clamp line, $\frac{3}{16}$ " square $\frac{1}{4}$ " higher at the planksheer line or midway and about $\frac{1}{8}$ "

square at the top—all in a gradual taper (Fig. 5). It is too much to expect to get precise dimensions. So try to stay on the full side, rather than scant. Uniformity is the main objective, and any stanchions that wind up obviously too large can always be trimmed back.

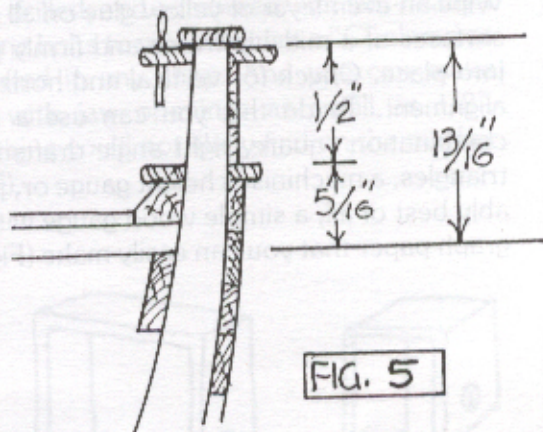


FIG. 5

BULWARK SECTION

The cutting down procedure can either be done by hand with a fine-toothed saw (Photo 15) or with a power scroll saw (Photo 16). Note the wood block used as a guide to keep the cut at a right angle to the frame face.

To sand the flats of the frame, tape a sheet of sandpaper to your work table and gently work each side of the frame back and forth until you get a reasonably smooth surface. (Photo 17) Do not try to get a perfect finish—you will remove too much wood and wind up with undersized frames. The outside frame surface is the only one that will really show, and the final sanding can wait until just before planking when the frames will be strong and solidly braced. (Naturally you will not sand away your frame identification numbers!)

It is a good idea to always keep your frames in numerical order while working on them. Keep them in groups of six or eight, held together with rubber bands, to avoid mix-ups.

So, finally you are ready to set up and fasten the frames in place. You already know they are going to fit and line up right because you've checked them before. This time you'll set them in the yellow glue and you'll check and measure each one for alignment as you go.

First, using a right angle square, check that the keel piece is setting vertical to your table. Wipe an even layer of yellow glue on all three surfaces of a midship frame and firmly press into place. Check for vertical and horizontal alignment. To do this you can use a small combination square, right angle draftsman's triangles, a machinist's height gauge or, probably best of all, a simple wood gauge with $\frac{1}{8}$ " graph paper that you can easily make (Fig. 6).

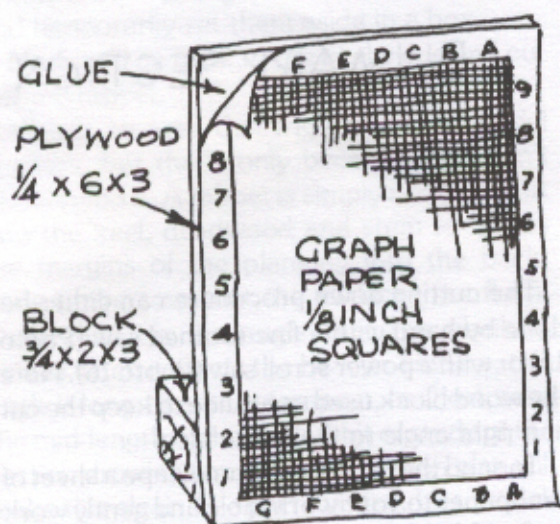


FIG. 6 FRAME TRUING GAUGE

Check first that the frame is exactly vertical, at right angles to the waterline and your worktable. Then measure to be certain that

the tops of both timberheads are the same height from your table (Photo 18). Adjust as necessary. Then make a final check that the frame is still vertical, and move on to the next frame (Photos 19, 20).

When all your frames are in place, examine your hull—for that is what it has now become—for symmetrical frame alignment. As you did earlier in your first alignment check, use your eye to discover jigs or jogs in a fair sweep down the line. Check also that all frames have their lower ends down to the bearding line. A very small amount of unevenness, say $\frac{1}{64}$ ", can be tolerated, for corrections can be worked out at later construction stages. But if any frame is grossly out of step with its neighbors, in the amount of $\frac{1}{32}$ " to $\frac{1}{16}$ ", carefully work it free, breaking the glue bond, and reset it. If the glue is set too much, you may break the frame in getting it free, whereupon just glue your frame back together and set it aside overnight when it will be as good as new.

Next on the schedule is setting up the stern framing. Here you have an option: You can frame up the stern from separate wood pieces or you can utilize the carved stern piece furnished with your kit.

Making a built-up stern, although time consuming is not as formidable as you might think. There are several approaches you can use. The first is to build up the stern with cant frames as shown in the construction plan of the *Jefferson Davis* (sheet 3). This will require a fashion piece around the curve of the knuckle. This piece should be much over-size, say $\frac{3}{16}$ " square, and then steam-bent to the curve required (Photo 21).

Steam bending is a simple process. Set a shallow pan with a half-inch of water to boil on your kitchen stove. Drop the pieces to be bent into the water for several minutes, holding them under with a small weight, such as a table knife. Remove with forceps and before the wood has a chance to cool, carefully bend around an appropriate form, such as a water tumbler, or an especially shaped forming jig. Hold in place with pins or tape and let dry overnight (Photo 22).

The fashion piece then must have the edges worked to angles so that, when fitted above the angle of the knuckle, the bottom planking below and the bulwark planking above, will fit fairly against it. After these planks are fitted, the thickness of the fashion piece can be sanded down flush with the planking.

Another method is to mark the cant frames on the solid stern piece supplied with the Bluejacket kit and cut them out, leaving a web of wood at the knuckle line to keep the stern form. This, in effect, results in a comb shape above and below the line of the knuckle.

But, of course, the simplest and easiest stern construction method is to use the carved piece supplied in the kit—a route that probably every model builder but the diehard purist will choose. This requires only that the piece be sanded and dimensions checked so that other pieces will fair into it. A bit of “joggling” will probably be needed, trimming a bit here and there, so it fits on the end of the horn timber properly. You may also want to cut mortises for the sheer strake and keelson ends to fit into (Photo 23). Make frequent checks of position with a pair of dividers because it is important that the angle, height, etc., be as close as possible to that shown on the plans. But don't worry if it is just a trifle off—adjustments can be worked in later on. This is the time to drill for the rudder shaft and install the sternpost (Photo 5).

The bow-assembly piece combining knight heads and hawse timbers should offer little problem. Dress out the slot to make a good fit on the stem head and check its position carefully against the plans before gluing.

Next, you can fit a keelson over the parts of the frames down the centerline. Choose a strip $\frac{1}{16}$ " x $\frac{1}{4}$ " x 24" long. (Note; if you ever need a longer piece of wood than you have in your supply, join two or more pieces with a plank splice). Check to see that the keelson will lie fair on the floors of the frames; dress down any high spots that prevent uniform contact.

Fasten the keelson in place with glue and No. 75 drill size pins or model nails, drilling beforehand to get an easy driving fit. You need not drive the pins all the way in; you can clip off the heads and press the remainder flush, or

even remove them entirely after the glue has set.

From here on out, you're going to need a lot of clamps, so take a break from your boat building and make yourself a mountain of clamps. And plan to make more than you think you could ever possibly use. Even so, you'll not have enough for no shipyard in history ever did!

Clamp making is easy work. You can turn out 50 to 100 in a few hours. A few short lengths of aluminum channel can be sliced down, drilled, and combined with slot-headed machine bolts to make as neat a “C” clamp as you'll find in any shop. And you can make them with jaw openings as small as $\frac{1}{2}$ ", something you'll not likely find on the market (Fig. 7).

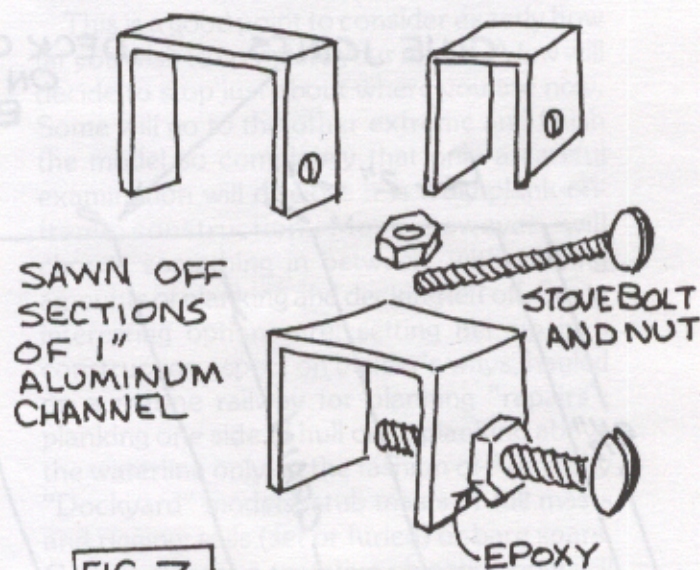


FIG. 7

QUICK & EASY C-CLAMPS

A package of 50 spring-type clothes pins and a jigsaw or grinding wheel can quickly result in a wide selection of spring clamps for all sorts of applications.

Now back to the model. Fitting the sheer clamps is next. Check to see that the pencil mark for the top of the sheer clamp is still inside each frame. Each clamp will be a $\frac{1}{16}$ " x

$\frac{1}{4}$ " strip running the entire length. Trial-fit these pieces, holding them in place with spring clothes pins (Photos 24, 25). Before gluing, however, a ribband, or backing piece, must be fitted along the outside of the timberheads on both sides to maintain the symmetry of the hull. Use two pieces $\frac{1}{16}$ " x $\frac{1}{4}$ " x 24" (splice two pieces if necessary). Clamp the ends securely on both sides of the stemhead and using at least a dozen spring clamps to each side, form snugly to the frames without any voids. Now you can glue the sheer clamps in place with the jaws of the clamps holding the frame between the longitudinal strips on either side. When glue has set, remove ribband strips and use them for the bilge stringers, fitting them midway between the sheer clamps and keelson (Photos 26, 27). Small "C" clamps will serve to hold them in place until glue sets.

When this is done, add additional clamps for the elevated quarterdeck and forecastle deck, again taking the distances from your plans.

Now check the frames for fairness. Spring a flexible batten—a strip of $\frac{1}{16}$ " x $\frac{1}{16}$ " material will do—along the frame to see that there is reasonable fairness (Photo 28). Again, your eye is one of the best checks to fairness. Pare down any humps that would prevent planking from laying flush on the frames. And when you're satisfied give a pass with a sanding block or hand sanding machine with #100 paper. Be very careful not to let sandpaper touch the edge of your rabbet.

At this point your model is starting to resemble a real little ship in frame, and you should feel greatly encouraged as you turn to the assignment of framing the deck.

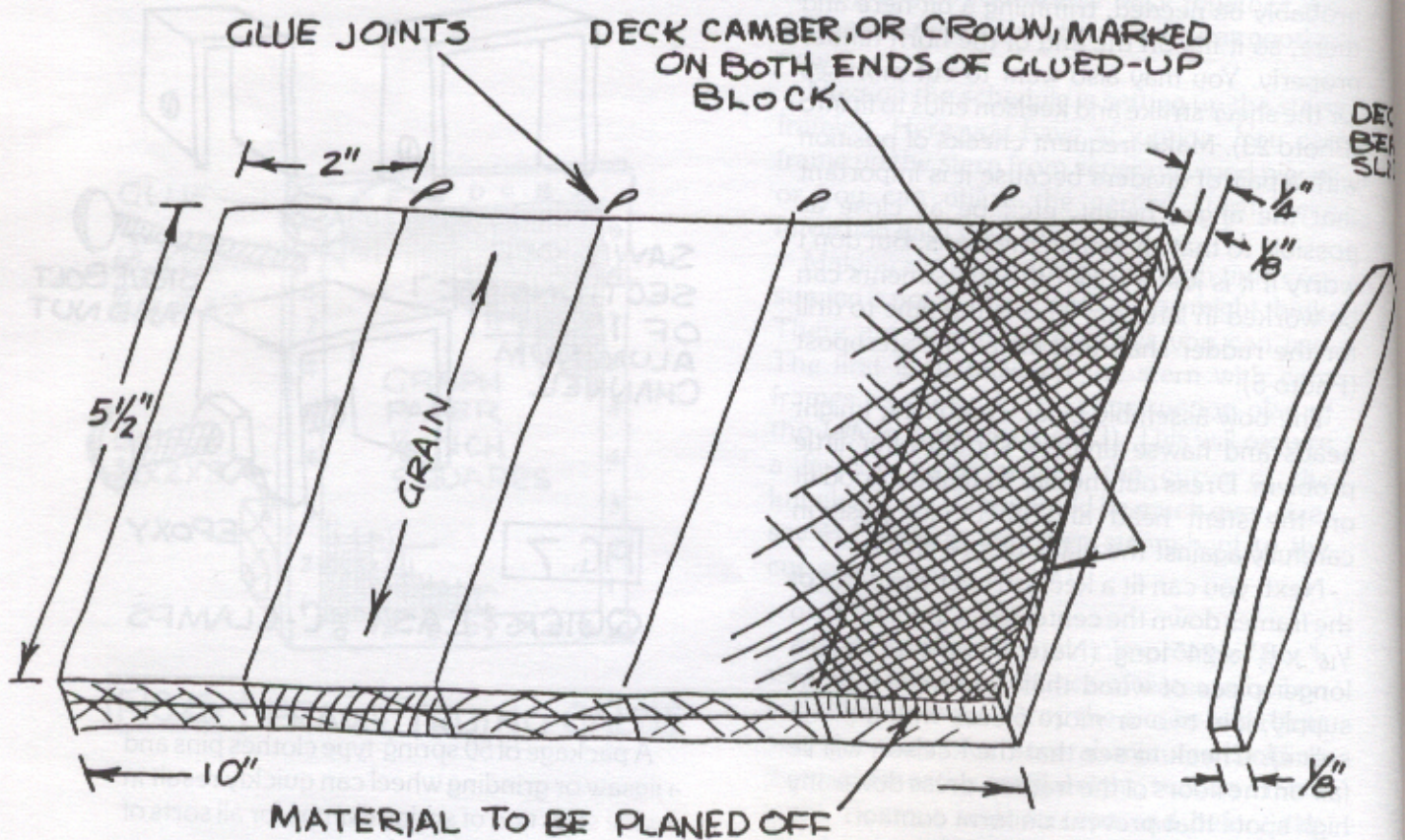


FIG. 8 "ONE HOUR" METHOD OF MAKING 40 DECK BEAMS

You will need about 34-36 deck beams, so 40 beams will give you enough, allowing for waste and mistakes. The beams would have measured about 6" square, so $\frac{1}{8}$ " square is fine for your model. All the beams will be made to the maximum width of the deck, and where shorter beams are required, you will trim both ends of beam equally in order to maintain the uniformity of the deck crown. The same applies to the short beams at the deck openings; take the pieces from the ends of a single beam, discarding the center piece.

The fastest and easiest way to make your beams is to make up a single piece of thin wood with the proper crown worked out of one surface and then slice off the individual beams like strips of breakfast bacon. Make five pieces of wood $\frac{1}{4}$ " x 2" x $5\frac{1}{2}$ " from the material supplied and edge glue the long edges to make a single piece, $\frac{1}{4}$ " x $5\frac{1}{2}$ " x 10" (Fig. 8). With a 4H pencil, carefully mark both $5\frac{1}{2}$ " edges with the deck-crown curve shown on the construction plan. Then dress down to the line with a small plane and sanding block. If you cut $\frac{1}{8}$ " pieces, allowing for $\frac{1}{8}$ " saw kerf, you will get 40 frames out of the piece. Note that the beams are not curved on the underside since this will not show.

The foredeck beams, however, will have to be curved on the underside to give clearance for the bowsprit. An easy way to cut the underneath curve is shown in Photos 29, 30.

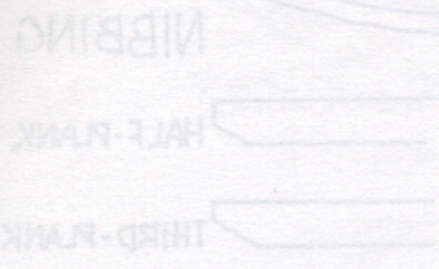
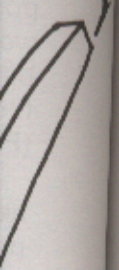
Now lay out your frames as shown on the deck framing plan. Mark the center of each beam so you can keep the crown aligned in the center line of your model. Remember that when you trim the ends off to make shorter beams, you must cut back the undersides of the new ends (where they rest on the sheer clamp) so they will only be $\frac{1}{8}$ " high (Photos 31, 32).

Assemblies can be made on your work table and fitted into the hull as a unit. Butt joints are easily made with a sharp blade (Photos 33, 34, 35). Try to make joints reasonably close fitting, although the glue will fill gaps to some degree.

Then, continue the deck framing. Place the beams and assemblies on the sheer clamps and check with your eye for any gross misalignment. This will not be as easy as it was with the frames, particularly since some of the short beams may not rest on the frames without strapping down. Make whatever adjustments seem necessary and glue beams and assemblies in place (Photo 36). (Note: it is not important that deck beams always space the same distance from the frames. The naval architect will probably draw them this way, but the shipwright usually has to make adjustments.)

This is a good point to consider exactly how far you wish to complete your model. A few will decide to stop just about where you are now. Some will go to the other extreme and finish the model so completely that only a careful examination will disclose it is truly plank-on-frame construction. Most, however, will choose something in between, with varying amounts of planking and decking left off. Some interesting options are: setting her up in a construction aspect on builder's ways; hauled on a marine railway for planking "repairs"; planking one side of hull only; planking above the waterline only, in the fashion of Admiralty "Dockyard" models; stub masts or full masts and rigging; sails (set or furled) or bare spars. Getting at least a tentative objective now will help in decisions you'll soon be making.

DECK
BEAM
SLICE



Decking

Returning to your model, the next step will be that of fitting the waterways, which are the margin planks of the deck at the base of the bulwarks.

Waterways on merchant ships and those on naval craft were different. Naval waterways acted as a stop for the forward wheels of gun carriages when guns were run out. This, then, was the shape of waterways on the Jefferson Davis. A covering piece—the plank sheer—acted also as a lower sill wherever gun ports were cut into the bulwarks.

So begin your decking with waterways fashioned from $\frac{1}{8}$ " x $\frac{1}{8}$ " strips, beveling the inside upper edge as shown.

Next, take a strip of hard cardboard, such as artists' bristol board or file folder, and cut one edge approximately to the curve of the waterway. Don't have a gap of more than $\frac{1}{8}$ ". Tape this to the deck beams, and using a draftsman's compass set for an opening of no more than $\frac{1}{4}$ ", mark the curve of the waterway. Cut the cardboard to this mark and check for fit. If there are visible gaps, repeat process with the compass, being careful not to change the angle of the compass when marking. When a good fit is obtained, repeat for the opposite side. (Photo 37)

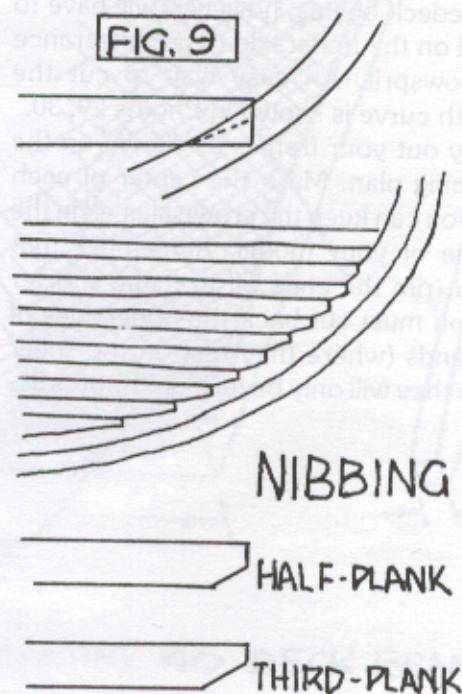
Making a template for the plank sheer is the next step. When these pieces were fitted on a real ship, a certain amount of gapping in the joints could be tolerated because these joints were sealed with cedar wedges and a bit of an opening was required for the wedges to enter. On your model, however, this is not feasible so a very accurate fit is needed and thus the need for an accurate template.

The easiest method is to piece up an assembly duplicating each face of the stanchions.

Cut a half dozen strips of hard cardboard, 10 inches long by $1\frac{1}{2}$ " wide and roughly cut an edge of one piece to fit reasonably close to the inside of the stanchions. Don't have it gap wider than, say, $\frac{1}{8}$ " away from the inside stanchion faces.

Tape this strip securely to the deck beams so it cannot shift position. (Photo 38) Then cut the ends of the remaining cardboard strips into many pieces $\frac{1}{8}$ " wide. Fit these pieces, one at a time, into each side of the spaces between stanchions and another against the inside face of each stanchion. Make sure each piece aligns flat against the face it will delineate; secure each piece individually with masking tape or a dot of glue. Finally, use a thin batten and mark the line of the outside stanchion faces on your template. (Photo 38) When completed, carefully remove, and with a sharp 4H pencil, transfer the outline of the template to your plank sheer pieces. Do this for the remaining plank sheer; carefully cut out all notches.

Take your time when fitting the plank sheers into place. The better the fit, the more friction there will be. Try to advance the piece evenly all along its length. You may find it necessary to make some small adjustments, shaving a bit off here or gluing a sliver there. (Photo 39) When



you are satisfied, glue into place, placing glue along the top of the waterway pieces and the inboard faces of the stanchions. Check the top face for horizontal level.

There are two ways to plank the decks. The first method is like the real ships were decked: fit a margin plank around the edges, against the waterways, fitting and gluing each individual plank, nibbing the ends into the margin plank as required (Fig. 9). Deck seams can be emphasized by adding a bit of india ink to the glue and when completed, scraping and sanding will level the surface and clean away the surplus glue.

This is a relatively simple process and goes rather quickly. It is the same way that decks on full sized ships are laid. The only difficulty in the model is avoiding damage when scraping and sanding in such close quarters—just use care (Photo 40).

An easier way is to glue the planks up on the flat of your workbench, clean up and sand smooth away from the model, then trim the shape and install as a simple unit and it will look exactly as if the planks were laid individually (probably a lot neater, too). Even better, is to use a sheet of ready glued-up decking. Blue-jacket sells it quite reasonably.

Using sheet decking requires a template of the entire deck, pieced up cardboard with the edges spiled and cut to a close fit against the waterways. Do this for all four deck areas: forecastle, main, quarter and well decks. (Photos 41, 42).

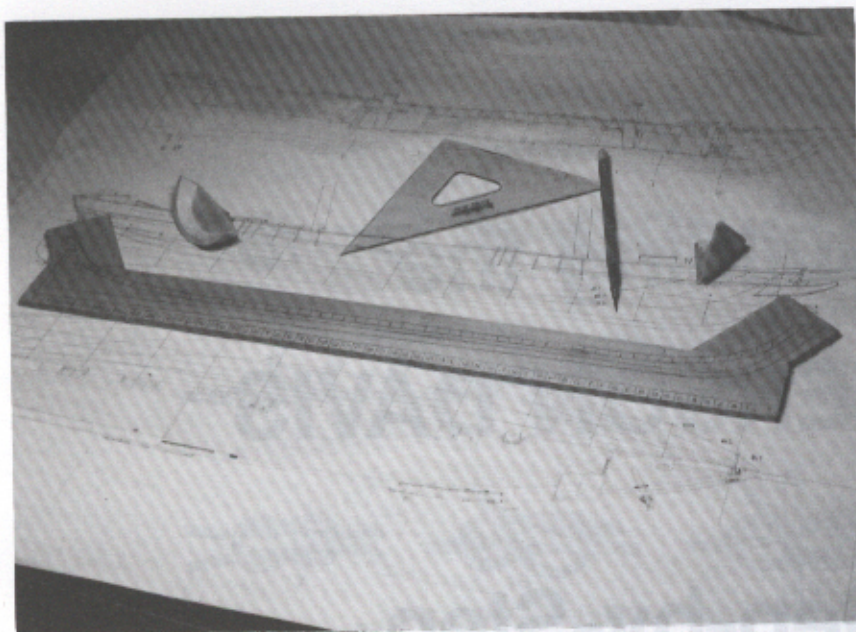
On a sheet of white cardboard, lay out the shape of the deck and a $\frac{1}{4}$ " wide margin plank. Mark the inside edges of the margin plank so that the outer planks on both sides of the deck are equal in width. Then work out the nibbing pattern.

The usual rule is when the end of a plank butting the margin plank is longer than the width of the plank, it must be nibbed into the margin plank. Half the width of the plank will then mortise into the margin plank and then angle back to the edge of the margin plank (Fig. 9, Photo 43). For a better appearance, use $\frac{1}{3}$ rd widths, rather than $\frac{1}{2}$ widths.

Mark all the nibs, cut them out, and use these edges as a template to mark the margin plank. Cut the margin plank for the nibs and glue together (Photo 44). Then, after hatch openings are cut, the entire piece can be glued into place. (Photo 45).

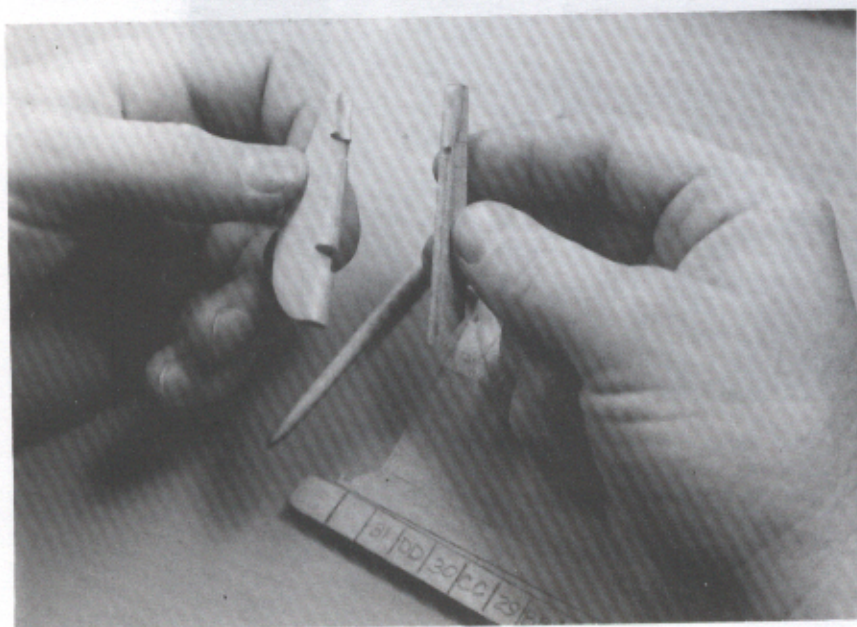
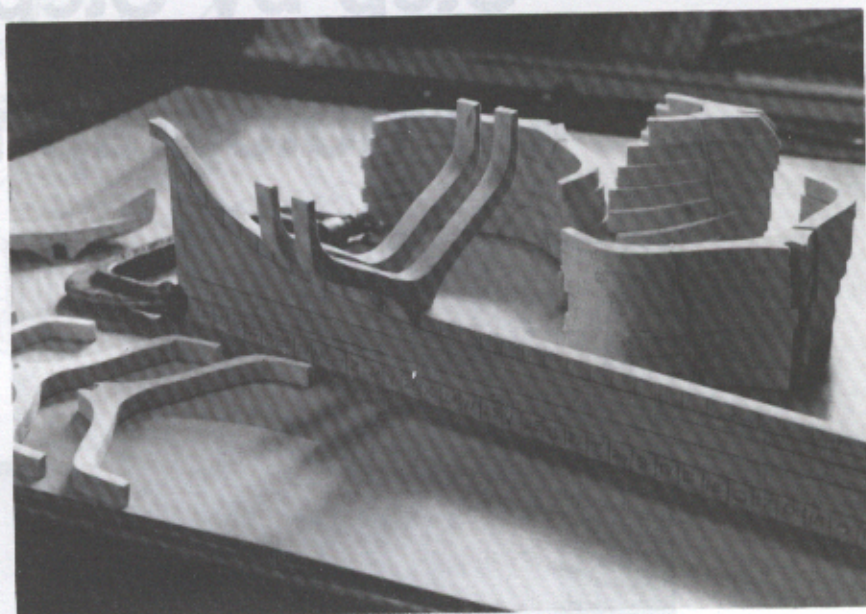
Repeat this process for the foredeck (Photo 44). Cut opening for bowsprit on the template, then cut decking piece, but do not install until bowsprit is fitted. Nibbing is not required for quarterdeck or well deck planking. (Photos 46, 47). They will be glued when the end bulkheads and companion openings are completed.

This is probably a good time to cut the opening for the bowsprit. Take a piece of stock $\frac{1}{2}$ " square by 7" long and make a centerline down the length of one face, and with this face uppermost, tape the piece exactly in the center of the hull, resting it on the deck beams aft and the bow piece forward. Sight down the pencil mark onto the main deck beams and measure again and again to be certain that the wood piece is *precisely* centered on the hull where it rests on the bow piece. When you are satisfied, tape it securely in place so it cannot shift. Now take a fine toothed razor saw and, holding it flush against a flat side of the bowsprit stock, make a vertical cut through the web on the end of the bow piece. Work slowly and carefully so as not to disturb the alignment. (Photo 48) When both sides are cut and the web removed the opening is complete.



2. Keel stock with bow and stern pieces fitted as when scratch building. Keel and frame markings have been transferred from plans.

3. Beginning the trial fitting of frames. Frames are kept in consecutive order by groups of six or so, held together with rubber bands.



4. Sternpost cut out and face of rudder blank checked for fit.

1. Stern view of partially
skewed Johnson bars.
Two 12 pounders are fixed
on deck. Print in back
ground is the sail plan
along the low courses.

Cut a tenon on the heel of the bowsprit so that it fits between the bitts, resting on the deck. The bottom of the heel must be cut to a slight angle to fit. When a good fit is obtained, the foredeck can be glued in place and water-

ways added. Use spring clamps to hold while gluing and back the clamps on the outboard side with a length of $\frac{1}{16}$ " stock to bridge the gaps between timberheads. (Photo 54)

Planking the Bulwarks

Now we can turn back to the outside of our hull and begin the interesting chore of planking. We'll start with that great bugaboo of shipbuilders: the elliptical stern. There are quite a number of methods of building such a stern and each yard usually had their own techniques. Some were complicated; some were simple.

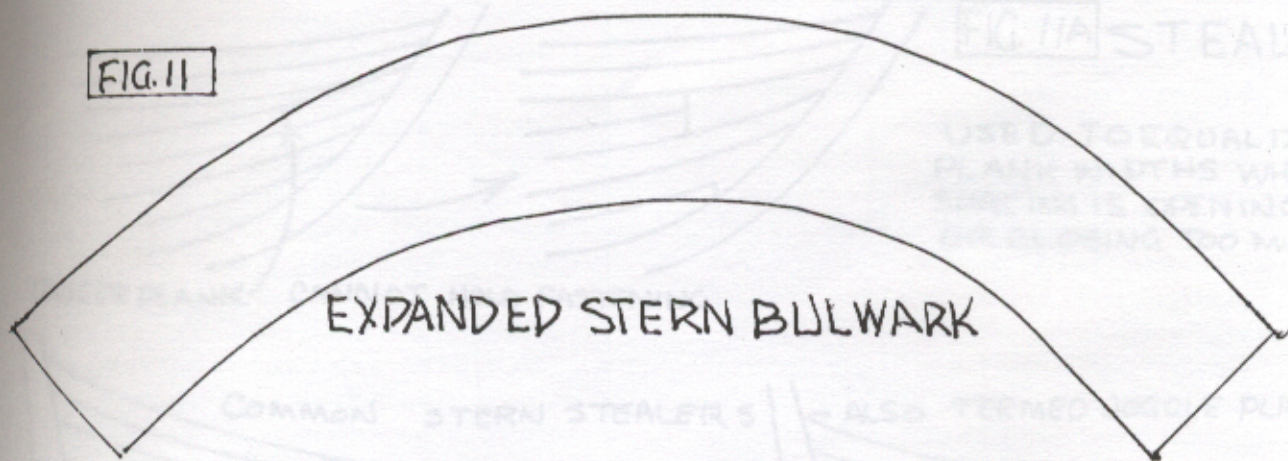
The simplest, perhaps, was the one used on the handsome *Shenandoah*, shown earlier in this book. Baulks of timber were laid up in the rough shape of the stern bulwarks and the proper shape was worked down in the manner of a sculptor. This method has a number of virtues, mainly that of eliminating the complicated framing and providing the stability of a single, solid piece.

If I were to build a schooner with such a stern, I might choose to use what is called the "cold molding" process—a multiple lamination of narrow wood strips which shapes itself to compound curves and is exceptionally strong and stable. With the development of epoxy adhesives, this technique is being used today to "plank" entire vessels 100-feet and longer. This technique should also be used on your model.

Another technique for round sterns calls for vertical planking, barrel-stave fashion, all the way around, each plank slightly V-shaped to provide the required flare. This also avoids the problem of compound curves.

The more traditional way is to use horizontal planking. There is a problem here, however, which you can see from the expanded shape of the stern bulwark (Fig. 11). The arcs required

FIG. 11



to fit the curve of the stern are extremely wasteful of materials. This necessitates using short lengths of planking—no more than six to eight feet—with staggered butt joints. If not done well, it can look like patch work.

Fortunately, we are building a model and waste is not a problem, so we can make up pieces of planking as long as we wish. Begin by making a paper template of the stern (Photo 56). Make it long enough to overlap the first frame forward of the quarterdeck bulkhead. If you wish to plank your stern with individual planks, divide your template into three equal sections above the plank sheer and one below. Each should be $\frac{1}{4}$ -inch wide. Cut four strips from $\frac{1}{32}$ -inch stock, $\frac{1}{4}$ -inch wide, to the curve of your template. Fit and glue each piece separately to be sure of getting a close fitting joint. If necessary, you can always go back and emphasize the seams with a dull knife, but open gaps are unsightly and difficult to camouflage. A strip for the planksheer should be fitted above the lowest plank. This should be $\frac{1}{16}$ " x $\frac{1}{8}$ ", steambent if required, as shown in photos 21, 22. With the planksheer strip in place, the lowest plank will overhang the knuckle slightly. This will be dressed off at an angle after additional planking is added below.

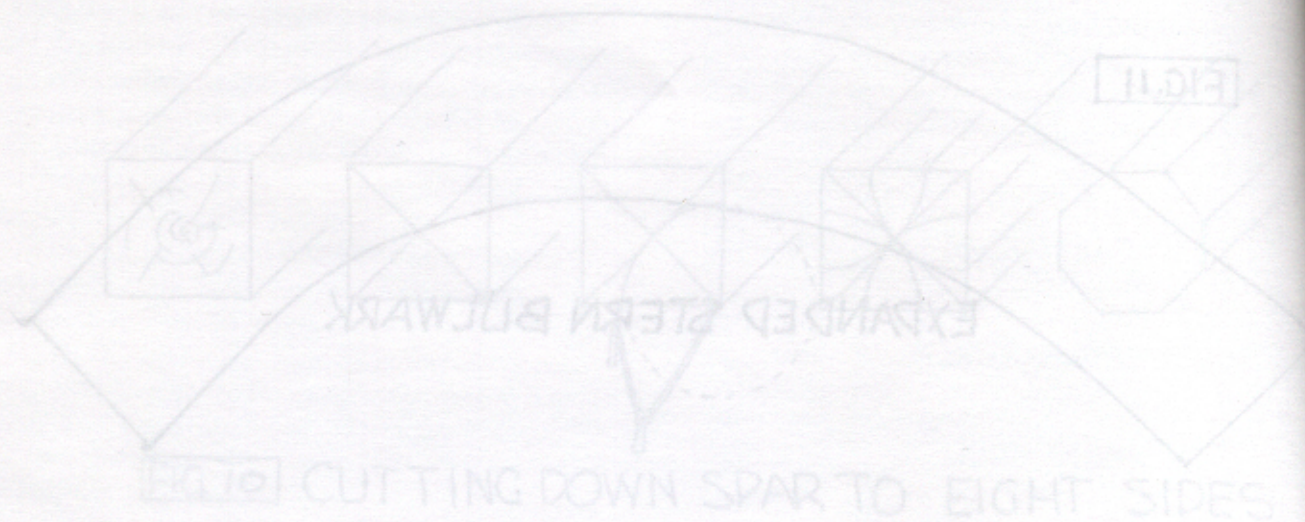
In the case of the model illustrated, a single, large piece of $\frac{1}{32}$ -inch stock was fitted to the stern with spring clothespins. Photo 57. With the planksheer molding in place and trimmed to shape, planking seams were indicated with a dull knife and a flexible plastic strip as a guide.

This method may not be traditional, but it looks good and saves an awful lot of time.

In order to plank the bulwarks on the sides, the outer piece of the plank sheer must be fitted. Spring a piece of $\frac{1}{16}$ " x $\frac{1}{8}$ " along the plank sheer, mark the centers of the timberheads and hold in place with pins. Sight down the length of the strip for fairness of the curve and adjust if required. (Photo 58).

This strip must also sweep into the upper edge of the trailboards, so it is necessary to temporarily fit the trailboards (or pattern shapes) in place in order to establish the required curve of the forward ends of the planksheer strips. When all is in order, glue strips into place, holding with pins and spring clips.

Trim the forward edges of the stern bulwark planking so that the ends are lined up on the centerline of the timberhead. The three planks, each $\frac{1}{4}$ " x $\frac{1}{32}$ ", will butt the stern planking on this timberhead. Glue these planks in place, one at a time, using a drop of glue on each timberhead and edge-setting each tightly down to the sheer curve with little or no discernable gap. You will need spring clothes clips on each timberhead to hold the planking in place, backed by a $\frac{1}{16}$ " x $\frac{1}{4}$ " strip on the inside to equalize the pressure. Be sure to have the planking overhang the bowsprit opening by $\frac{1}{8}$ " to provide for the final trimming. When set, a large sandpaper block can be used level off the tops of the timberheads and the top edge of the planking.



Planking the Hull

If you were building a wall-sided barge, your job of planking would be simplicity itself. However, a ship is not formed of right angles, but of compound curves, and before you begin planking, you should understand the principles of measuring, marking and fitting ship's planking. A properly planked model looks right simply because it is right. Nothing destroys the effect of an otherwise well built model than the glaring evidence that the builder didn't understand the basics of planking.

To help understand the planking of a ship's hull, you might visualize a wooden barrel lying on its side, with the staves horizontal. Where the girth of the barrel is the greatest the staves are the widest. At the ends, where the girth is less, the planks bend inwards and are tapered to conform to the reduced dimension. Thus, at anywhere along the length of the barrel, there are the same number of equally spaced wood staves.

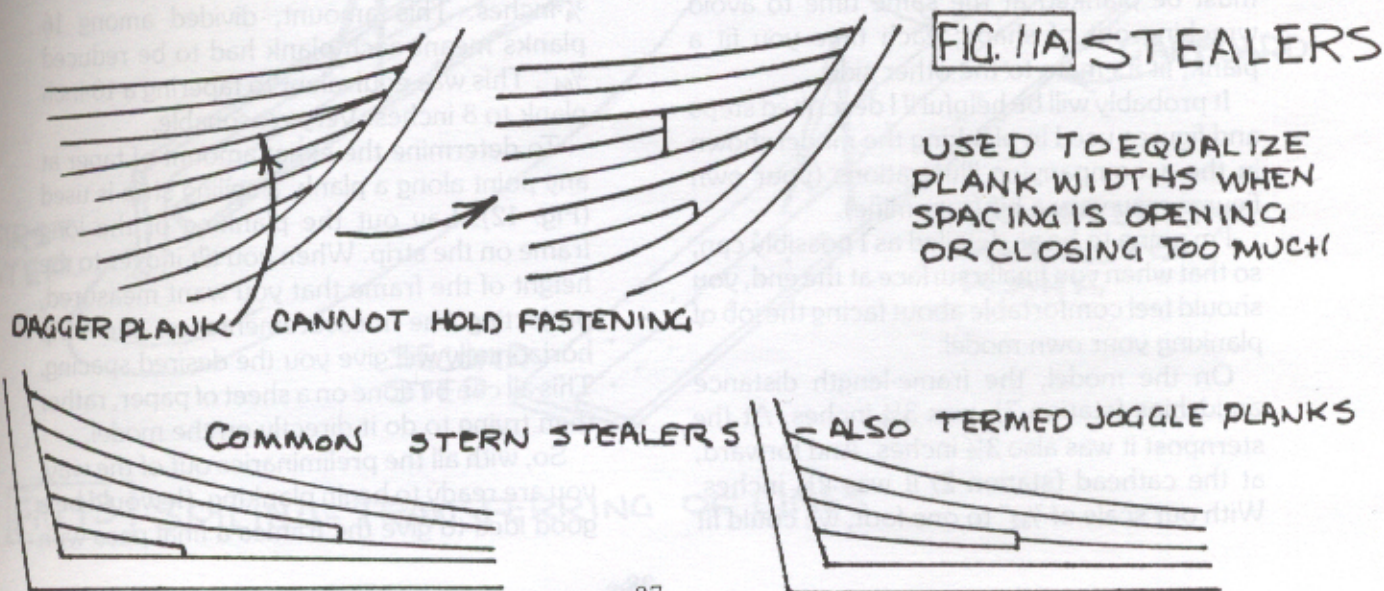
Now, if you sawed the barrel in half lengthwise and removed the top half, the remainder would be a properly planked "boat." (In fact, there are small square-end boats being built today, called Prams, that have a surprising resemblance to half barrels.)

So where a ship is to be planked, its longest

frame must first be found, usually located at the point of greatest beam. Next, the desired width of the planks is determined. Then, the number of planks that will fit between the deck to the rabbet line is calculated. Suppose, for example, this distance was 10 feet and you wanted to use planking 6 inches wide. This works out to 20 planks. Now suppose further, that the measurement at the bow was 6 feet and at the stern it was 8 feet. We would still want 20 planks at each place. A little arithmetic shows that each plank at the bow should measure $3\frac{5}{8}$ inches and at the stern should measure $4\frac{13}{16}$ inches.

That's the general principal of measuring ship's planking. There are other considerations that affect planking, such as historical period, shape of hull, type of vessel, regional practice, etc., but the basic principle generally holds.

One interesting planking rule is the 5-4-3 rule of proportion and this addresses itself to the aesthetics of planking above the waterline. Its purpose is to insure an appearance of lightness and grace to the ends of a vessel. Very simply, it holds that the width of the planks forward should be $\frac{4}{5}$ of the plank width amidships, and the planks aft should measure $\frac{3}{5}$ of the midships planks—or 5 amidships, 4 forward and 3 aft.



Of course, once below the waterline you would taper as first discussed in order to equalize proportions. Usually it is necessary to do a bit of shifting about to get everything to fit your plan. Sometimes it may be impossible to get your sizes of tapers to work out right; you may simply have too much or too little space at the ends of the hull. In that case, you can work in a short "stealer" plank. (Fig. 11A). But this should be done only as a last measure, and never above the waterline.

A plank, on the hull or on deck, should never end in so sharp an end that there is not sufficient wood to hold a fastening. Such "dagger" ends invariably resulted in leaks.

It is good practice to mark the run of planking on the frames using 3 to 6 equally spaced battens, sprung to the required lines and temporarily fastened to the frames. This gives you a good visual check of the proper taper as you plank each section at a time. You could also lightly mark with pencil the outlines of all the planking on the frames and deadwood. A spiling strip will give you your measured marks and battens will check the marks for fairness.

Now turn back to your model and put some of this theory into practice. Normal procedure is to plank from the sheer (deckline) downwards and from the rabbet upwards, closing in somewhere near the turn of the bilge (usually a bit below the waterline) with a plank, called the "shutter plank." And both sides of the hull must be planked at the same time to avoid wracking out of shape; each time you fit a plank, fit its mate to the other side.

It probably will be helpful if I described steps and figures used in planking the model shown in the accompanying illustrations (your own figures may vary a bit from mine).

I'm going to be as detailed as I possibly can, so that when you finally surface at the end, you should feel comfortable about facing the job of planking your own model.

On the model, the frame-length distance amidships (station 7), was $3\frac{1}{4}$ inches. At the sternpost it was also $3\frac{1}{4}$ inches. And forward, at the cathead (station 2) it was $2\frac{1}{2}$ inches. With our scale of $\frac{7}{32}$ " to one foot, we could fit

at amidships the equivalent of 14 12-inch planks and one ten-inch plank or in model size, $\frac{7}{32}$ " and $\frac{3}{32}$ " wide planks. These are reasonable sizes, but because it is good practice to fit a wide garboard (the lowest plank) for its strength and to avoid having a plank seam over the joint of the frames, I chose an 18-inch plank for the garboard— $\frac{5}{16}$ " in our model scale.

The next several planks up would be on the hollow of the hull, so to reduce the amount of shaping to make the planks lie fair on the frames, I decided on 10-inch planks— $\frac{3}{16}$ " in our model scale.

The upper planks, starting with the sheer strake which fits under the planksheer (don't get them confused), were also required to be narrower because of the convex hull shape, particularly in the quarters. So again, the choice was for 10-inch planks— $\frac{3}{16}$ " in scale. Since 10-inch planking is a reasonable size for this vessel, I decided to do the entire job with $\frac{3}{16}$ " planking, excluding the $\frac{5}{16}$ " garboard. However, when I laid it out on paper the numbers didn't total up right. To get $3\frac{1}{4}$ -inches, I needed a different combination of plank widths. The one I settled on was 11 planks of $\frac{3}{16}$ ", 4 planks of $\frac{7}{32}$ " and the garboard of $\frac{5}{16}$ "—total $\frac{66}{16}$ ths, or $3\frac{1}{4}$ -inches.

Tapering the planks was no problem. With the sheer-to-rabbet distance at the stern the same as it was amidships, the only taper required would be forward. There, the distance was $2\frac{1}{2}$ -inches, requiring a total reduction of $\frac{3}{4}$ -inches. This amount, divided among 16 planks meant each plank had to be reduced $\frac{3}{64}$ ". This was equivalent to tapering a 10-inch plank to 8 inches. Very reasonable.

To determine the exact amount of taper at any point along a plank, a spiling strip is used (Fig. 12). Lay out the planking of the long frame on the strip. When you tilt it over to the height of the frame that you want measured, projecting the measurements on the strip horizontally will give you the desired spacing. This all can be done on a sheet of paper, rather than trying to do it directly on the model.

So, with all the preliminaries out of the way, you are ready to begin planking. (It would be a good idea to give the frames a final pass with

No. 150 sanding paper—either with sanding blocks or power sander. (Photos 59, 60)

Begin with the garboard. It will be necessary to cut and fit this plank to match the curve of the rabbet.

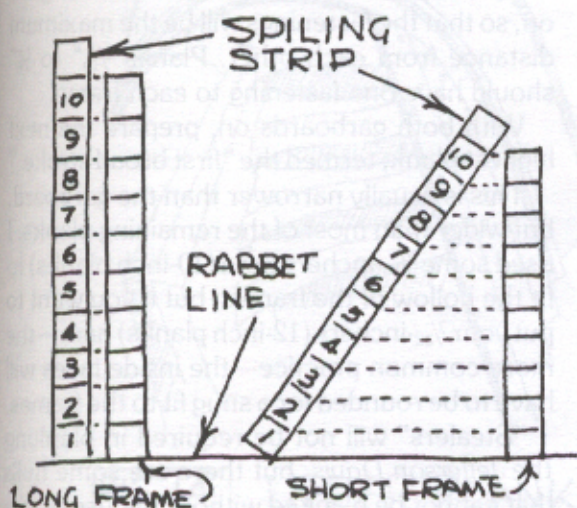


FIG. 12 SPILING STRIP TO LAY OUT PLANK TAPERS

The shape is marked by a simple process called "spiling." A drafting compass or dividers is opened to the widest gap between plank and rabbet. Keeping the opening constant, make a series of closely spaced marks on the wood strip, making sure as you go along not to turn the compass from the original angle, which should be approximately perpendicular to the rabbet.

The result will be a "spiling batten." Lay the spiling batten on the plank you want to mark, and using the same process as before, transfer the markings onto your plank. Draw a fair curve through all your marks, using a sharp pencil and a flexible batten. (Fig. 13).

That's all there is to spiling, and once you get on to it, you'll use it many places in ship building where you need a good fit. The only trick is remembering not to change the angle of the compass until all the marks are transferred. Try experimenting on hard cardboard until you get the hang of it, to avoid wasting your wood pieces.

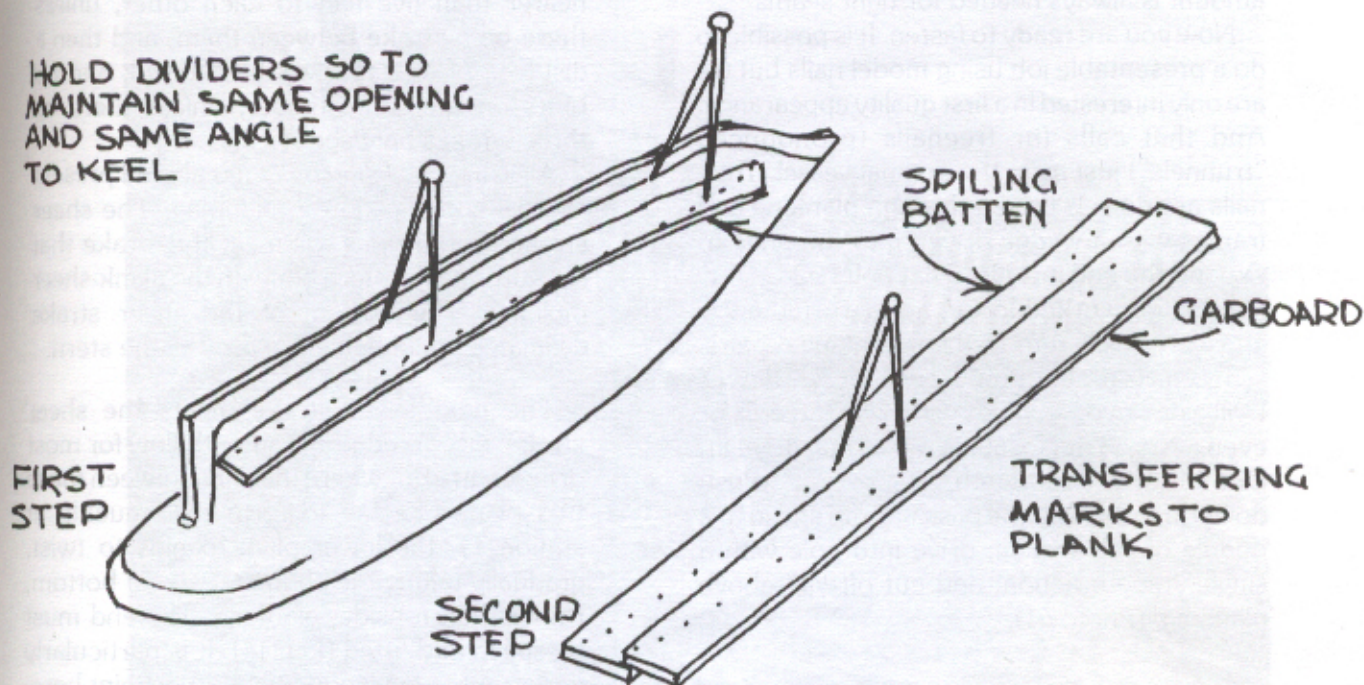


FIG. 13 SPILING- TRANSFERRING OF LINES

Cut out the lower edge of your garboard to your mark.

Make a little template to pick up the shape of the after end of the garboard and cut it out together with the top edge. Run the forward end all the way out to a sharp point where it meets the rising curve of the rabbet. Sand your edges fair with medium sandpaper around a block of wood at least four inches long.

In the case of the *Jefferson Davis*, the rabbet, for the most part, is a straight line and, except for the forward end, spiling is not required. This is not the case in most vessels, however.

It is standard shipbuilding practice to use the first garboard as a pattern for the one on the opposite side, so now that you have your first, check and see how it fits the other side. If you're lucky, cut your second to match the first.

Clamp your first garboard in place with a clamp every third or fourth frame to hold it in snugly against the rabbet. You should have a tight, wood-to-wood joint. A hairline opening should be the widest gap you should accept. Use firm pressure with your fingers and you probably can eliminate all, or nearly all openings. This is called "edgesetting," and a certain amount is always needed for tight seams.

Now you are ready to fasten. It is possible to do a presentable job using model nails but we are only interested in a first quality appearance. And that calls for treenails (pronounced "trunnels") just as in the original vessel. Treenails are dowels driven through planking and frames with a wedge driven into the ends to expand the end just like a flat bolt head. Treenails never worked loose, never rusted away and were easily removed for planking repairs.

Treenails for your model call for $\frac{3}{64}$ " dowel. Drill a dozen or so holes with a No. 56 drill, or even a No. 58 or No. 60, to get a snug drive fit. Drill in for a total depth of $\frac{1}{8}$ " or $\frac{3}{16}$ ". Push dowel in to smooth the passage; dip end in to a puddle of yellow glue; drive into hole with a single smooth action; and cut off $\frac{1}{16}$ " above planking. (Photo 61).

Adapting the Lloyds rule for the spacing of fastenings; two fastenings should be placed in $\frac{1}{4}$ " or wider planks where they bear on each

frame. The upper fastening should be approximately $\frac{1}{16}$ " down from the top of the plank, and $\frac{1}{16}$ " in from the edge of the frame. The lower should measure the same from the bottom, but on the opposite side of the frame. Keep this pattern uniform as each strake goes on, so that the fastenings will be the maximum distance from each other. Planks $\frac{3}{16}$ " to $\frac{1}{3}$ " should have one fastening to each frame.

With both garboards on, prepare the next highest plank, termed the "first broad strake."

This is usually narrower than the garboard, but wider than most of the remaining planks. I used some $\frac{3}{16}$ -inchers here (10-inch planks) to fit the hollow of the frames, but if you want to put your $\frac{7}{32}$ -inchers (12-inch planks) here—the more common practice—the inside faces will have to be rounded for a snug fit to the frames.

"Stealers" will not be required in planking the *Jefferson Davis*, but there are some hulls that cannot be planked without the use of this technique, so you should be familiar with it (Fig. 11A).

When you make joints in planks, butting the ends on a timberhead, you should follow the Lloyds rule for spacing butts: "No butts to be nearer than five feet to each other, unless there be a strake between them, and then a distance of four feet will be allowed; and no butts on the same timber, unless there be three strakes between."

All in all, the *Jefferson Davis* should present no real complication in planking. The sheer strake on the sides will meet the strake that runs around the stern beneath the plank-sheer molding. The bottom of the sheer strake delineates the knuckle line around the stern.

The next lower strake meets the sheer strake edge-to-edge in a smooth flow for most of its length. But where the joint between these two planks begins to form the knuckle at station 11, the lower plank begins to twist, gradually taking the characteristic of bottom, rather than topside, planking. The end must be spiled and fitted (Fig. 14). It is particularly important to get a good tight-fitting joint here, for any gap will be very noticeable. You will have to bevel the upper edge of the second plank to make it snug—practice first on scrap

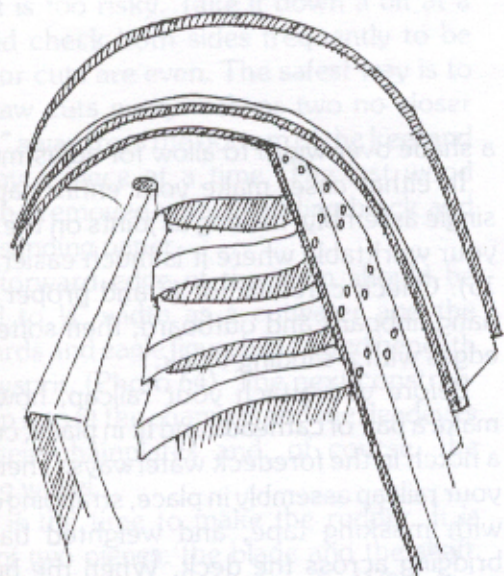


FIG. 14 UPPER PLANKING



Schooner in frame in the last century at Gloucester, Mass. Ribbands are keeping the frames aligned as planking begins—the garboard and next two planks are already in place. This scene is so typical of ship construction, that it could have been at any of the countless yards along the coast.

pieces of planking. In all subsequent sanding, be careful not to round off the edge of this knuckle (Photo 62).

Your planking should go smoothly from here on. Just remember to keep a constant check on your spacing measurements so you will avoid unwelcome surprises.

When you have planked as far as you intend, work the projecting treenails down with medium grade sandpaper on a wood block. The hollow at the garboard can be smoothed with a large dowel wrapped in sandpaper. Be very, very careful not to oversand—you only have $\frac{1}{16}$ " thickness to work on. Finish off with a light sanding of No. 220 paper. You should be able to look on your work thus far with considerable satisfaction.

Completing the Hull

With the planking and decking completed, it is time to fit the railcaps. The first step is to make a pattern. Take a piece of wrapping paper and stretch it tightly over the hull, taping it securely on all sides. Run your thumb and forefinger around the bulwark making a sharply defined crease. Mark the edge further with a pencil, holding it at an angle so that the side of the lead, not the point, makes your mark.

Remove pattern and tape it flat to a table top. Lay out strips of $\frac{1}{32}$ -inch stock to cover bulwark marks all around. The caps should be figured for $\frac{1}{4}$ " width. This covers the $\frac{1}{8}$ " stanchions as well as the bulwark plank, with $\frac{1}{32}$ " overhang inboard and outboard. Ten pieces $\frac{1}{2}$ " wide by 6" long should cover it with enough for scarf-jointing the pieces together. An additional piece around the stern rail and another breast piece at the stem should complete the cap. Scarf joints are easiest made by cutting the scarf in one half of the joint, overlapping onto the adjoining piece and using the edges of the first piece as a template to cut the second piece. Epoxy cement will give you the best bond for this joint. When completed, glue in position and tape down until set.

Another, faster method, is to make the caps for each side in a single piece, cutting them from sheets of $\frac{1}{32}$ " x 3" x 22" basswood. Make them

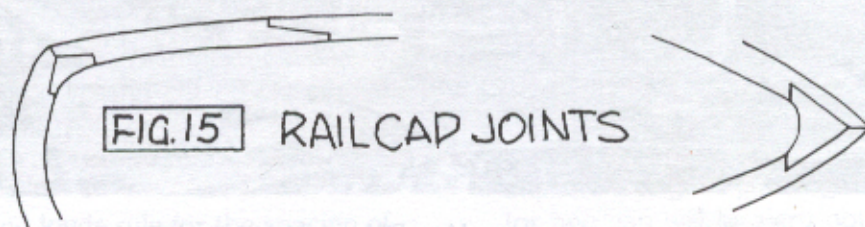
a shade over-width to allow for adjustments.

In either case, make your entire cap as a single assembly, making all joints on the flat of your worktable where it is much easier. (Fig. 15). Check carefully for fit and proper overhang, inboard and outboard, then soften the edges with a sanding block.

Before you attach your railcap, however, make a pair of catheads and fit in place, cutting a notch in the foredeck waterways. Then glue your railcap assembly in place, strapping down with masking tape, and weighted battens bridging across the deck. When the buffalo rails are in place, the railcap is completed.

The pinrails can be fitted next — remember to drill the belaying pin holes first. Then the heads and locker structures can be fitted. In the well deck there will be an opening between the edge of the deck planking and the exterior bulwark planking. Cover this with a $\frac{1}{32}$ " thick pad in the manner of a raised margin plank. The wheelbox and quarterdeck lockers are very simple box structures and should constitute no problems.

The stem knee is next. Taper it in thickness so that its forward end is no more than $\frac{1}{16}$ inch. It should join the stem in a long, angled mortise, flush fitted on the upper edge, and let in $\frac{1}{32}$ " on the lower end.



Painting and Finishing

Painting—Because it is not known to what stage you are completing your model, several alternative painting treatments will be covered.

The simplest and probably the most popular is a natural wood finish such as shown in our illustrated model. This is preferred for a number of reasons: it shows without any question, that this is indeed a true plank-on-frame model and not a solid, or plank on plywood-former model; it shows the treenail fastenings to best advantage; it follows the traditional treatment of fine built-up models, such as exhibited in maritime museums, including the famous Admiralty "Dockyard" models.

This finish is obtained simply by sealing the wood with boiled linseed oil, thinned with 10% gum turpentine, and buffed with a soft cloth when dry. An even easier, and maybe better looking, treatment is spraying with a satin-finish varnish or lacquer. On our model, we used crystal clear "Krylon" brand acrylic coating available in aerosol cans in most hardware stores. Several coats were allowed to dry overnight and rubbed down with very fine steel wool. Three treatments resulted in a beautiful, warm, satin finish. As an alternative to steel wool, 3-M Company makes a plastic sponge imbedded with abrasive. It is available in varying grades of coarseness and produces a satin finish without the mess of steel-wire fragments.

If you choose to paint all or part of your hull, it will be necessary to seal the hull and then build up a good foundation of primer coats. All pits and blemishes must be filled with a sanding vinyl spackle or high-solid sanding surfacer—both obtainable in paint stores. Be sure you use foundation materials whose chemistry is compatible with the finish paints you plan to use.

There are many new products introduced each year. Some fulfill their promises; others don't. It seems prudent not to use your valuable investment as the manufacturer's proving ground, or as the experiment for your own education.

Therefore, unless you have much painting experience, I suggest you use the following procedure. There is a widely distributed brand of model paints called "Floquil" that has an excellent reputation. It is easily applied by brush or spraying; covers well and dries rapidly; it has a dead flat finish that can be given any degree of gloss by buffing or by adding a glazing agent; the pigments are ground exceedingly fine for excellent coverage and retention of detail. An English paint, "Humbrol," appears to have similar qualities.

Always mask off the area to be painted, whether brushing or spraying. There are many types of masking tapes available, and although they all look alike, some are absolutely worthless for painting. You'd do well to get a roll from an auto body repair shop that specializes in painting expensive cars. In using the tape, press the edges down firmly to prevent paint from creeping underneath. When applying paint, try not to let a puddle build up against the tape edge. Remove tape after the paint has set up, but before it dries hard. If you are masking off an area that separates two different colors, such as a waterline, you can smooth the hard paint edge by wiping it gently with a moistened finger tip.

Although most professional model makers use spray guns, excellent work can be done with a brush if a few rules are observed. Use good quality, artist's-grade brushes that have tapered bristles with good "chisel" shape.

Use the widest brush you can for each area. You want to cover the entire area with as few strokes and as quickly as possible. Charge the brush well with paint so you don't have to go back and disturb an area already covered; but not so much paint that there is excess to form runs and puddles.

Floquil paints usually dry in five minutes, but 48 hours are required between coats. If one coat looks good, stop there rather than build-

ing up too heavy a paint layer. Any sanding required between coats should be very light, using No. 400 paper.

Inexpensive spraying equipment is available to the hobbyist. Use the same paint as with brush, but thinned with 10% of the recommended thinner.

With either brushing or spraying, you should practice to refine your technique on some scrap materials, such as coffee cans or children's toys—don't try to learn from the mistakes you make on your model.

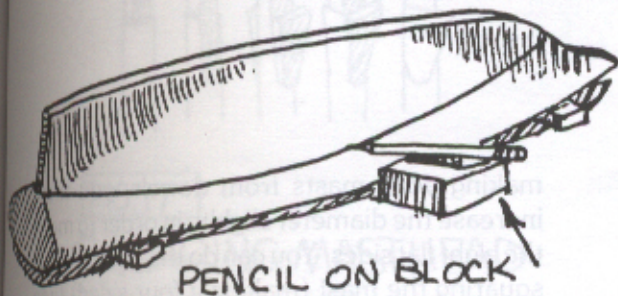


FIG. 15A MARKING A WATERLINE

If a waterline is to be scribed—in the rare case where a model builder has chosen to fully plank one or both sides completely, follow the sketch for procedure. (Fig. 15A). Block the model upside down so that the waterline at the stem and the sternpost are equal heights above the table, and fitting a sharp, soft-lead pencil to a wood block of sufficient height for the pencil to touch the hull at the watermark line, carefully work the pencil and block around the hull to mark the waterline. Try not to go over the same spots more than necessary, lest you end up with the confusion of several waterline marks. The major caution is not to let the seams of the planking misdirect your line—the waterline is independent of the flow of the planking.

Should you also want to finish the bottom, you might well consider painting the bottom a copper color, rather than coppering with overlapping plates, as was the original vessel. There are several reasons this is recommended. First, very few modelers have ever done a coppering job that looked like a real ship's coppering scaled down—and this includes many professionals. Second, it presents a "busy" look to the bottom, drawing attention away from the characteristics you want to display; the planking treenails, frames, etc. Lastly, if you are finishing one side only, it presents real problems where the finished and unfinished sides meet.

If you decide to go ahead anyway and apply coppering, both Underhill's and Davis' books on built-up models give good guidance. But if you do copper, please avoid two pitfalls modelers fall into by following bad advice. Don't try to heat-treat your copper to give it a variegated color. Copper, then as now, comes from the rolling mill cut to size, in wood crates, of bright uniform color—like new pennies. Also, don't show a surface like coarse sandpaper with hundreds or thousands of nail-heads sticking up. Coppering nail-heads were a special design, with flat heads so that the last tap of the hammer would leave the heads flush with the plating. A smooth surface was important to get the maximum speed that a clean coppered bottom gave to vessels.

Colors—There was nothing complicated in the color scheme of Revenue Cutters. Cost dictated the utility and serviceability of black, white and grey, with a bit of natural oiled wood. No specific record exists for the Jefferson Davis, but based on common practice, the following would likely be correct:

Black: topsides

White: deck furniture, ends of all spars, bowsprit, mast doublings, masts below the spider bands, bulwarks, bulkheads

Grey: deckhouse roofs, locker tops, companion slides, railcap, planksheer

Natural wood: spars, decks, steering wheel

Trailboard design and eagle would be white, or if possible, yellow. The outer planksheer molding would be white or, again if possible, yellow or even green. Sometimes the railcap was also treated to a brighter color. But other than these exceptions, the rule was black, white, grey.

It should be pointed out, however, that for

most models that emphasize plank-on-frame construction, such as the famous Admiralty Dockyard models, the traditional treatment is unpainted wood. Your model should be sealed against moisture, though. Use a spray, such as Krylon Acrylic Crystal-Cote—at least three coats.

Masting and Rigging

In this area you have a choice of options. You may: 1. eliminate the masts entirely, fitting only the bowsprit; 2. fit bowsprit and stump masts which extend only about three inches above the deck; 3. fit out with all the masts, spars and rigging. Each of these has its merits.

The first option is obviously the easiest—this was the choice in the illustrated model. It has the quality of concentrating attention on the plank and frame construction of the hull.

The addition of stub masts adds a bit more and the choice is a bit of a tossup.

The last option has the advantage of displaying the characteristic raking masts of the topsail schooner rig. The details are well covered in the plans and the detail sketches.

Masts—It usually comes as a surprise to ship modelers that the foremast of schooners is not smaller in diameter than the mainmast. It is usually shorter, true enough, but because of the additional strains of the headsails, the foremast is either the same size, or a bit larger, than the mainmast.

In your *Jefferson Davis*, both masts should be the same in diameter. The stretch between the deck and the heel—called the “bury”—tapers down to the keelson as shown on the plans. This part of the mast is eight-sided. Fig. 10 shows how to eight-side a timber. If you are

making your masts from dowels, you must increase the diameter slightly in order to make the eight flat sides. You can do this easily by first squaring the mast (making it four-sided) then gluing on wood pieces to pad it out to greater diameter (Fig. 16). Then work down the four corners to produce an eight-sided section, as shown in Fig. 10. A fore and aft tenon is worked into the heel of each mast to fit the mortise in the maststeps. These will rest on the keelson and secure the lower ends of the masts.

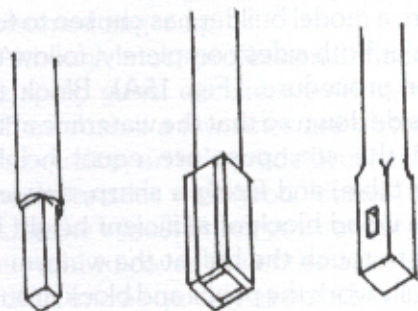


FIG. 16

SQUARING TOPMAST

Taper the masts as shown in the sail plan and construct the trestletrees and crosstrees as shown in the various detail sketches (Figs. 17, 18, 19). The heel of the topmasts must be padded out square (Fig. 16) and a taper worked into the remainder (use the drill and sandpaper procedure described earlier). Shoulders should be worked into the topmasts to keep the shrouds and backstays from

sliding down. Shoulders will also be needed on the yardarms and jib boom.

Most of the details are self-explanatory.

The fittings are easily made—the kit from Bluejacket has materials as well as many ready-made fittings in fine britannia alloy and brass. Simple mast hoops are easily made. (Fig. 20, 21).

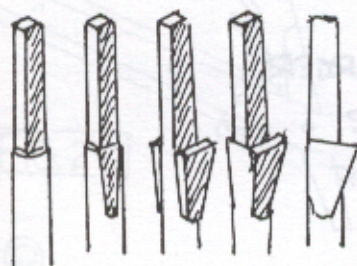


FIG. 17

SQUARING MASTHEAD

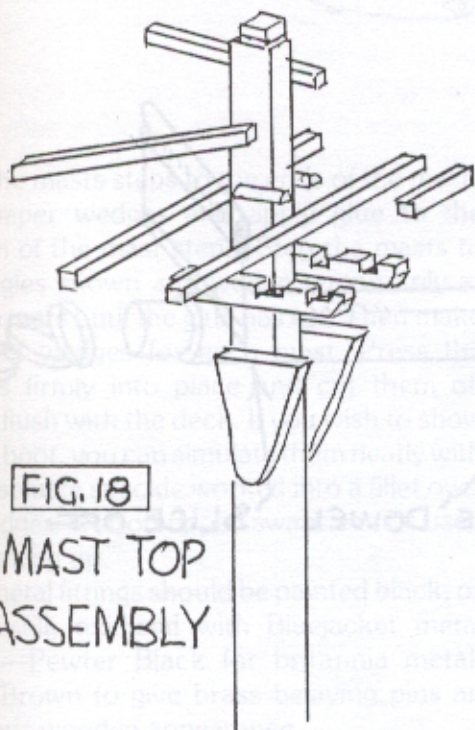


FIG. 18

MAST TOP
ASSEMBLY

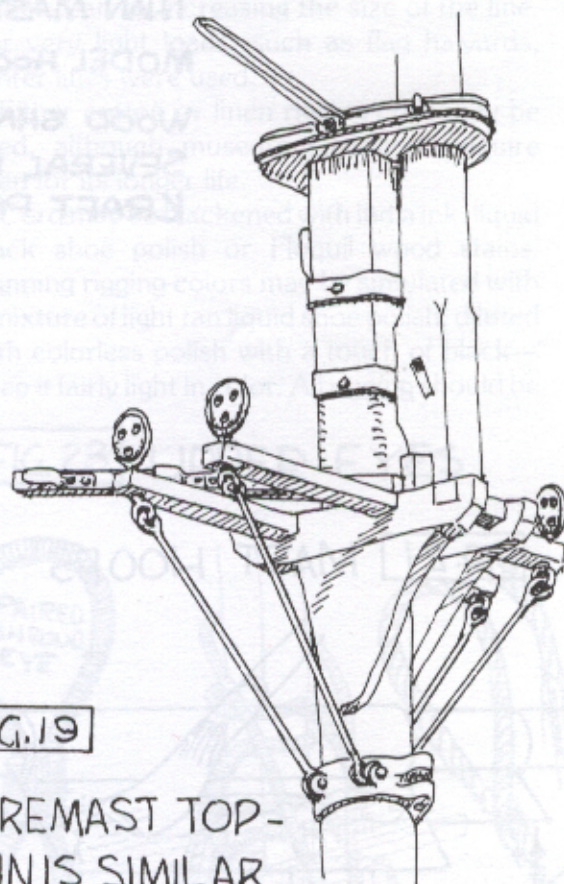
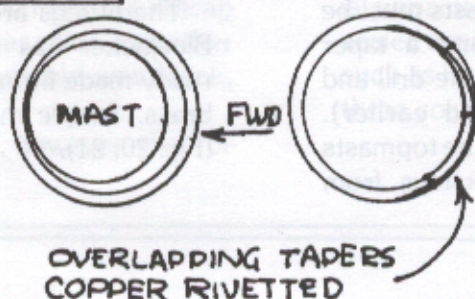


FIG. 19

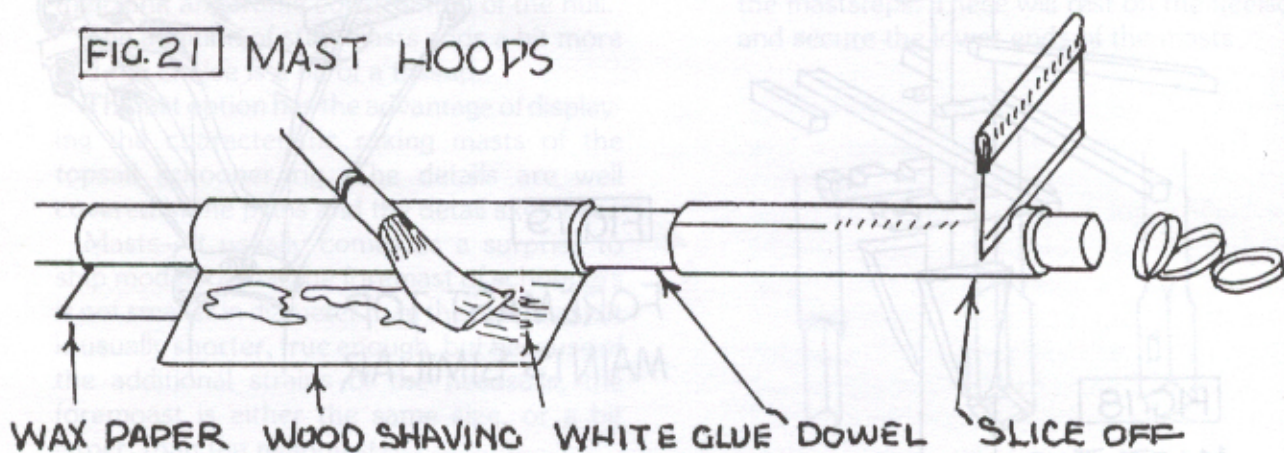
FOREMAST TOP-
MAIN IS SIMILAR

FIG. 20 MAST HOOPS

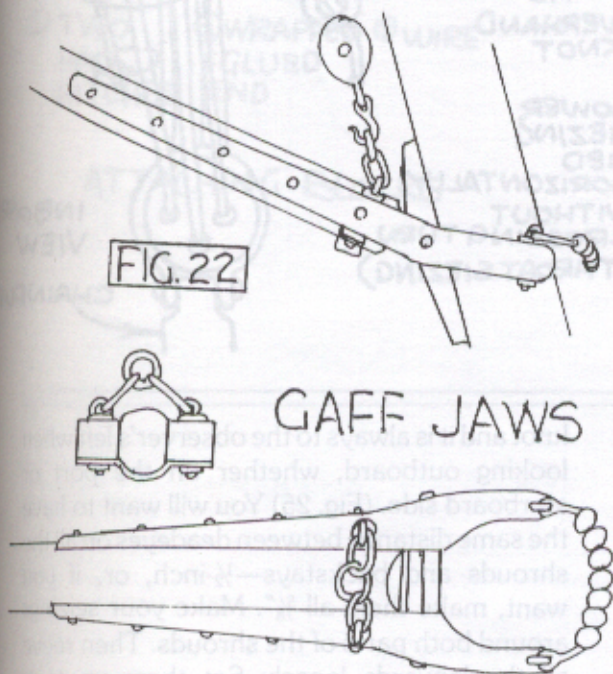


HOOPS OF ASH, 25% LARGER
THAN MAST DIAMETER.
MODEL HOOPS MADE OF
WOOD SHAVINGS OR
SEVERAL LAYERS OF
KRAFT PAPER.

FIG. 21 MAST HOOPS



Gaffs and boom—These, too, are simply made following the illustrations. Remember, of course to take all measurements from the plan, for the detail drawings are not to scale. The jaws of the gaffs have a slight curve to reduce their required length. The jaws of the boom however, are straight, as shown. (Fig. 22).



Fit the masts steps to the ends of the masts with paper wedges and apply glue to the bottom of the mast steps. Step the masts to the angles shown and wedge temporarily at the partners until the glue has set. Then make up eight wedges for each mast. Press the wedges firmly into place and cut them off nearly flush with the deck. If you wish to show a mast boot, you can simulate them neatly with water-soluble spackle worked into a fillet over the wedges. Cotton-tipped swabs can be used for cleaning up.

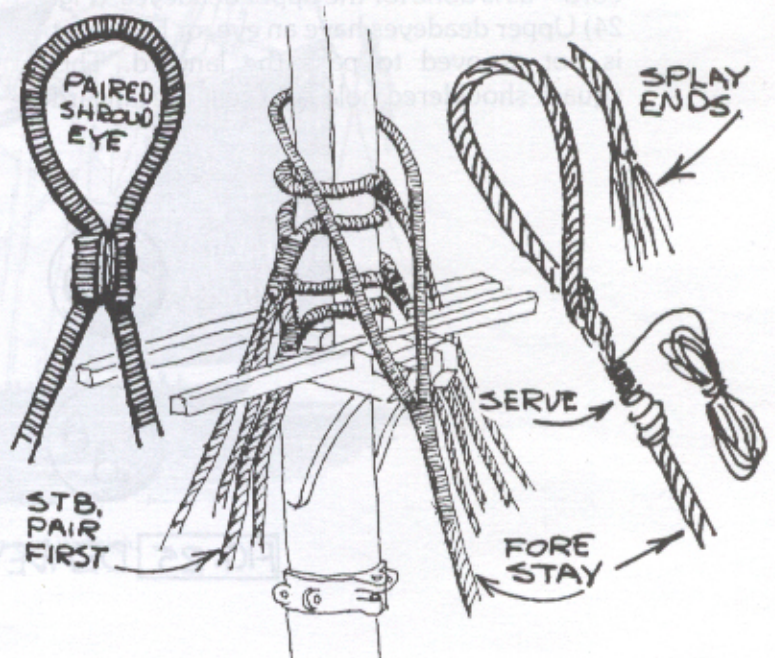
All metal fittings should be painted black, or better still, oxidized with Bluejacket metal toners—Pewter Black for britannia metal; Brass Brown to give brass belaying pins an authentic wooden appearance.

Rigging—There are two types of rigging on sailing ships: standing and running. Standing rigging “stands” in place, in most cases to brace and support the masts, and was of various sizes depending upon the strain placed on it. It was generally black, being coated with tar to protect it from the weather. Running rigging was so named because it ran through blocks (pulleys) to adjust the movable parts of the rig. Running rigging was hemp, with a yellowish tan color that gradually became grey as it weathered. Almost all lines were a nominal 1” in diameter as that was the size that gave the best grip in the hands. When the load on the line was increased, the power was increased by adding sheaves to the tackle, rather than by increasing the size of the line. For very light loads, such as flag halyards, lighter lines were used.

Either cotton or linen rigging cord may be used, although museum standards require linen for its longer life.

Cord may be blackened with india ink, liquid black shoe polish or Floquil wood stains. Running rigging colors may be simulated with a mixture of light tan liquid shoe polish, diluted with colorless polish with a touch of black—keep it fairly light in color. All rigging should be

FIG. 23 UPPER EYES



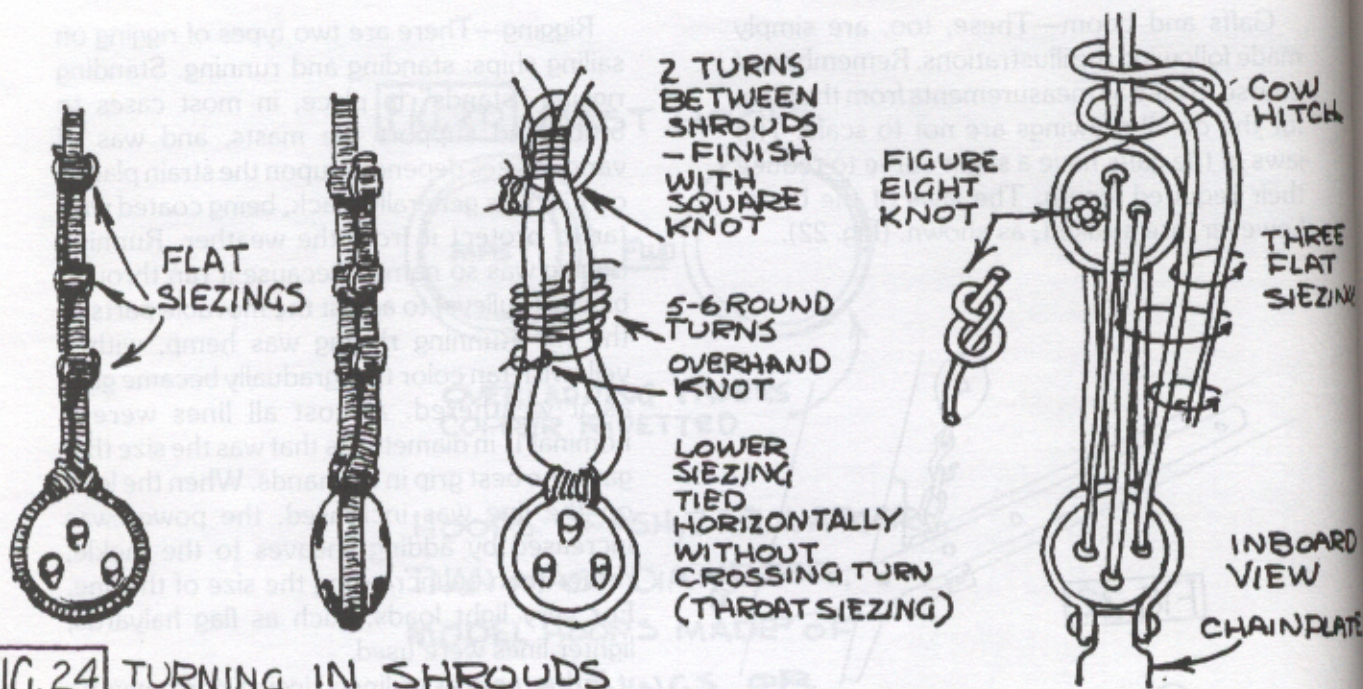


FIG. 24 TURNING IN SHROUDS

dressed with a piece of beeswax and buffed with a soft cloth to lay the fibers smooth and add to its longevity.

The neater you make your serving and the smaller you make your knots, the greater the effect will be. (Fig. 23) Knots should be touched with a drop of white glue to prevent unravelling.

Serve the lower ends of the shroud with fine cord—as is done for the upper deadeyes. (Fig. 24) Upper deadeyes have an eye, or hole, that is not grooved to pass the lanyard. This square-shouldered hole is to seat the lanyard

knot and it is always to the observer's left when looking outboard, whether on the port or starboard side. (Fig. 25) You will want to have the same distance between deadeyes on all the shrouds and backstays— $\frac{1}{2}$ -inch, or, if you want, make them all $\frac{5}{8}$ ". Make your seizings around both parts of the shrouds. Then reeve all the lanyards loosely. Set them up taut, alternately port and starboard, to keep from pulling the masts out of line. Check this alignment frequently by sighting from either the bow or stern. Rigging should be reasonably tight, but not like bowstrings.

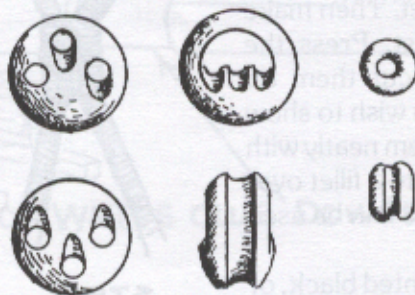


FIG. 25 DEADEYES, BULLSEYES, HEARTS

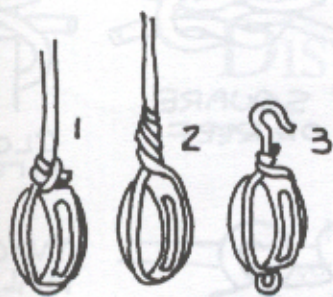


FIG. 26

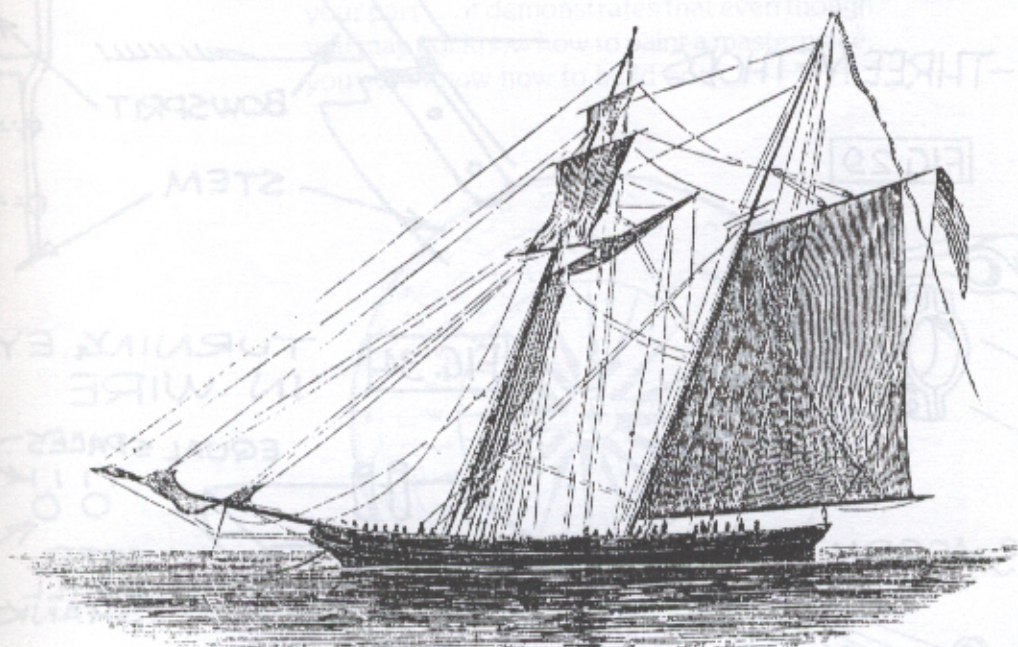
- ① TWO HALF HITCHES
 ② WRAPPED & GLUED END
 ③ WIRE

ATTACHING BLOCKS

Where running rigging is secured to blocks (previously painted), use two half hitches, drawn snugly, glued and with the tail snipped close after the glue has set. (Fig. 26) Eyes can be made by splaying the fibers of the cord, dipping the end in white glue, forming an eye and wrapping around the remaining part of the cord. This looks good and even better when served.

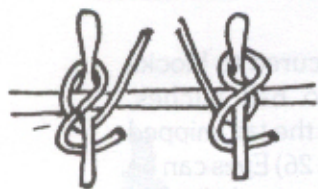
Where lines are belayed to belaying pins, it will be easier to cut off the line after it is belayed and making separate coils to hang on the pins. (Fig. 27) To make the coil drape naturally, dip the coil in white glue, well thinned with water, then tape or pin in a natural hanging shape until the glue dries. Coils always hang straight down in a limp fashion; they are never stiff and round like a cowboy's lariat.

Additional rigging details are shown in Figs. 28 thru 34.

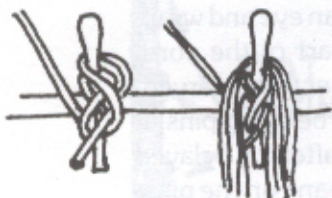


A Schooner-of-War getting underway.

FIG. 27 BELAYING



ALWAYS UNDER THE PIN, THEN CROSSING TURNS "WITH THE SUN" (CLOCKWISE).



FINISH WITH A SINGLE HITCH, COIL REMAINDER, HANG OVER PIN.

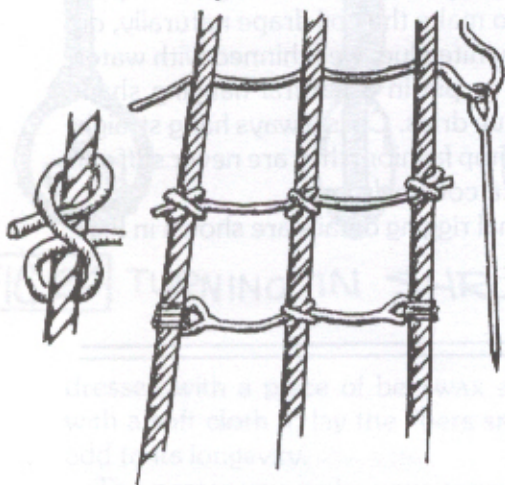
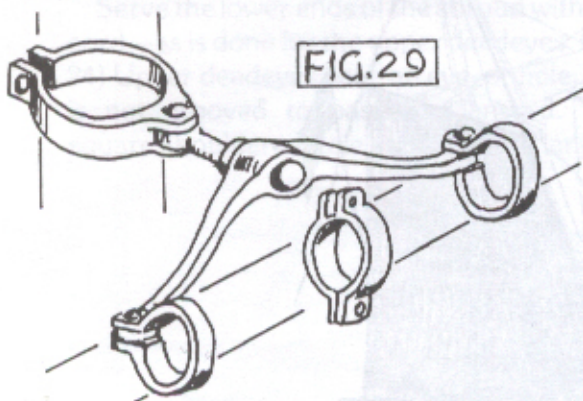
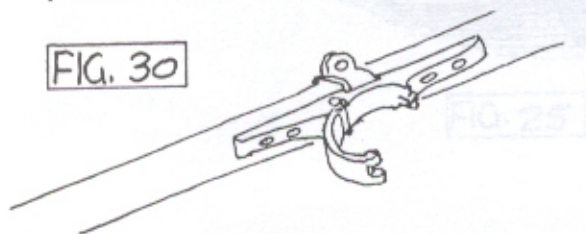


FIG. 28 RATLINES - THREE METHODS



YARD TRUSS ASSEMBLY

FIG. 30



UPPER YARD PARREL

FIG. 31 COMMON KNOTS



OVER HAND



SQUARE OR REEF



CLOVE HITCH



TWO HALF HITCHES

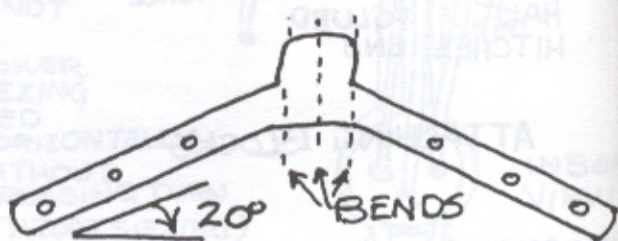


FIG. 32 BOBSTAY STRAP

FIG. 33 GAMMON IRON

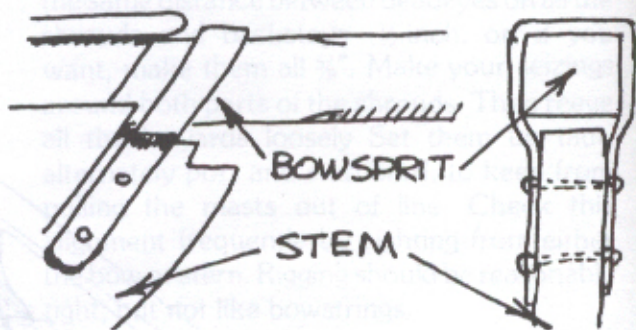
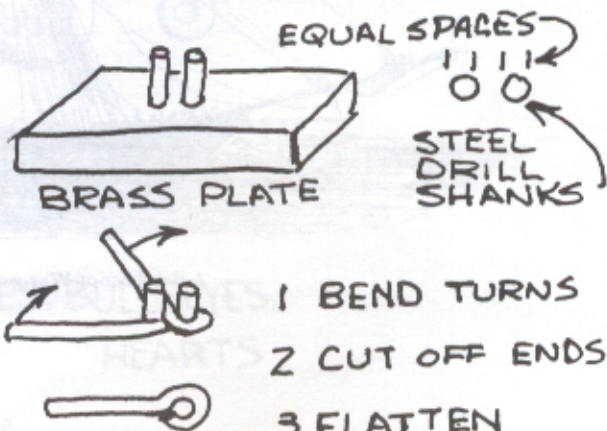


FIG. 34 TURNING EYES IN WIRE



EQUAL SPACES

STEEL DRILL SHANKS

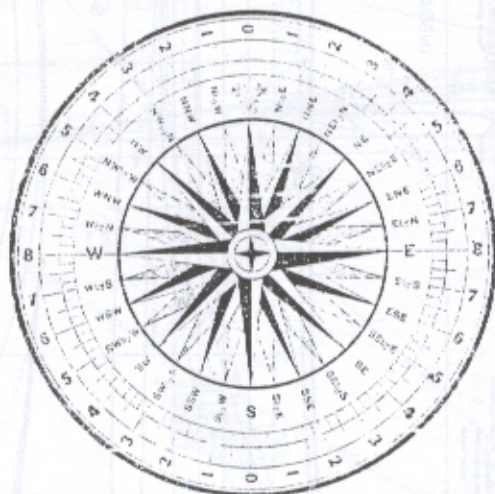
- 1 BEND TURNS
- 2 CUT OFF ENDS
- 3 FLATTEN

Displaying the Model

Here are some suggestions for displaying your model to full advantage:

1. Mount model on simple crossbeam as our illustrations show, but covering it with a glass or acrylic dust cover.
2. Build a shipyard setting for your model and show it as if in some stage of construction, with blocking, shoring, and planks and perhaps some miniature tools about.
3. Mount the model without spars but in a large case that has as a background a sail plan or enlarged photograph of the *Jefferson Davis*.
4. Encase the model with spars and rigging, but unpainted with a black or dark brown panel against the rear of the case as a contrasting background.

But however you present it, your model will surely display a genuine accomplishment on your part . . . it demonstrates that even though you may not know how to paint a masterpiece, you sure know how to build one!

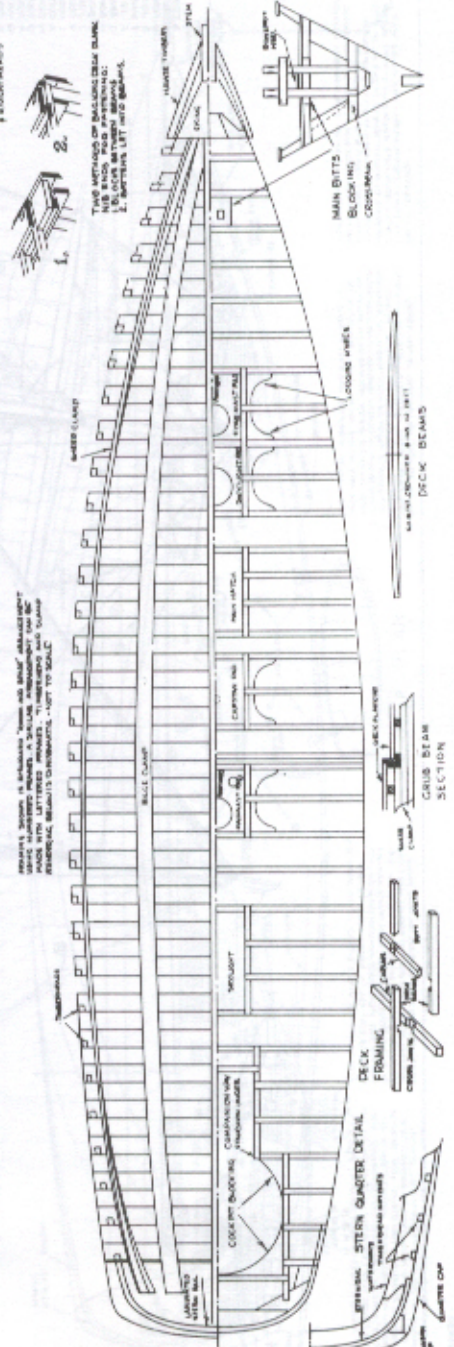
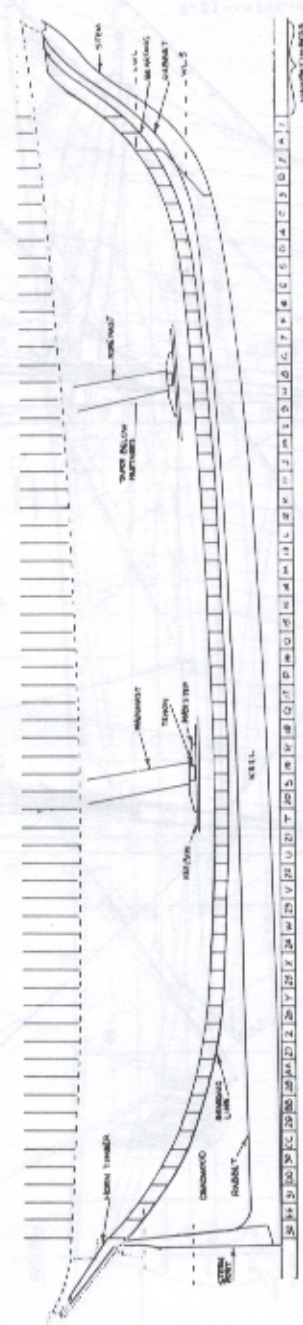
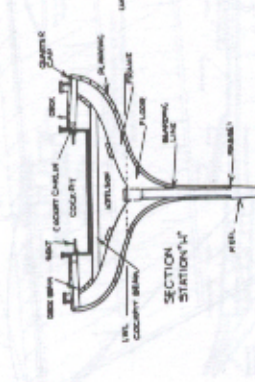
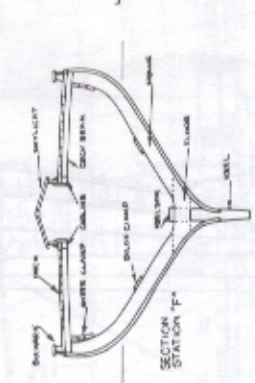
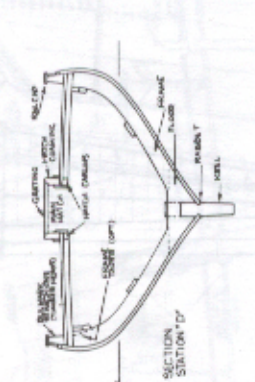
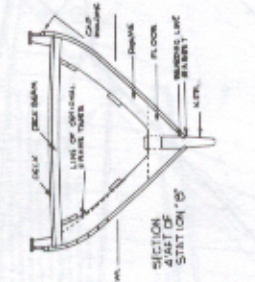
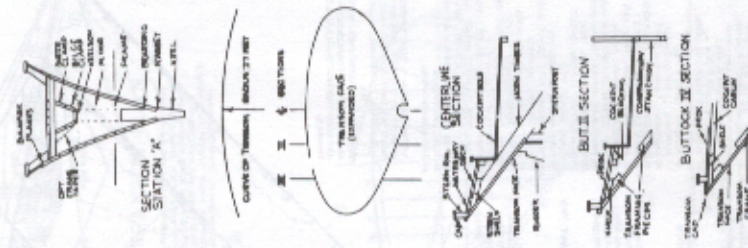


SCHOONER YACHT AMERICA 1851
 SCALE 1/8" = 1'-0"

CONSTRUCTION PLAN

SCANTLING AND CONSTRUCTION DETAILS SHOWN ON LIGHT BROWN AND MODIFIED SHOWN ON TAN. SOME MAJOR MODIFICATIONS MADE BY THE BUREAU OF NAVAL ARCHITECTURE TO THE ORIGINAL PLAN OF SAUL WING AND HIS PARTNER THOMAS HOPKINS.

BLUEJACKET
 TRAFFIC INC.
 CONSULTING ARCHITECTS, ENGINEERS, DESIGNERS



REMARKS: Section is intended to show "true and shell" arrangement of deck beams and floor beams. A section through the deck is shown in the plan view. The section is shown in the plan view. The section is shown in the plan view.

**DECIMAL EQUIVALENT OF THE NUMBERS
OF TWIST DRILL AND STEEL
WIRE GAGE**

No.	Size of No. in Decimals	No.	Size of No. in Decimals	No.	Size of No. in Decimals	No.	Size of No. in Decimals	No.	Size of No. in Decimals
1	.2280	17	.1730	33	.1130	49	.0730	65	.0350
2	.2210	18	.1695	34	.1110	50	.0700	66	.0330
3	.2130	19	.1660	35	.1100	51	.0670	67	.0320
4	.2090	20	.1610	36	.1065	52	.0635	68	.0310
5	.2055	21	.1590	37	.1040	53	.0595	69	.0292
6	.2040	22	.1570	38	.1015	54	.0550	70	.0280
7	.2010	23	.1540	39	.0995	55	.0520	71	.0260
8	.1990	24	.1520	40	.0980	56	.0465	72	.0250
9	.1960	25	.1495	41	.0960	57	.0430	73	.0240
10	.1935	26	.1470	42	.0935	58	.0420	74	.0225
11	.1910	27	.1440	43	.0890	59	.0410	75	.0210
12	.1890	28	.1405	44	.0860	60	.0400	76	.0200
13	.1850	29	.1360	45	.0820	61	.0390	77	.0180
14	.1820	30	.1285	46	.0810	62	.0380	78	.0160
15	.1800	31	.1200	47	.0785	63	.0370	79	.0145
16	.1770	32	.1160	48	.0760	64	.0360	80	.0135

TABLE OF DECIMAL EQUIVALENTS

8ths	13/16 = .8125	29/32 = .90625	27/64 = .421875
	15/16 = .9375	31/32 = .96875	29/64 = .453125
1/8 = .125			31/64 = .484375
1/4 = .250	32ds	64ths	33/64 = .515625
3/8 = .375	1/32 = .03125	1/64 = .015625	35/64 = .546875
1/2 = .500	3/32 = .09375	3/64 = .046875	37/64 = .578125
5/8 = .625	5/32 = .15625	5/64 = .078125	39/64 = .609375
3/4 = .750	7/32 = .21875	7/64 = .109375	41/64 = .640625
7/8 = .875	9/32 = .28125	9/64 = .140625	43/64 = .671875
	11/32 = .34375	11/64 = .171875	45/64 = .703125
16ths	13/32 = .40625	13/64 = .203125	47/64 = .734375
	15/32 = .46875	15/64 = .234375	49/64 = .765625
1/16 = .0625	17/32 = .53125	17/64 = .265625	51/64 = .796875
3/16 = .1875	19/32 = .59375	19/64 = .296875	53/64 = .828125
5/16 = .3125	21/32 = .65625	21/64 = .328125	55/64 = .859375
7/16 = .4375	23/32 = .71875	23/64 = .359375	57/64 = .890625
9/16 = .5625	25/32 = .78125	25/64 = .390625	59/64 = .921875
11/16 = .6875	27/32 = .84375		61/64 = .953125
			63/64 = .984375

Metric Conversion: 1 inch = 2.5 centimeters, (cm)
 1 centimeter = 10 millimeters (mm)
 1 millimeter = .04 inch

Recommended Order of Hull Construction

Size of Decimals	No.		
0.30	63		COMPLETED
0.30	66		
0.30	67		
0.30	68	Glue up keel pieces, cut down to marks	_____
0.30	69	Make and fit sternpost	_____
0.30	70	Sand frames, clean-up notches	_____
0.30	71	Trial set-up of frames	_____
0.30	72	Cut rabbet	_____
0.30	73	Cut out timberheads	_____
0.30	74	Glue in frames and bow/stern pieces	_____
0.30	75	Fit sheer clamps	_____
0.30	76	Fit bilge stringers and keelson	_____
0.30	77	Make deck beams	_____
0.30	78	Set up deck framing	_____
0.30	79	Fit waterways	_____
0.30	80	Fit planksheer	_____
		Make deck margin planks	_____
		Lay out deck—nib into margin planks	_____
		Fit bulkheads on deck beams	_____
		Cut bowsprit notch	_____
		Install decks	_____
		Make deck furniture	_____
		Make and fit bowsprit	_____
		Make bitts	_____
		Install decks	_____
		Plank stern bulwarks	_____
		Install outer planksheer piece	_____
		Plank bulwarks	_____
		Plank hull	_____
		Fit catheads	_____
		Fit railcap	_____
		Fit deck furniture	_____
		Fit pin rails and channels	_____
		Fit stemknee, trail boards, figurehead	_____
		Cut away keel	_____
		Paint or seal hull	_____
		Mount on base	_____

Bibliography

- The Story of the U.S. Coast Guard, Eugene Rachlis, Random House, 1961
The Coast Guard, Glenn Paxton, Viking Press, 1985
Coast Guard History, CG-213 U.S. Govt. Printing Off. 1958
"By Juan DeFuca's Strait" James G. McCurdy
Revenue Cutter Jefferson Davis, McDonald, Sea Chest (paper),
Puget Sound Mar. Hist. Soc. Seattle, WA 1973
"Schooner America . . . building in plank-on-frame"
Montgomery, Bluejacket, Shelton, CT 1983
The Ashley Book of Knots, Clifford W. Ashley, Doubleday, 1944
The Built-up Ship Model, Charles G. Davis, Sweetman, 1970
The Ship Model Builder's Assistant, C. G. Davis, Sweetman, 1970
The Art of Ship Modeling, A. Richard Mansir, Van Nostrand Reinhold, 1982
Plank-on-Frame Models, Harold A. Underhill, Brown, Son & Ferguson, 1958
Boatbuilding, Howard I. Chapelle, W. W. Norton, 1941
Yacht Designing and Planning, Chapelle, Norton, 1970
The History of American Sailing Ships, Chapelle, Norton, 1935
The Search for Speed Under Sail, Chapelle, Norton, 1967
American Sailing Craft, Chapelle, Kennedy Bros., 1936

A Shipmodeler's Glossary

- ABAFT**—behind
AFT—toward the stern
AMIDSHIPS—the center of a vessel
ATHWARTSHIPS—going from one side to other
BACKSTAYS—stays supporting upper masts
BEAM—the vessel's width
BEES—fairleads on outer end of bowsprit
BELAY—to make fast (usually ropes)
BELAYING PIN—a pin to which a rope is belayed
BEAKHEAD—framework on stem of older vessels
BINNACLE—the stand which holds the compass
BITTS—upright timbers for securing hawsers
BLOCK—a pulley with grooved sheave
BOBSTAY—stays leading from bowsprit to stem
BOLSTER—round padding piece for shrouds
BOOM—spar at foot of a fore-and-aft sail
BOW—forward part of a vessel
BOWSPRIT—spar extending forward from bow
BRACES—lines that turn the yards about mast
BRAILS—lines that gather in a sail
BULKHEAD—partitions dividing ship's interior
BULWARK—side of ship extending above deck
BUNTLINES—ropes that lift sail up to yard
CAP—wood or metal fitting at joining ends of spars
CAPSTAN—an upright winch to pull on lines
CATHEAD—a timber at bows for raising anchor
CHAIN PLATES—iron straps attaching the lower deadeyes to the hull
CHANNELS—flat timbers on hull used to give more spread to rigging
CHEEKS—supports for trestletrees as masthead
CLEAT—a horn-shaped piece for securing lines
CLEW—the lower corners of a square sail
COAMING—a raised watershield on a deck
COMPANIONWAY—steps leading below from deck
CRANSE—swivel attaching lower yards to mast
CROSSJACK—lower mizzen yard
CROSSTREES—small timbers at the mastheads which spread the upper rigging
DEADEYES—wood blocks with holes for lanyard used to tighten shrouds
DOLPHINSTRICKER—a spar extending from bowsprit
DOUBLING—where two masts overlap
FID—wood piece passed through heel of topmast
FIFERAIL—a framework at foot of a mast for belaying lines
FOOTROPE—rope under spar to stand on
FORE—toward the bow
FORECASTLE—crew's quarters in bow of ship
FUTTOCK SHROUDS—short shrouds under crosstrees
GAFF—spar along head of fore and aft sail
GAMMONING—rope or straps holding bowsprit down
HALLIARD—rope used to hoist yards and sails
HAWSEPIPE—opening in bow for hawser
HEAD—the upper end of sails, masts, etc.
JACKSTAYS—rods on yard for attaching sails
JIBBOOM—an extension of the bowsprit
KEEL—lowest timber of the hull (backbone)
KNIGHTS—timbers at stem bracing the bowsprit
PARREL—collar holding upper yards to mast
PIN RAIL—rail or rack for belaying pins
PORT—opening in ship's side, also ship's left side
QUARTER—side of vessel near the stern
RAKE—angle of masts from perpendicular
RAILCAP—flat timber covering the rail
RATLINES—rope ladders set up in the shrouds
SHEER—the upward curve of a ship's deck
SHEET—line to sails to control their set
SHROUDS—ropes to ship sides supporting masts
SPAR—term for any mast, yard, etc.
SPREADER—struts to spread shrouds and stays
STANCHION—upright timbers supporting the rail
STANDING RIGGING—rigging supporting masts
STARBOARD—righthand side of ship
STAY—standing rigging that runs fore and aft
STEM—foremost ship's timber
STERN—the rear of a vessel
TAFFRAIL—rail around a vessel's stern
THROAT—inner end of gaff
TOP—platform atop the crosstrees
TOPPING LIFT—line to lift end of boom
TRANSOM—the facepiece of the stern
TRUCK—wooden cap for topmost mast
TRUSS—a fitting holding lower yard to mast
WATERWAYS—outermost edge of a deck
WINDLASS—winch used to haul in anchor line

Acknowledgments

The problem of bringing to life a vessel deceased for more than a century can be formidable. The full record can never be revealed. It is usually a matter of degree—so much information for so much research. But it seldom balances out. Sometimes a little digging will reveal much. Or hundreds of hours can be spent with little or nothing to show for it. And nearly always, help is required from others.

Some of those whose help has made this effort possible are recognized below. To all of them sincere thanks is given.

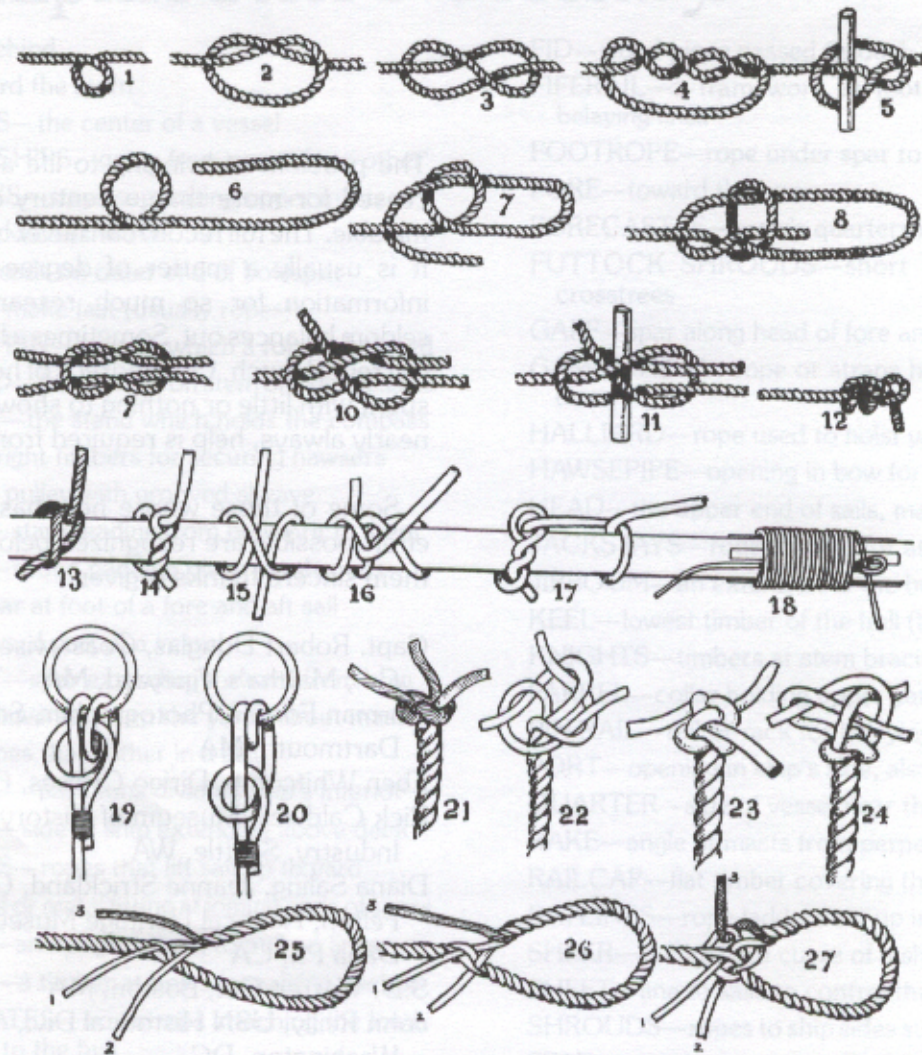
Capt. Robert Douglas, Coast-wise Packet Co., Martha's Vineyard, MA
Norman Fortier, Photographer, So. Dartmouth, MA
Eben Whitcomb, Dirigo Cruises, Clinton, CT
Rick Caldwell, Museum of History & Industry, Seattle, WA
Diana Saling, Jeanne Strickland, Gary Felton, Nautical Heritage Museum, Dana Pt., CA
S.D. Warren Co., Boston, MA
John Reilly, USN Historical Div., Washington, DC
Paul Johnson, USCG Academy, New London, CT

Also to Fred Nichols, President of Blue-jacket, for his help in coordinating the production of this volume.

But most of all to my wife, Florence, first mate on all my ventures, for her patience and help in pulling this project together.

KNOTS, BENDS, HITCHES AND SPLICES

Commonly Used on Boats



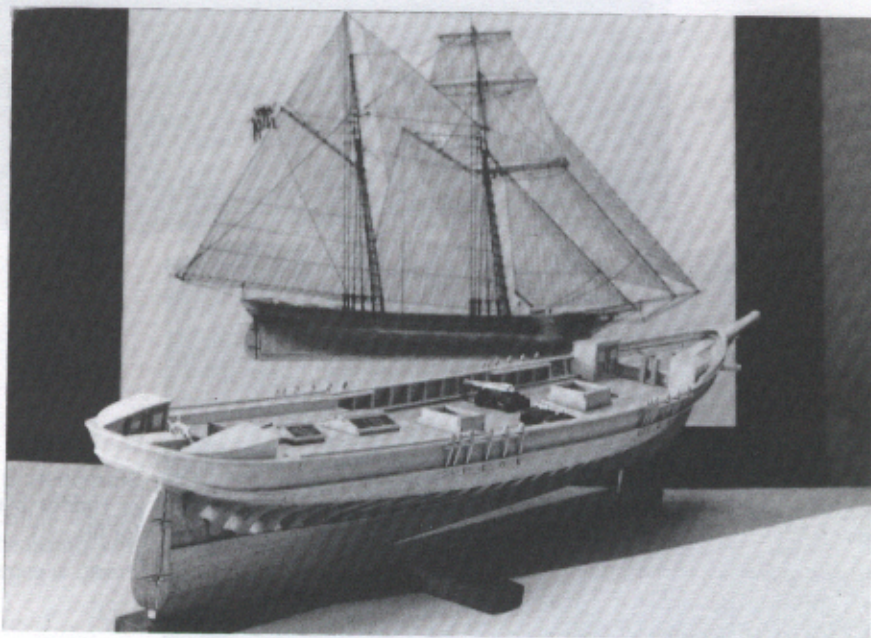
- | | | |
|-----------------------|-------------------------------------|--------------------------------|
| 1. Bight of a Rope. | 6. Bowline, first stage. | 11. Sheet bend with toggle. |
| 2. Overhand Knot. | 7. " second stage. | 12. Stevedor's Knot. |
| 3. Figure Eight Knot. | 8. " third stage. | 13. Half Hitch. |
| 4. Double Knot. | 9. Square or Reef Knot. | 14. Timber Hitch. |
| 5. Boat Knot. | 10. Sheet Bend. | 15. Clove Hitch. |
| | 16. Rolling Hitch. | 20. Round Turn and Half Hitch. |
| | 17. Timber Hitch & Half Hitch. | 21. Wall Knot—complete. |
| | 18. Lashing. | 22. " " —commenced. |
| | 19. Fisherman's Bend. | 23. " " —crowned. |
| | 24. Wall Knot, Crowned—commenced. | |
| | 25. Eye Splice—first strand tucked. | |
| | 26. " " —second " " | |
| | 27. " " —third " " | |

A Knot, Bend or Hitch, properly made, will not jamb

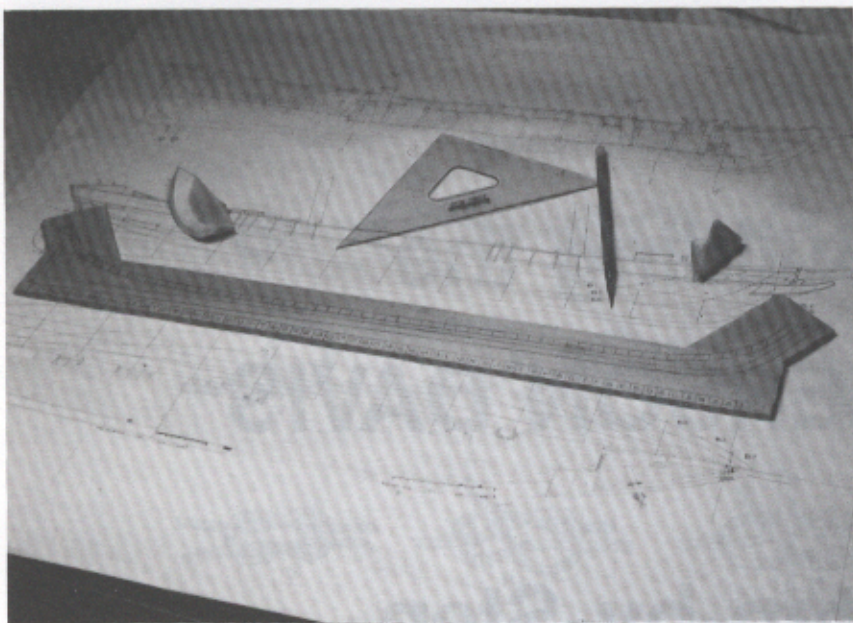
Page from an early Boucher Ship Model Catalog illustrating common knots used aboard ship and in model work.

Building the JEFFERSON DAVIS

Step-by-Step in Photographs

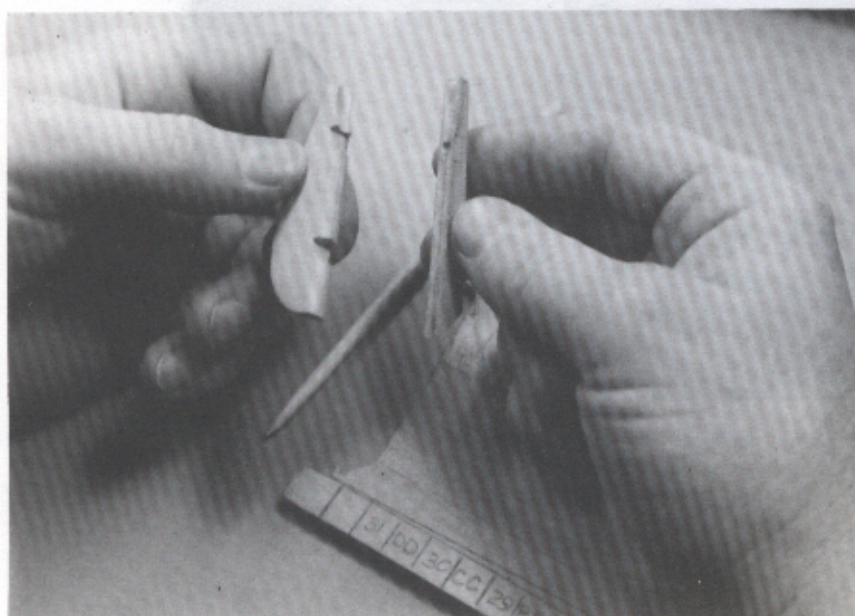
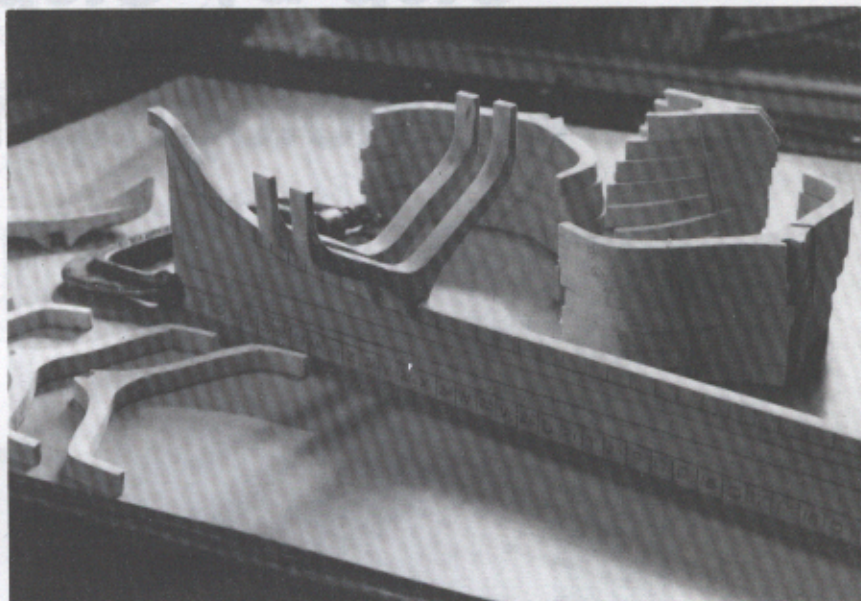


1. Stern view of partially planked *Jefferson Davis*. Two 12-pounders are fitted on deck. Print in background is the sail plan (Less the fore course).



2. Keel stock with bow and stern pieces fitted as when scratch building. Keel and frame markings have been transferred from plans.

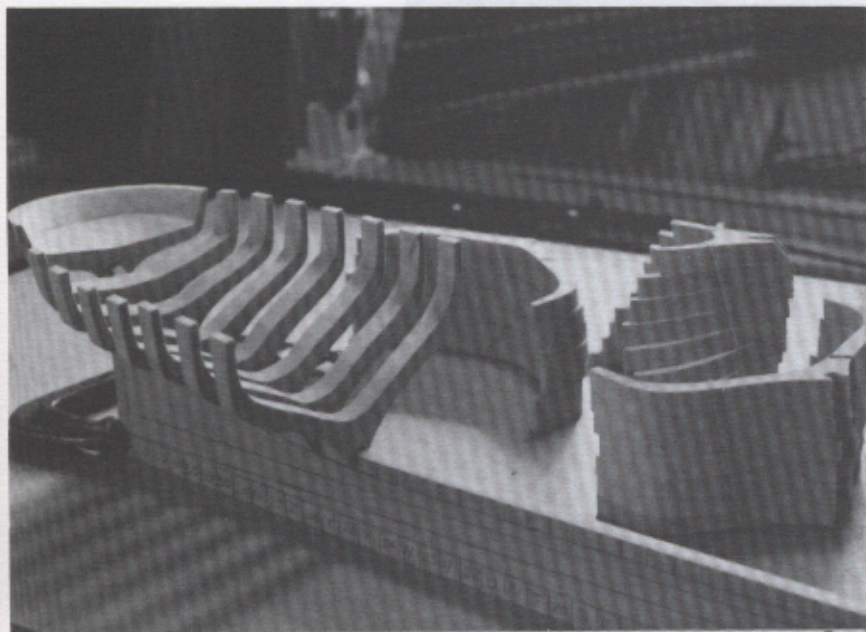
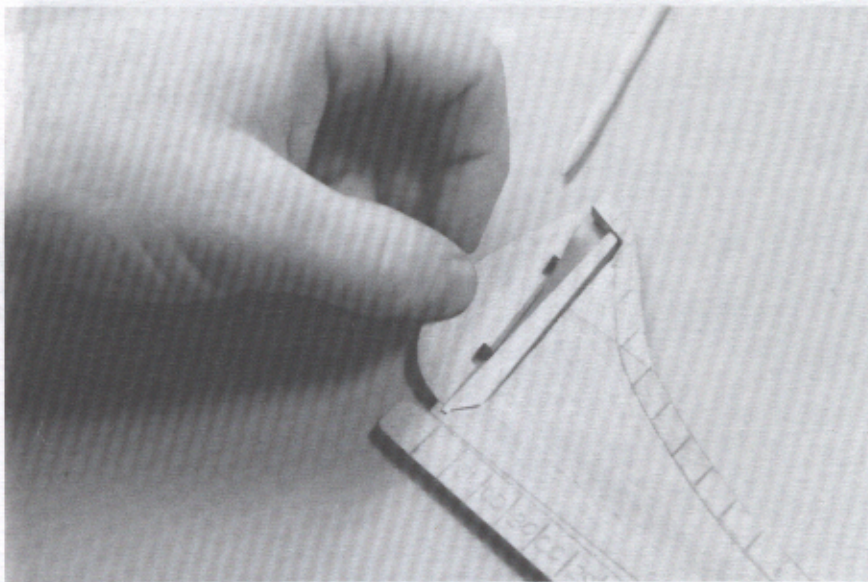
3. Beginning the trial fitting of frames. Frames are kept in consecutive order by groups of six or so, held together with rubber bands.



4. Sternpost cut out and face of rudder blank checked for fit.

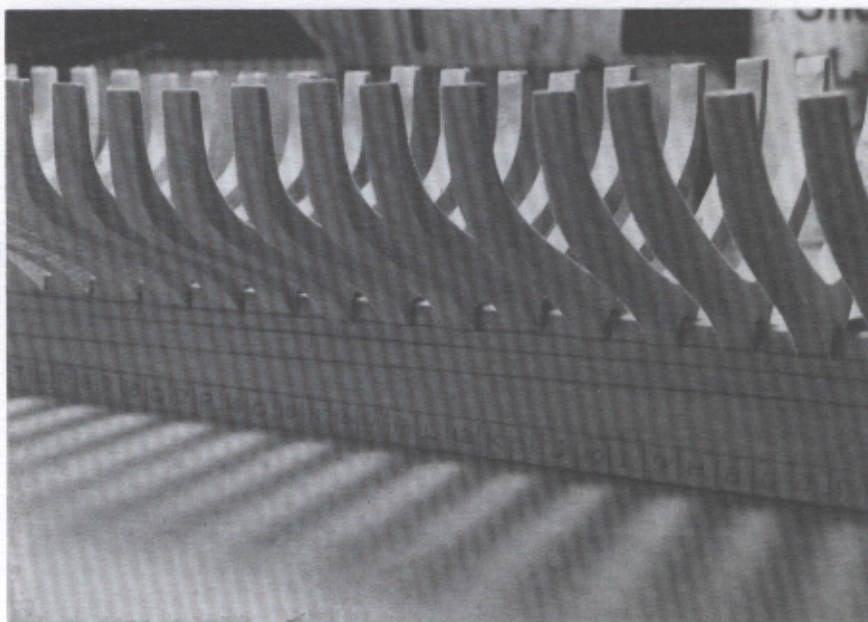
1. Stern view of partially
 finished hull. Two
 12 pounders are fitted
 on deck. First in back
 ground is the sail plan
 (1/2 scale the fore course)

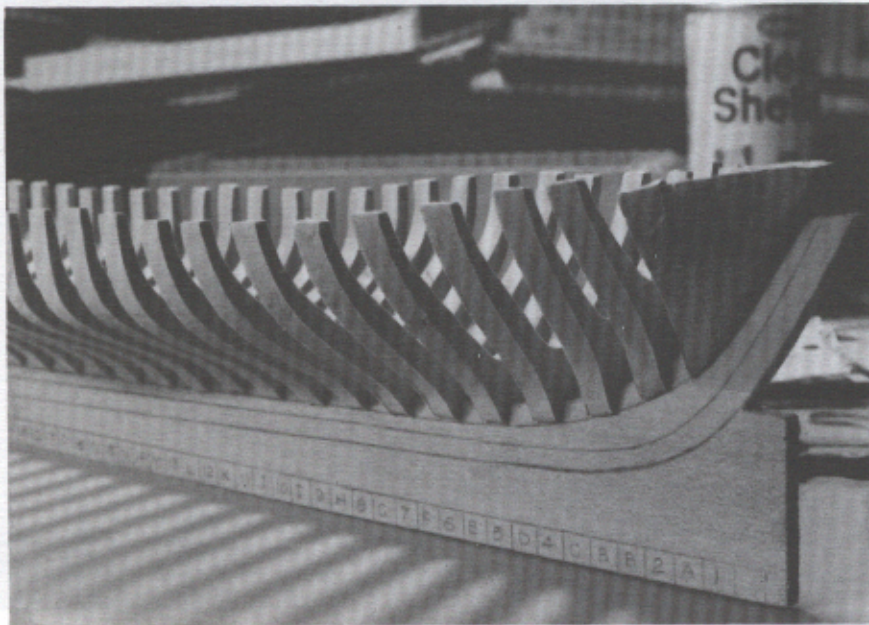
5. Fitting sternpost into cut-out in deadwood. The rudder shaft is also checked for fit.



6. Stern piece trial-fitted onto the horn timber. Note taper of timberheads.

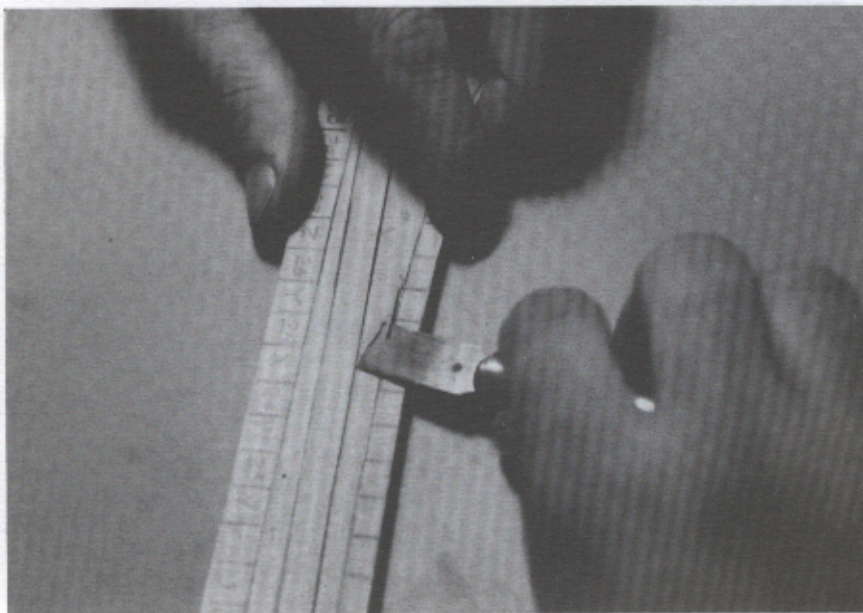
7. Heels of frames aligned along the bearding line. Taper of frames is clearly seen.





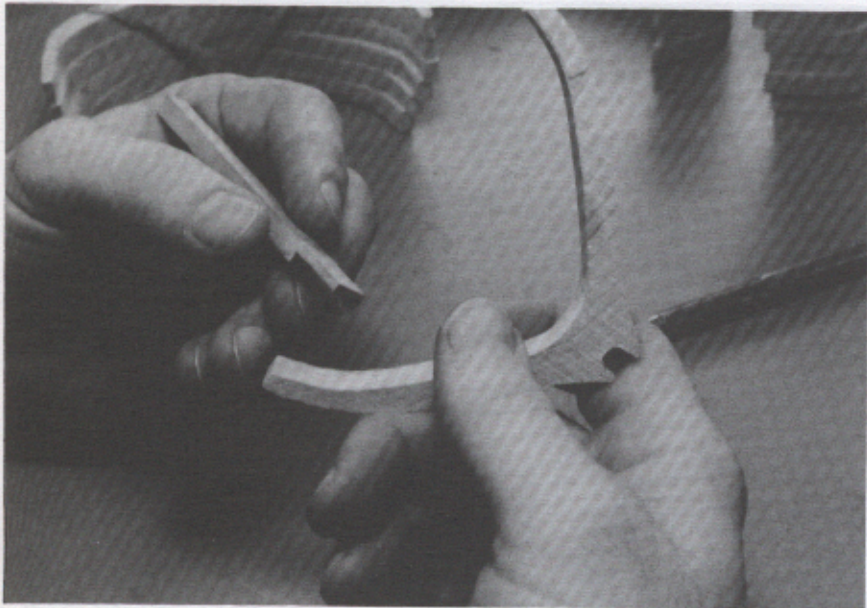
8. Matching bearding line in the forward section. The hawsetimber bow piece is trial-fitted.

9. All frames in place for a trial fitting. The templates on work table are not needed when framing with the Bluejacket kit.



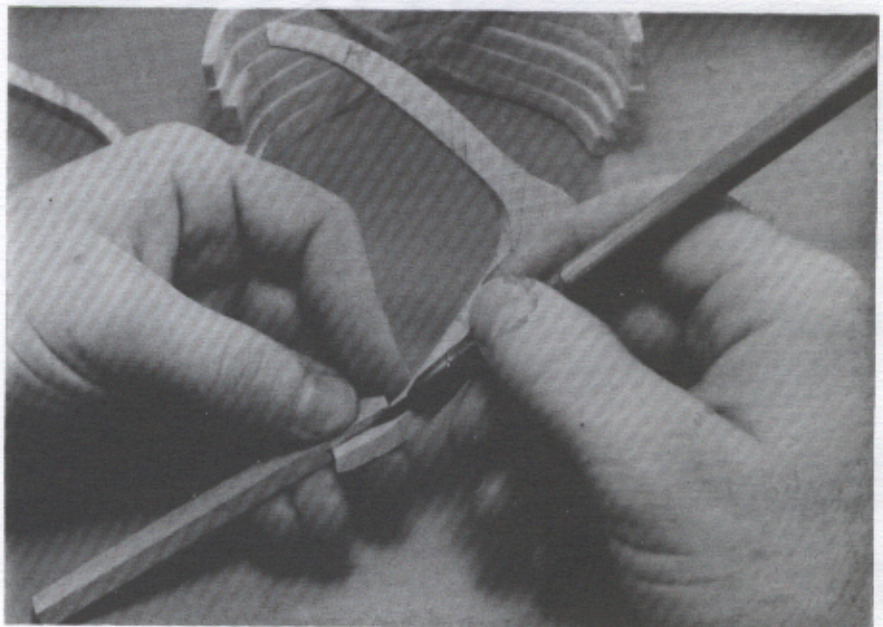
10. Slicing down the rabbet bevel with a sharp chisel. The rabbet line has already been scored to the proper depth.

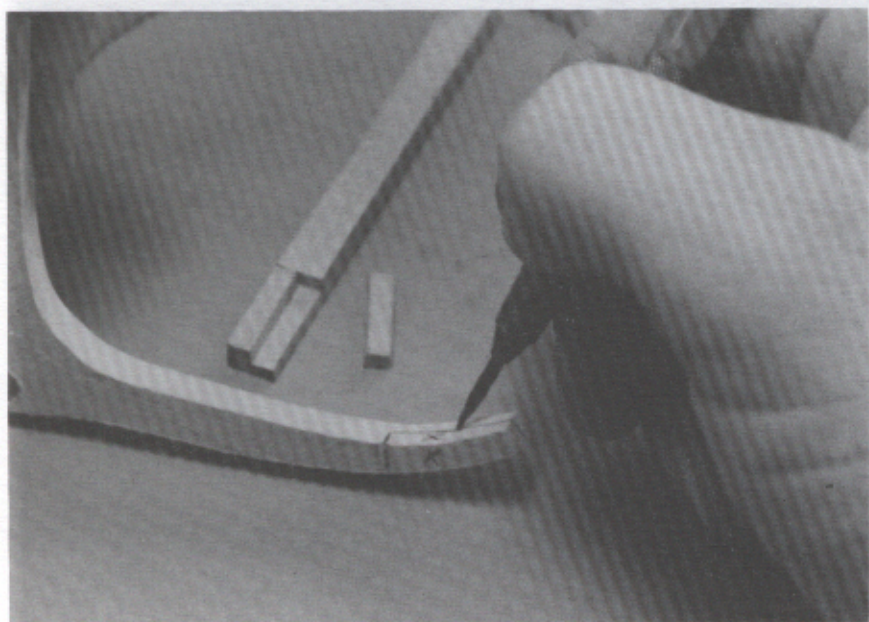
11. Cleaning up the rabbet. A scrap of planking stock is used to check rabbet angle and depth.



12. Simple jig is prepared to aid in marking timberheads for uniform length and thickness.

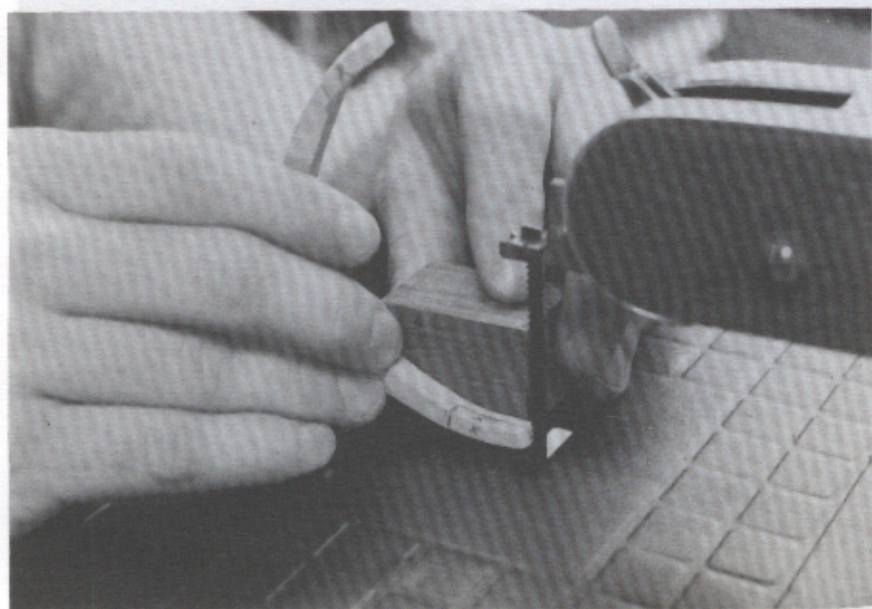
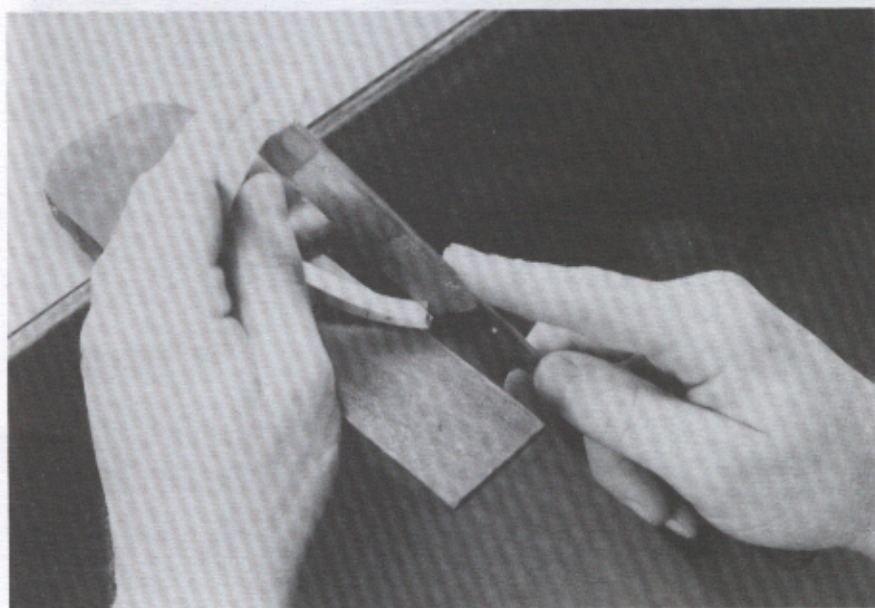
13. Using the jig to mark the thickness and length of timberheads—sharp 4H pencil needed.





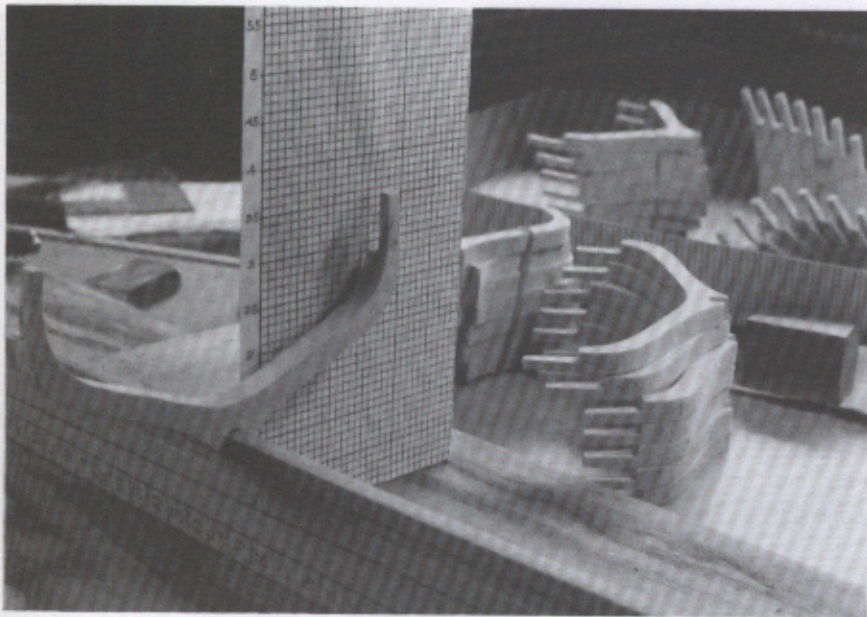
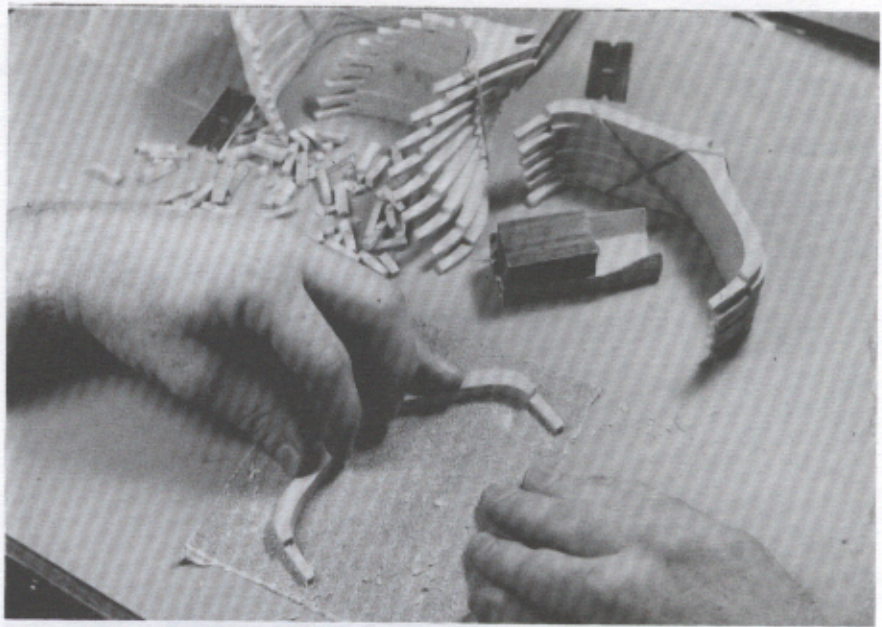
14. Lines show where cuts must be made. X's identify waste portion to avoid mistakes.

15. Cutting out timberheads using a fine toothed saw and a bench-mounted steady rest.



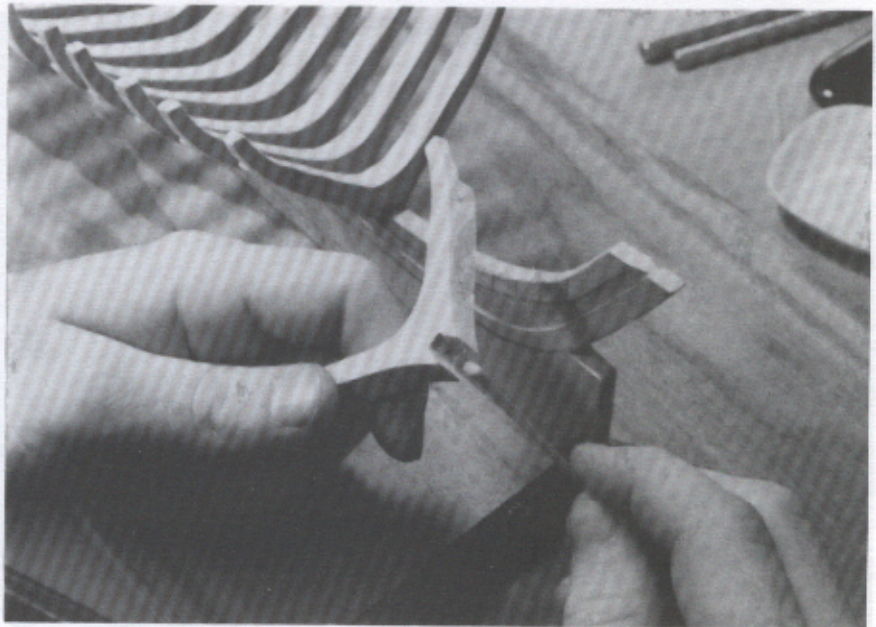
16. If a power scroll saw is used, use a small wood block as a steady rest and guide.

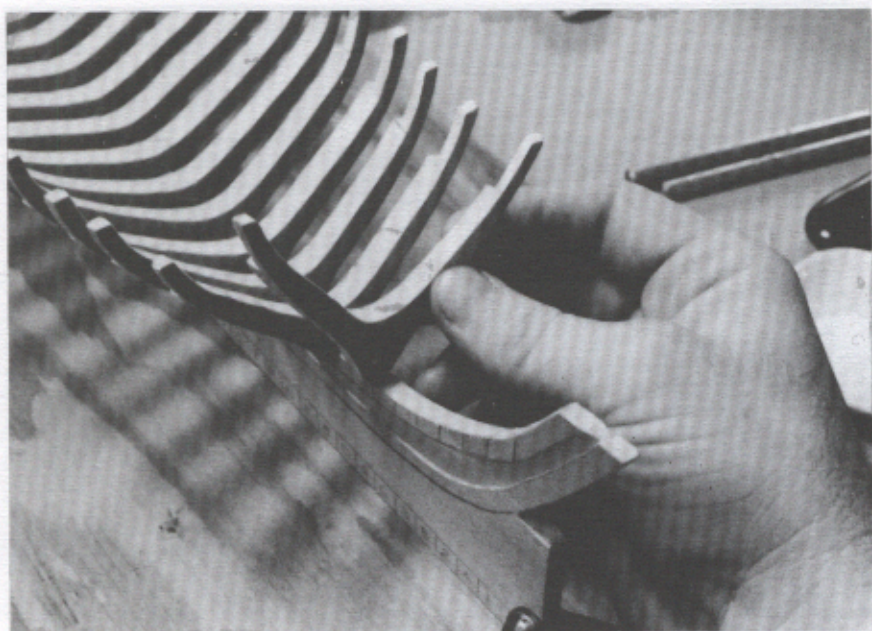
17. After all timberheads are cut out, frames are sanded with No. 120 grit paper.



18. A gauge made of 1/8" square graph paper is used to align frames for their final placement.

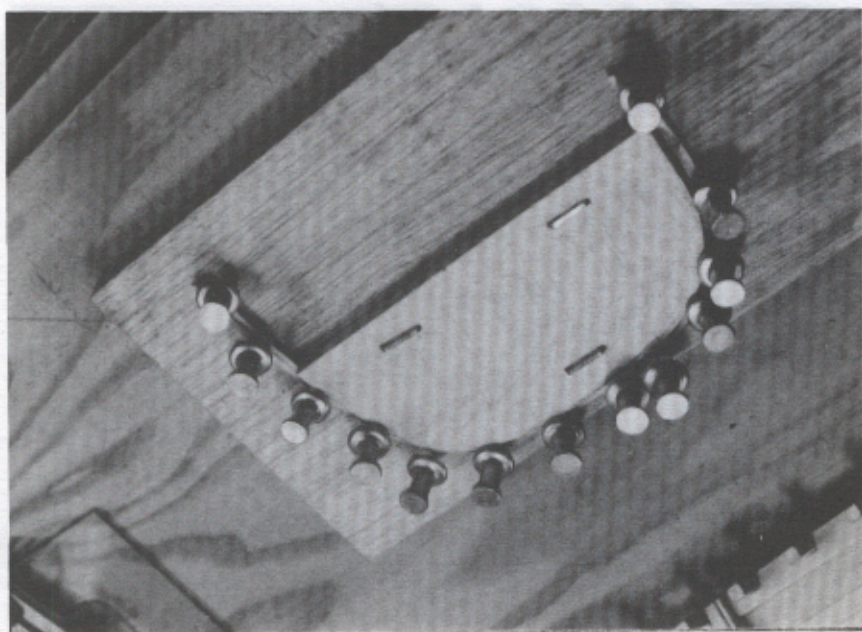
19. Yellow wood glue is wiped onto all three sides of frame notch. Moist cotton swabs clean up any excess.





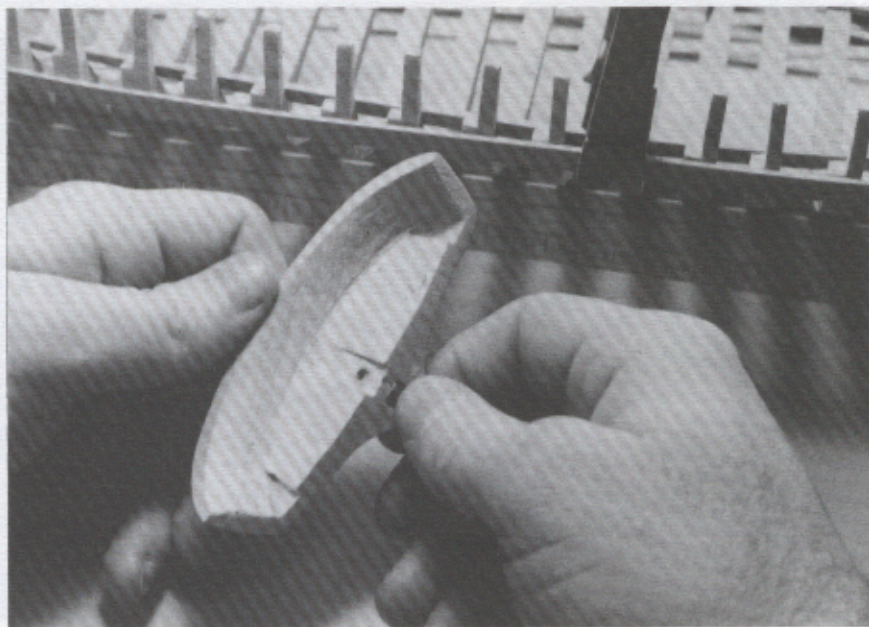
20. Fitting the frames in the bow section. Here the angle of the rabbet shows on the stem head.

21. After soaking in boiling water for a few minutes wood strips can be formed to curves around a suitable form.



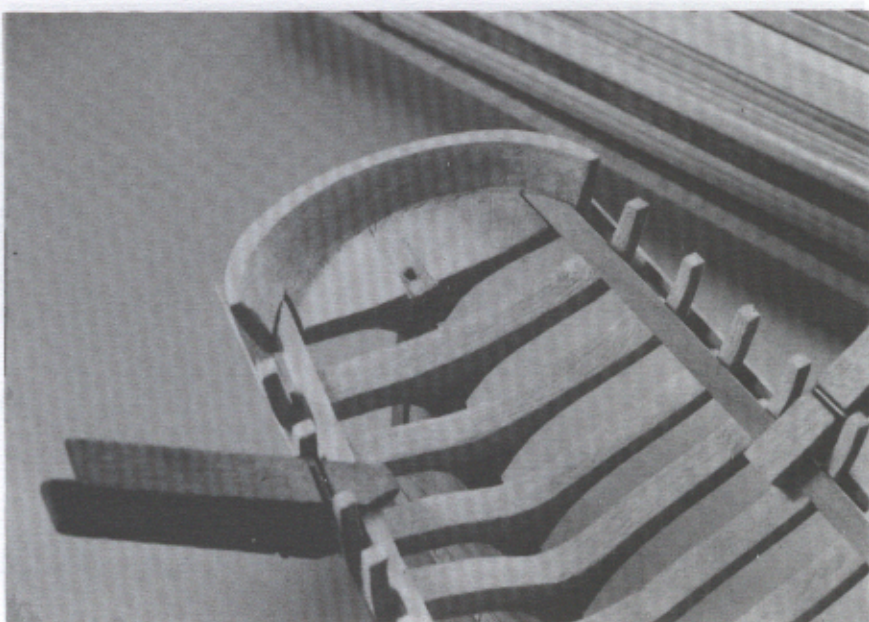
22. Heavier pieces can also be formed to special shapes. This is a stern piece, pinned in place until it dries.

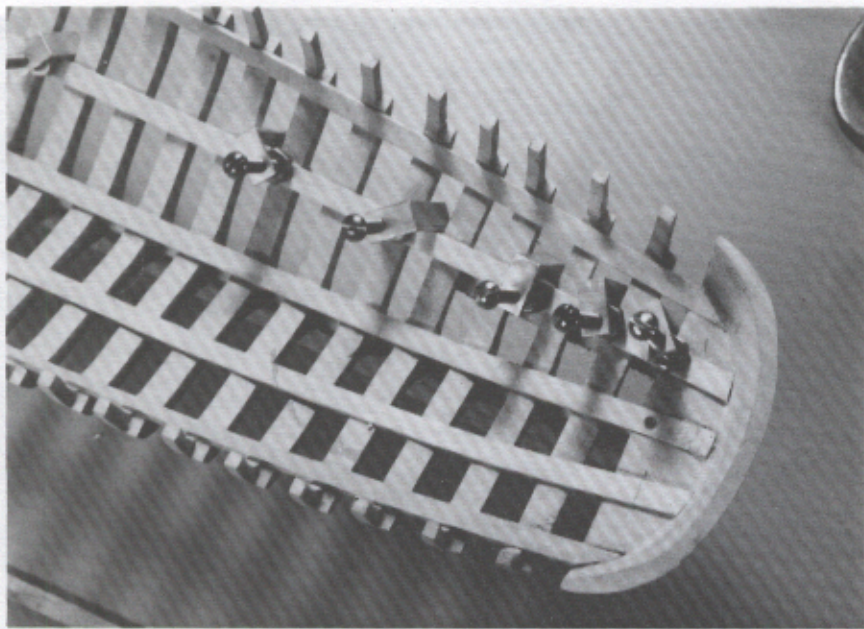
23. The carved stern piece is trimmed to final shape to fair into stern frames. Rudder shaft hole is drilled and notches cut for sheer clamps and keelson.



24. Fitting sheer clamp. A ribband, or backing strip, is placed on the outside for better clamping and to help align frames.

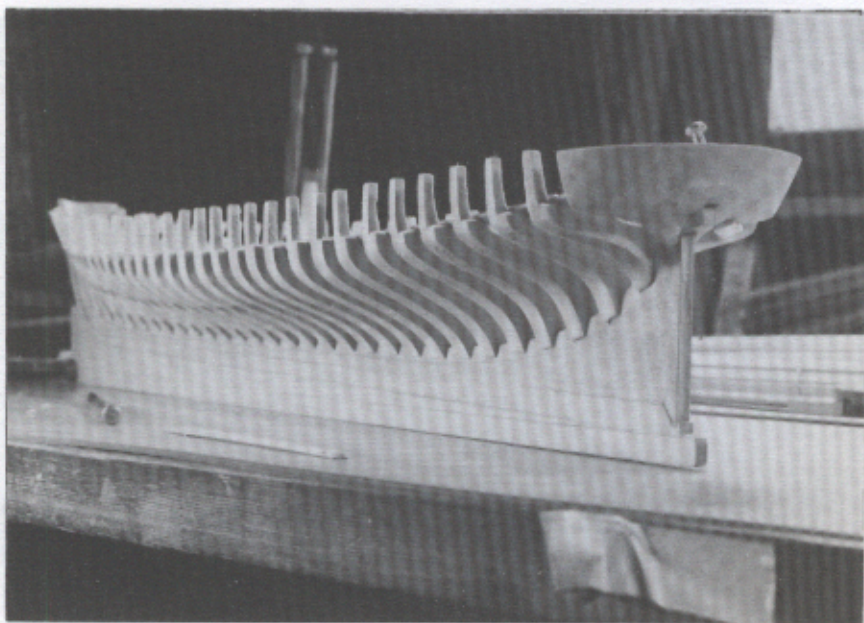
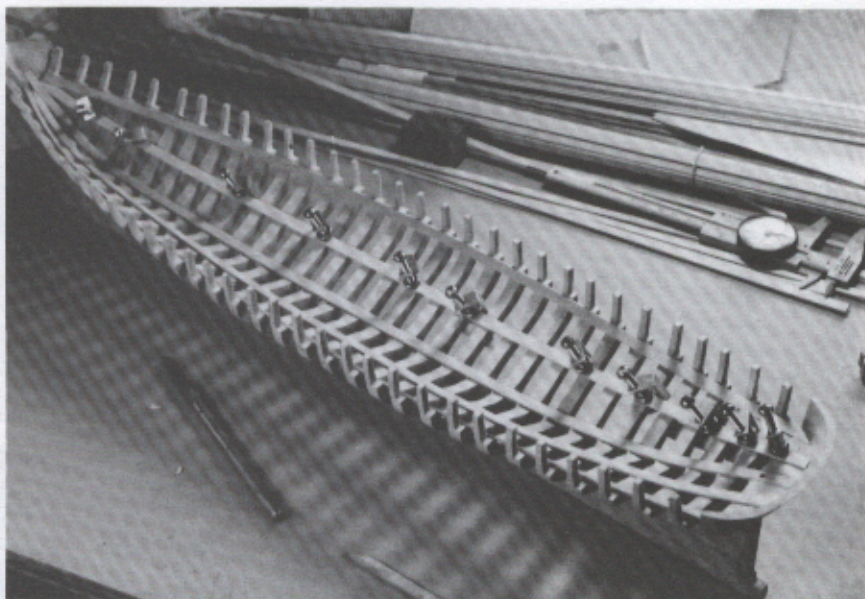
25. This view of stern piece shows how sheer clamps fit into previously cut notches.





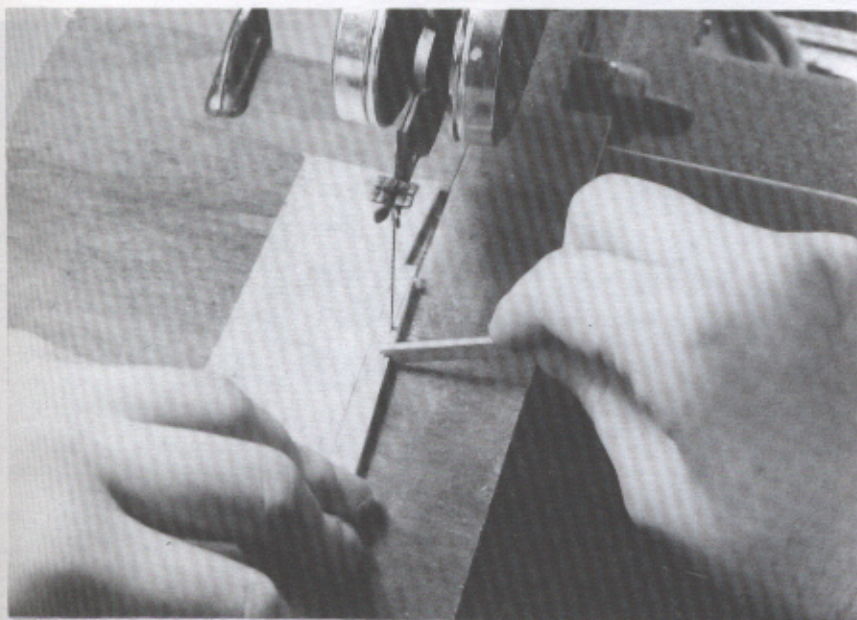
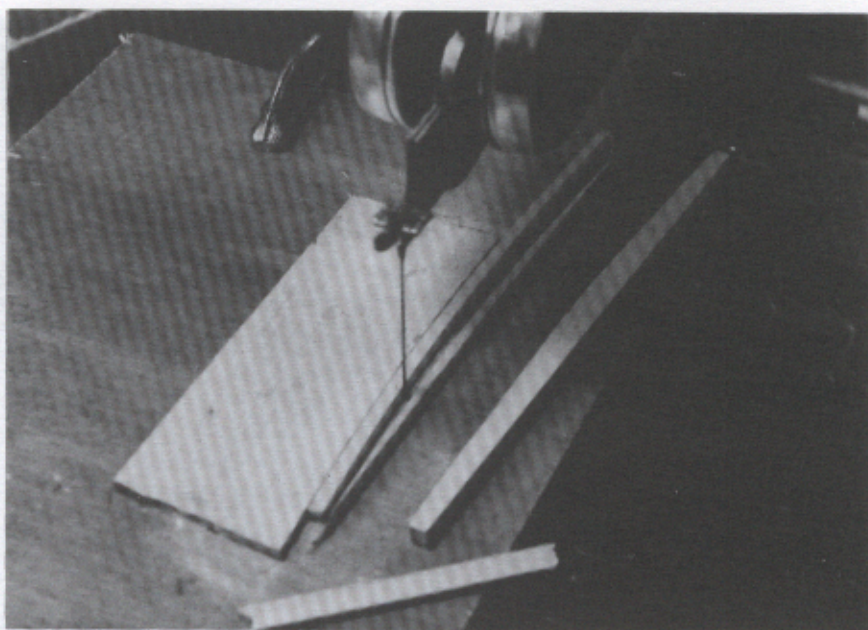
26. Here the bilge stringers are being fitted, using small clamps. Notches not required.

27. Overall view showing the last longitudinal being fitted, the starboard bilge stringer.



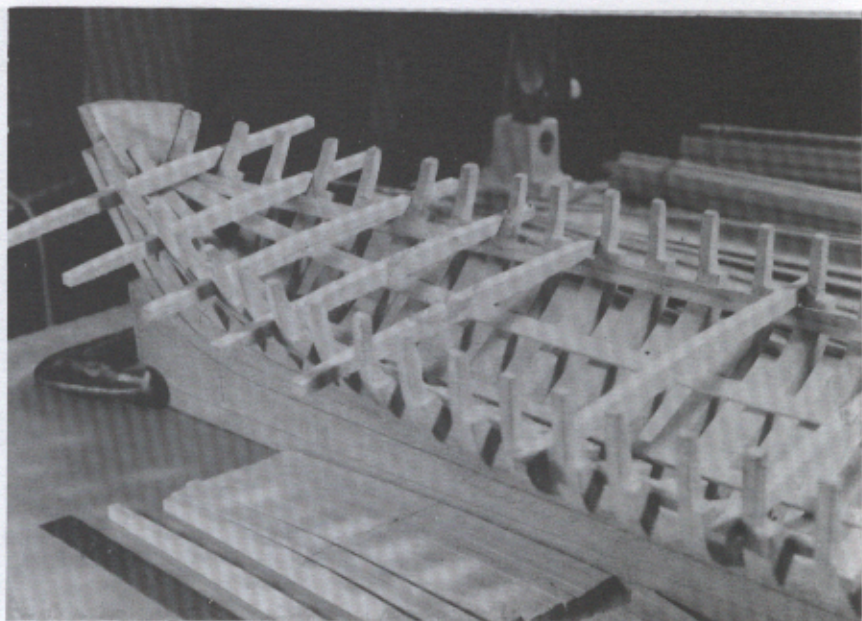
28. Frames in place, all longitudinals in, and your eye tells you everything lines up.

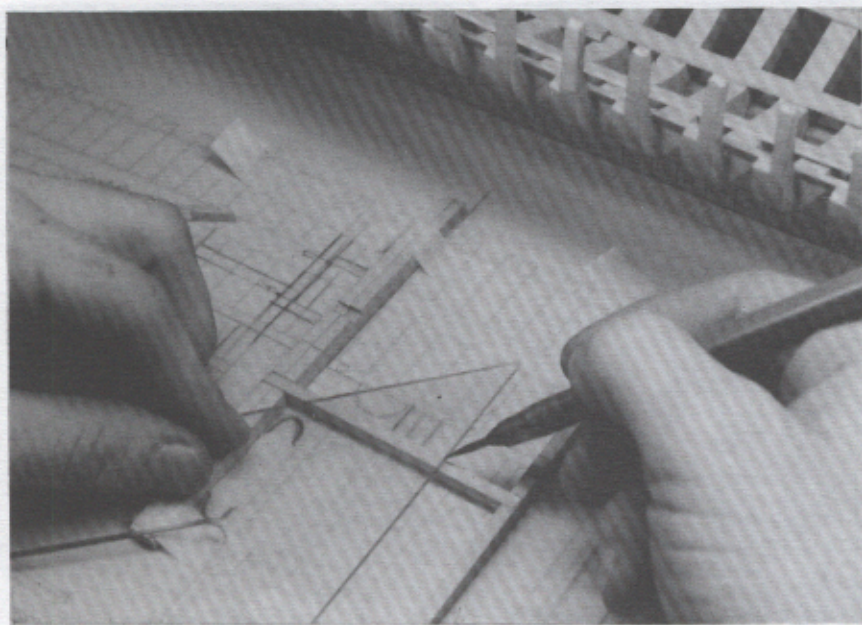
29. A wood guide, cut to the arc of the deck beams and set to $\frac{1}{8}$ " width can cut beams with top and bottom curves.



30. A notched push stick holds deck beam against guide as other hand pushes beam through the cut.

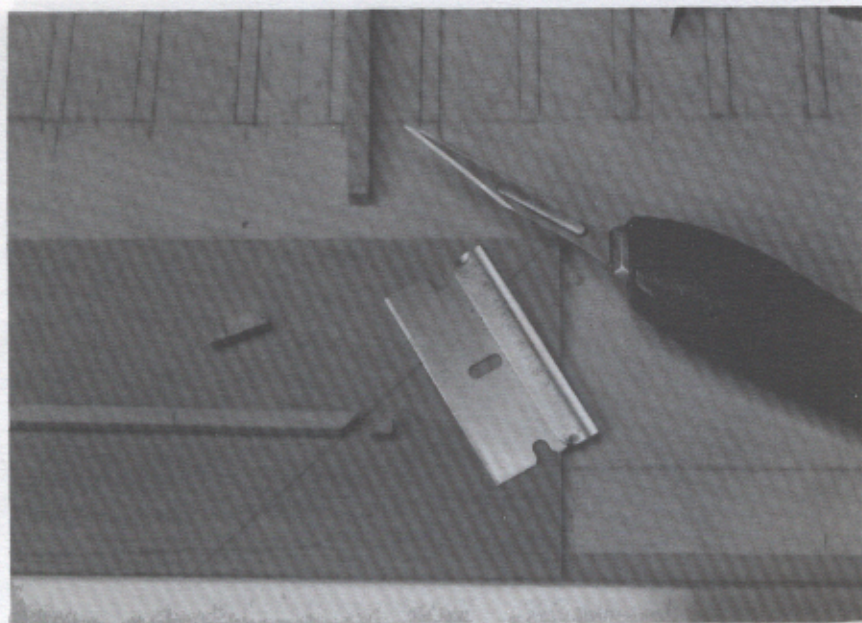
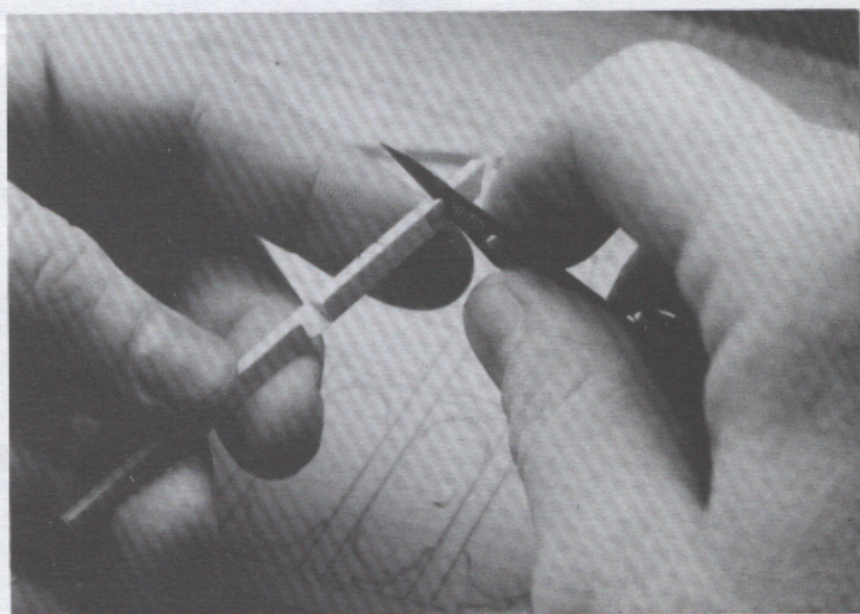
31. Deck beams are trial fitted across sheer clamps. A straight-edge laid down center lines finds any unevenness.





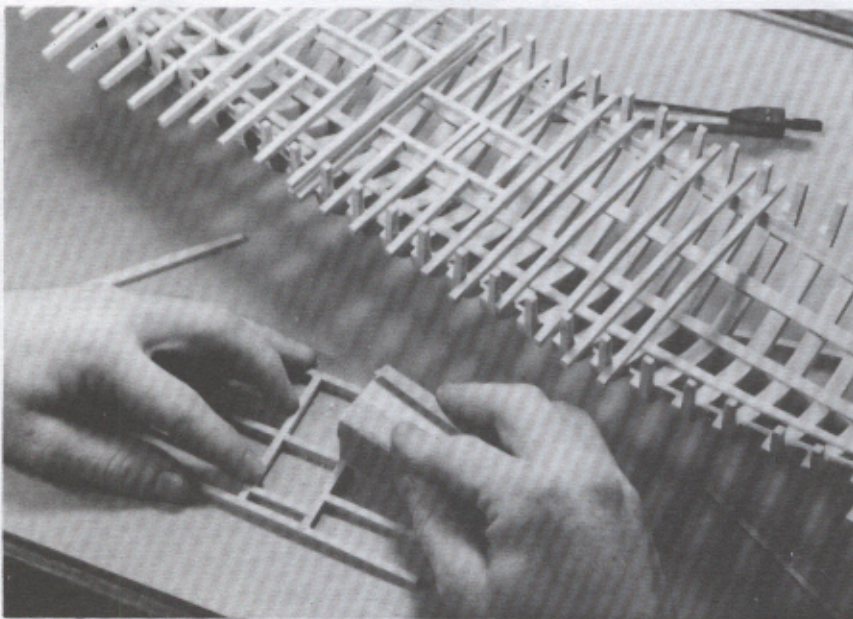
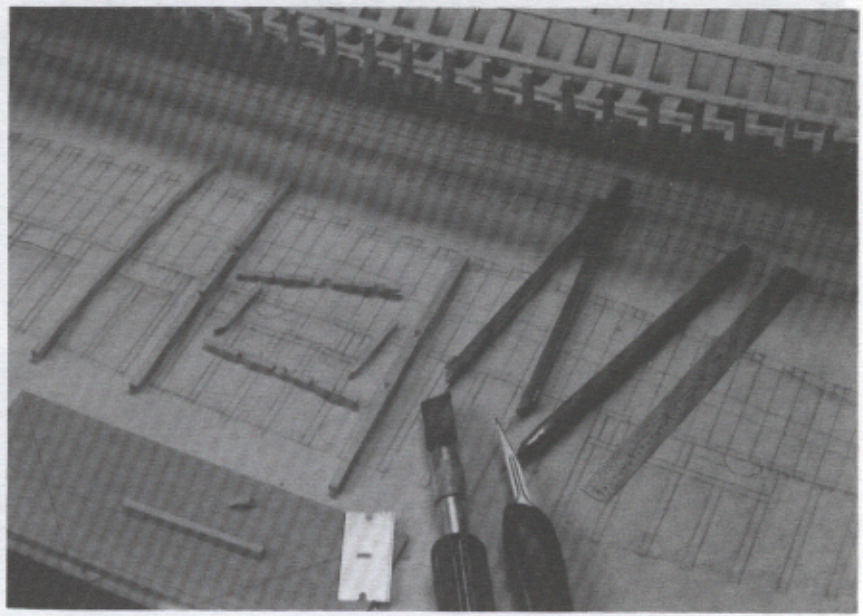
32. Beam assemblies are made up by taping beams directly to framing plan and using draftsmans angles to lay out cutting marks.

33. A small knife with very sharp blade will cut true notches for the joints.



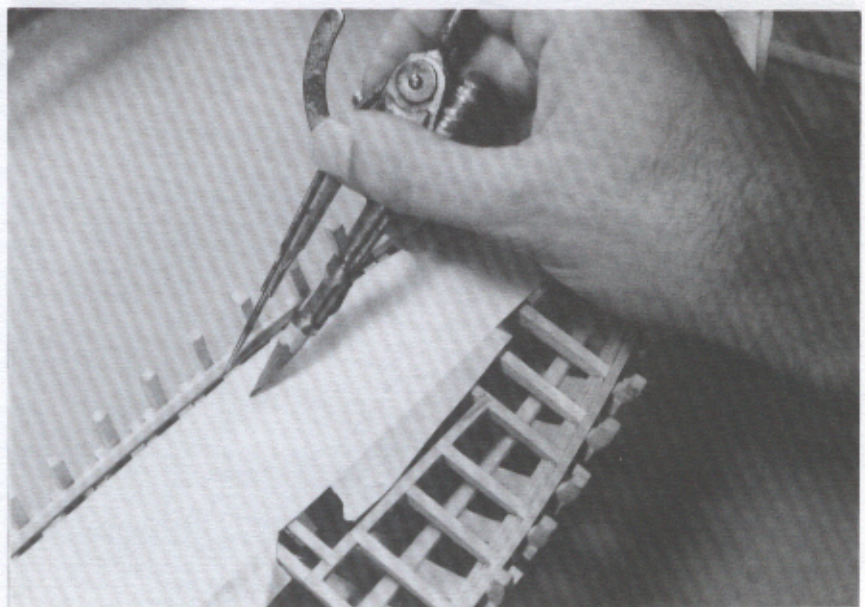
34. A small cutting board with guide lines and a new razor blade produces clean angles.

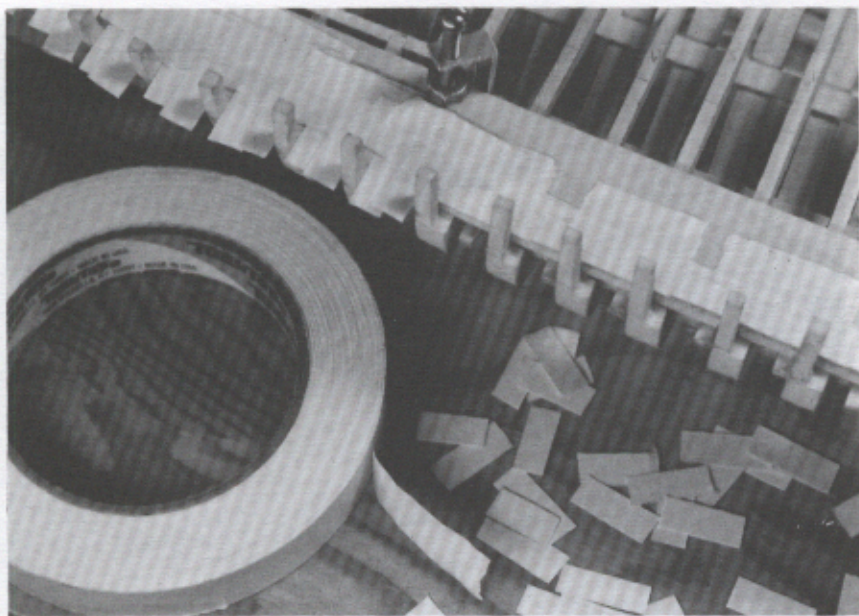
35. Assemblies are made up according to the plans, but checked carefully on the hull.



36. A sanding block is used to fair all the deck beam joints of the assemblies.

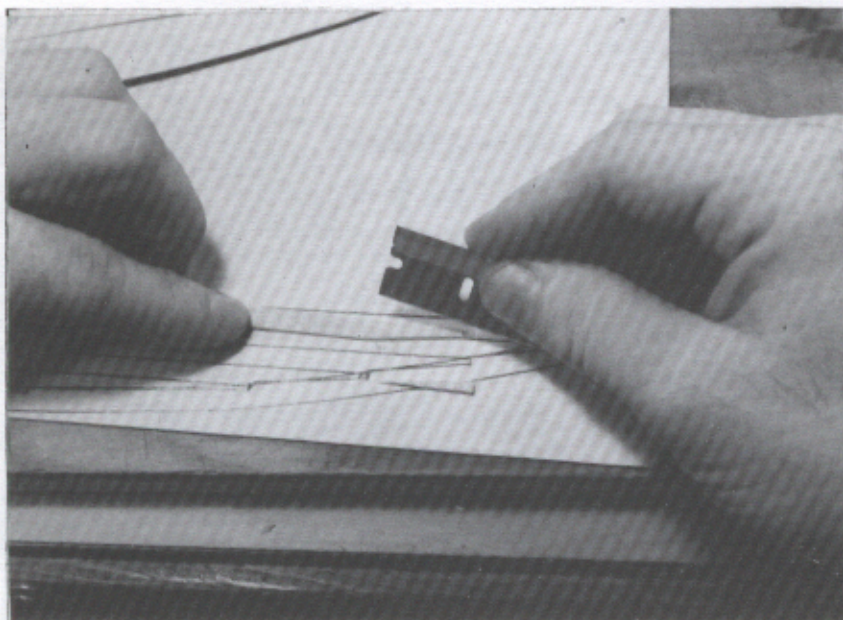
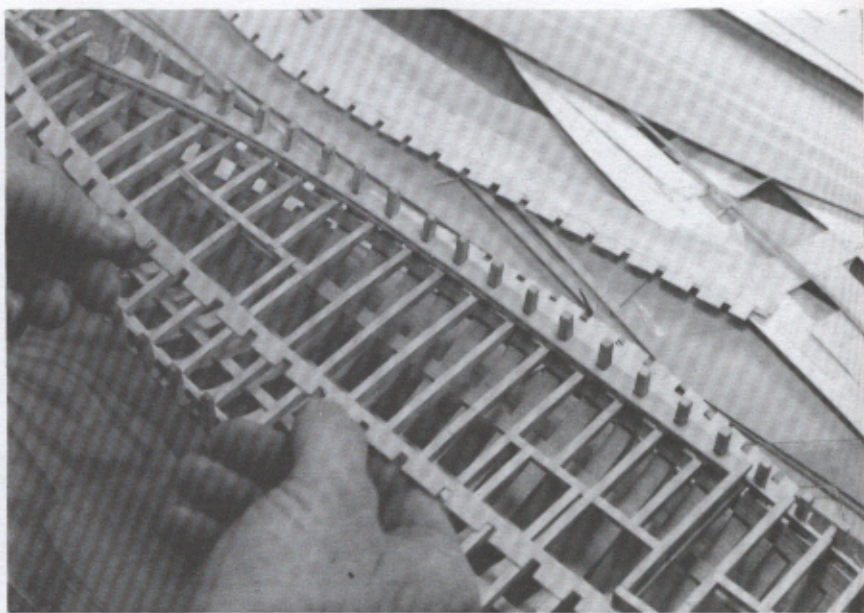
37. Curves and offsets are taken off onto a pattern by "spiling" with a compass.





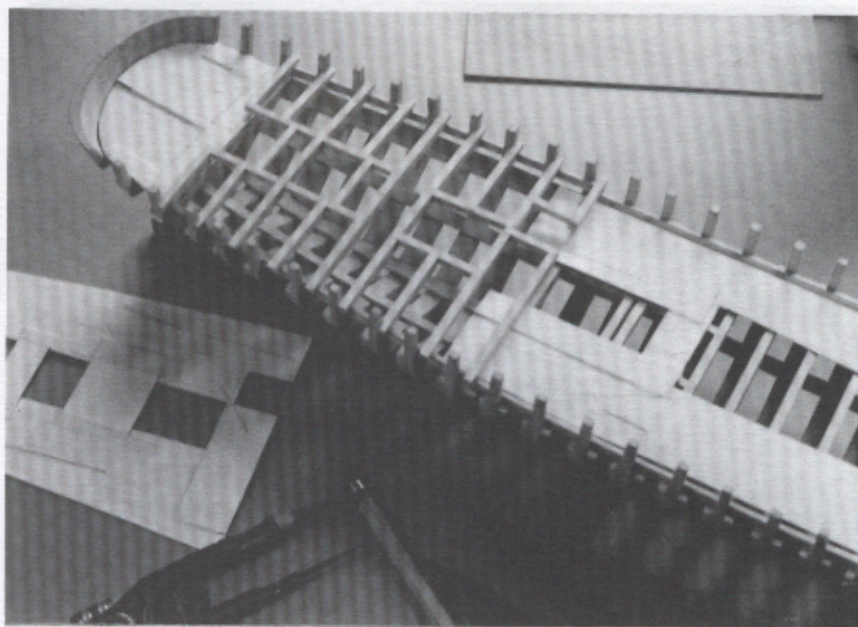
38. Template for the timberhead notches in the planksheer is made with tape and many small snips of card stock.

39. The finished planksheer. The starboard planksheer is already in place—the pattern is in the background.



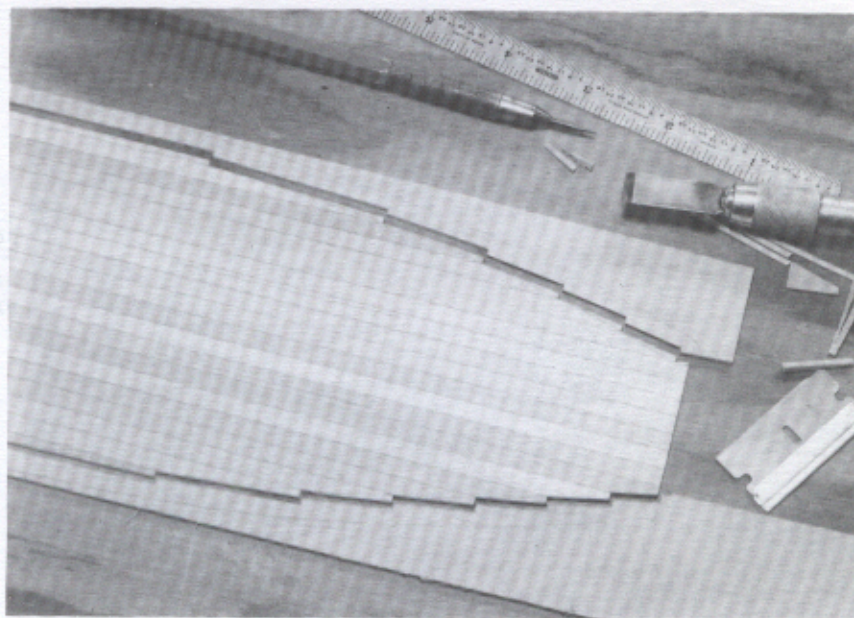
40. Cutting the nibs on individual planks is best done if the arrangement is first accurately laid out on paper.

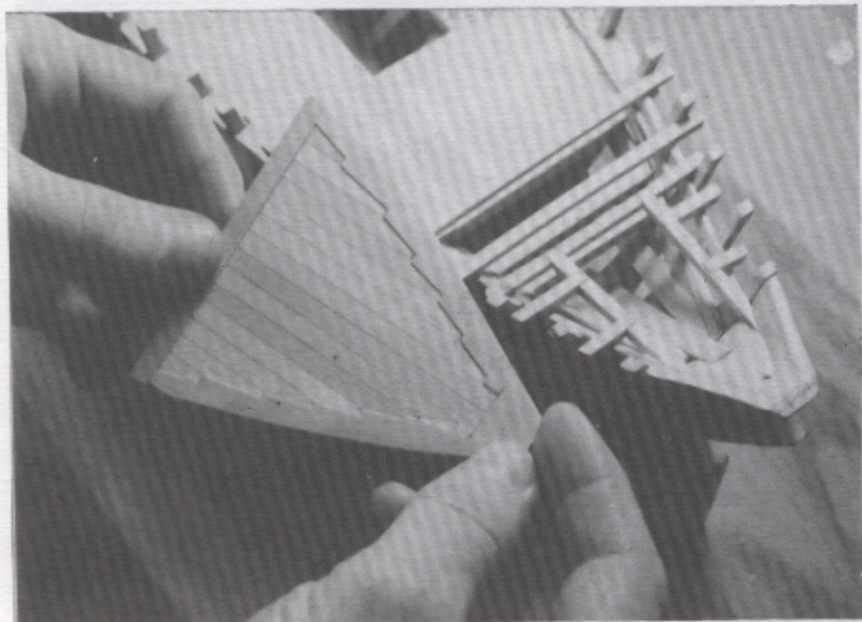
41. If planking is made up of large, glued-up assemblies, templates must be made of each deck section.



42. Here the patterns for all four deck sections are made, with hatch openings framed out.

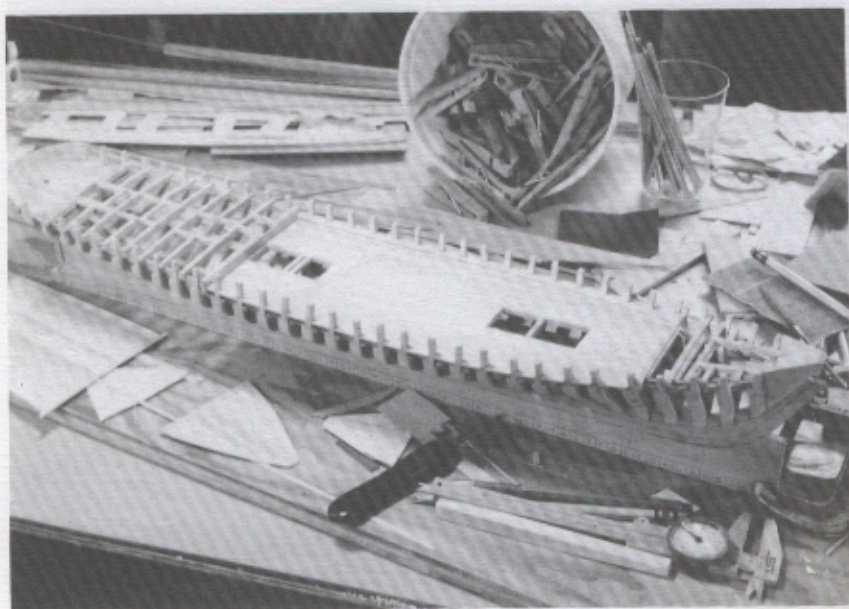
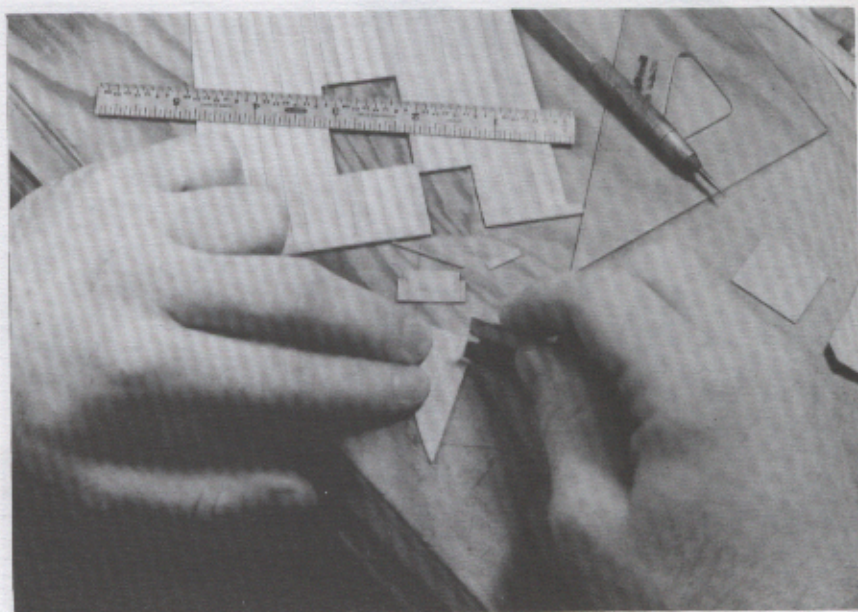
43. Glued-up sheet of decking with nibs cut out and matching cuts in sheet wood for margin plank. When glued, margin edges were cut according to template.





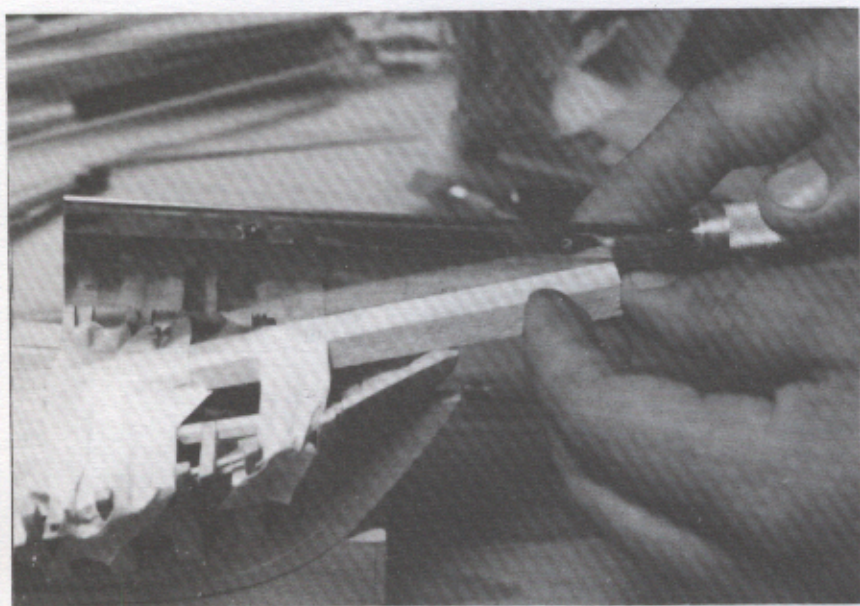
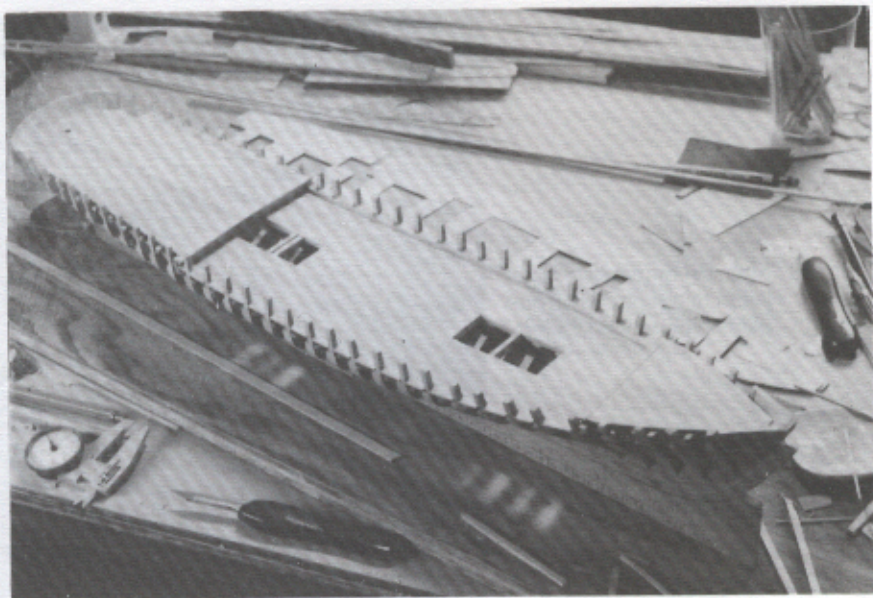
44. Fore deck assembly completed, with decking neatly nibbed into margin plank.

45. Hatch openings are cut in the deck assemblies and companionway framing cut to match openings.



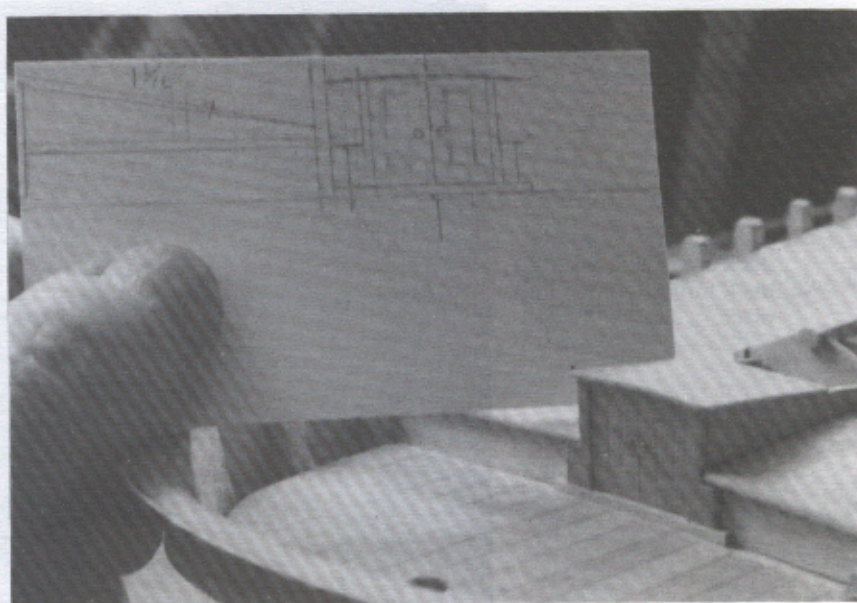
46. After the quarterdeck and foredeck bulkheads are fitted, decks are fitted into place.

47. All decks trial fitted. Note that rudder shaft hole is worked into well deck before gluing.

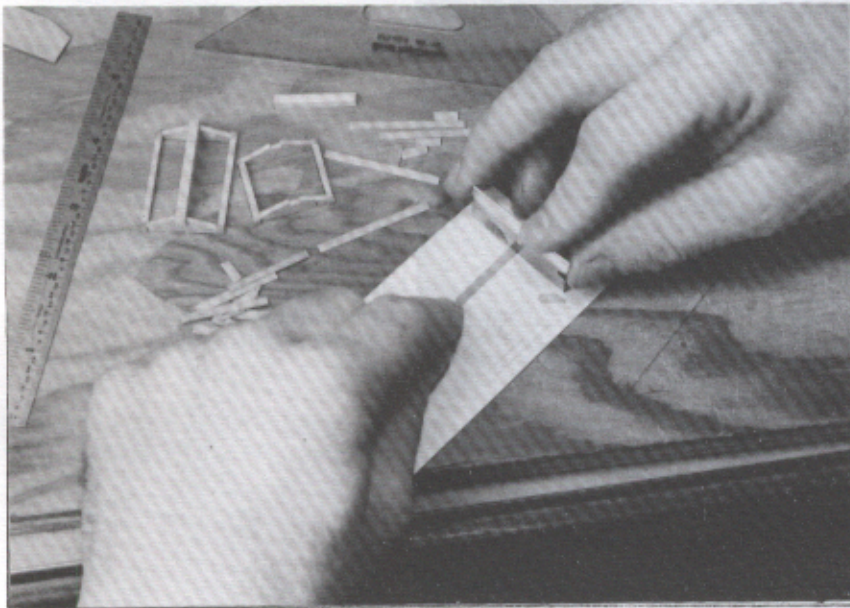
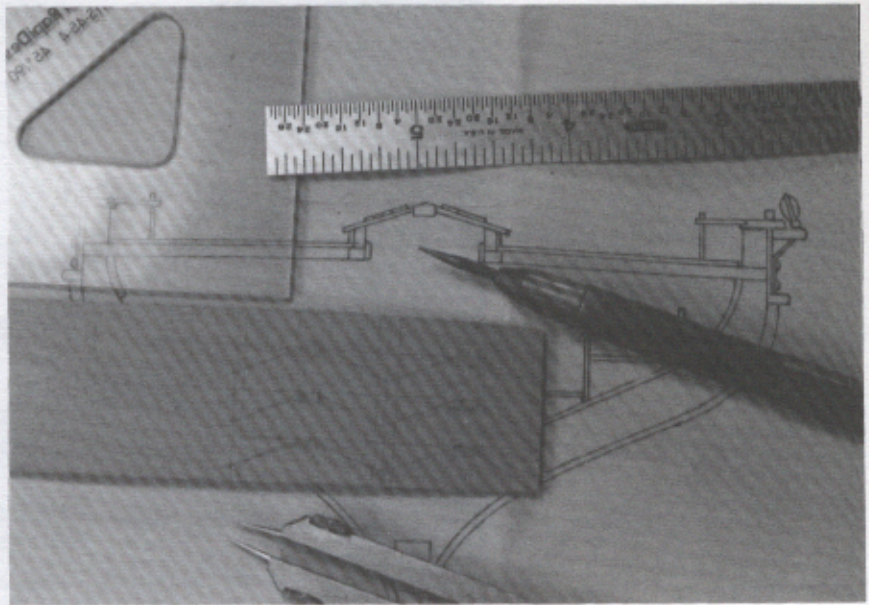


48. Opening for bowsprit is cut in hawse timber piece. Tape holds bowsprit stock while cuts are made.

49. All hatches, skylights and companions are laid out on paper first to assure good fit.

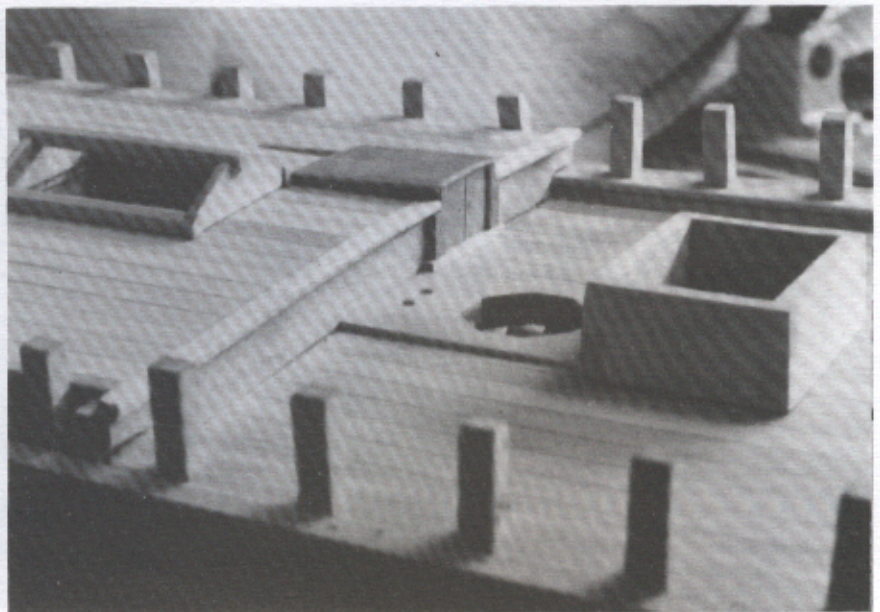


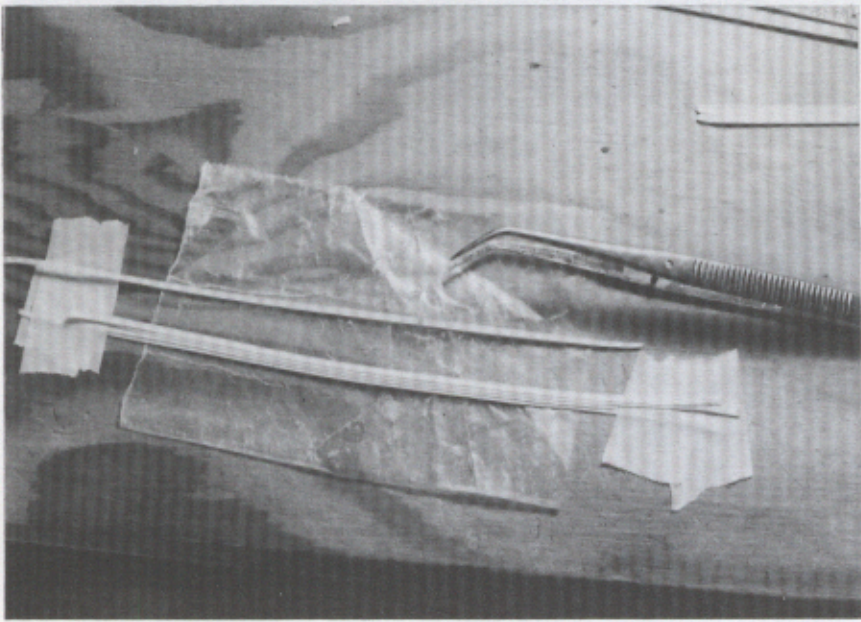
50. Measurements for skylights taken directly from plans onto wood stock.



51. Skylight frames have been made up; lids are being cut out according to paper layout.

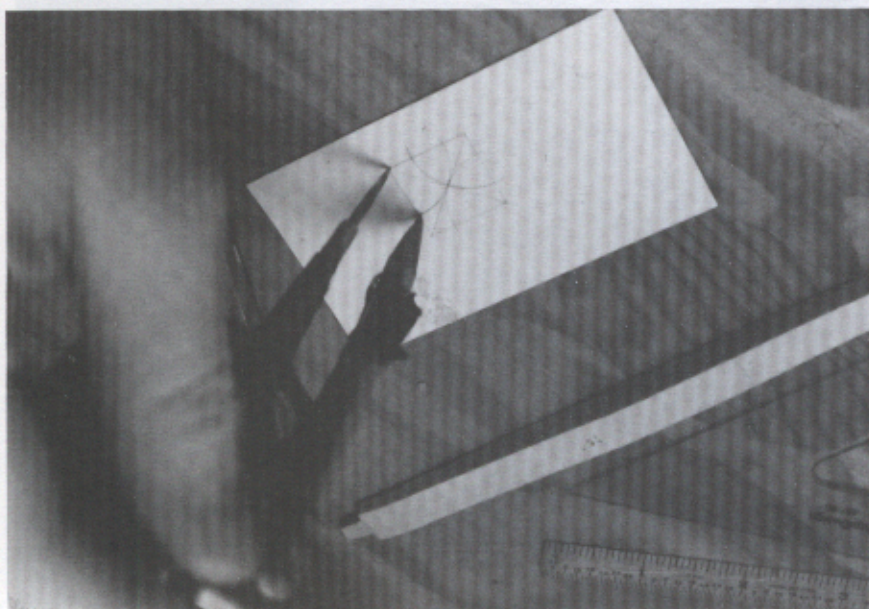
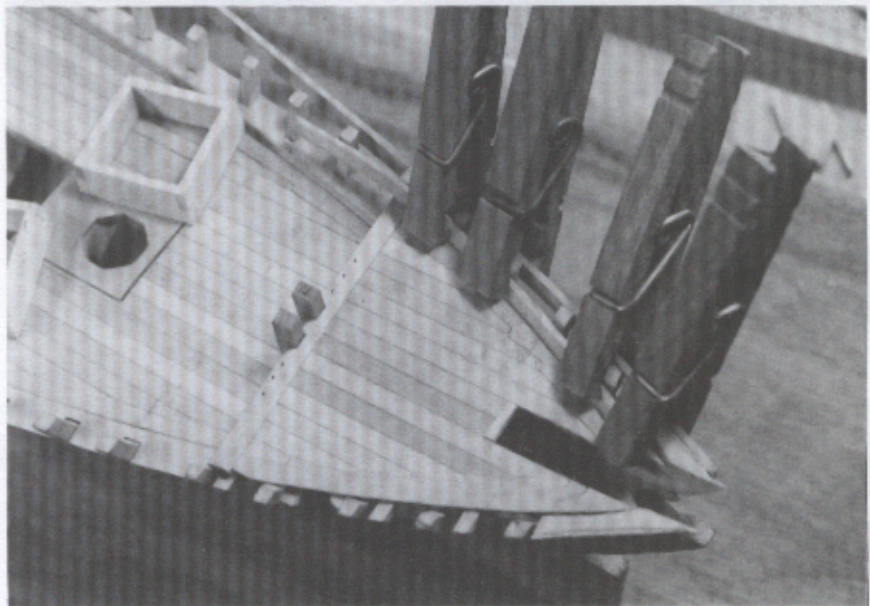
52. This shows the quarter-deck break with assorted deck furniture fitted into place.





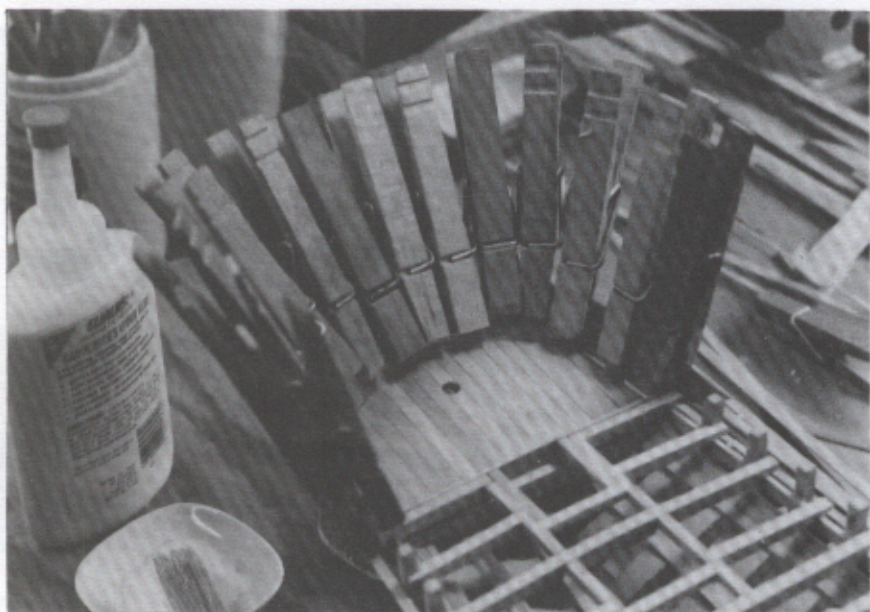
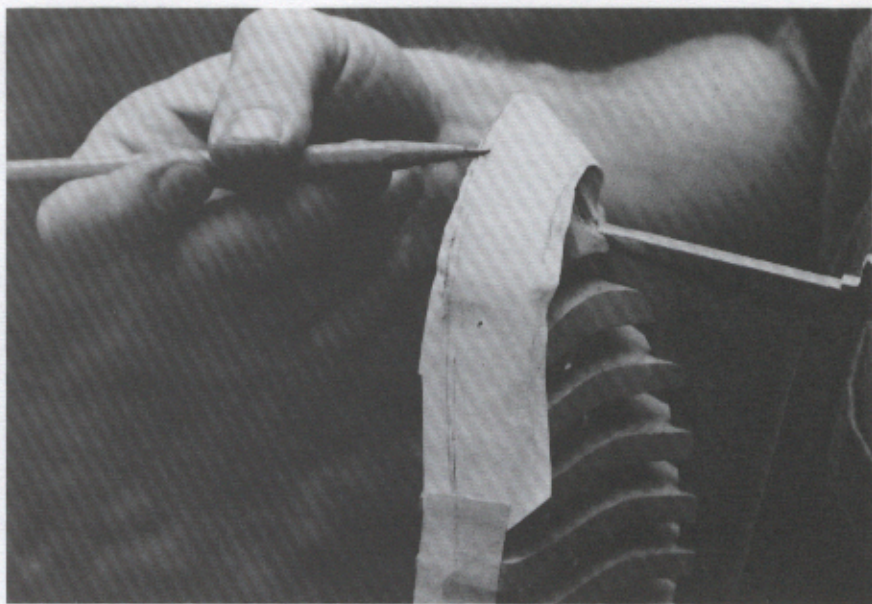
53. Louvers for locker doors are made of over-lapping strips glued into a handy single length.

54. This is the foredeck waterway being glued into place using a backing strip for the clamps.



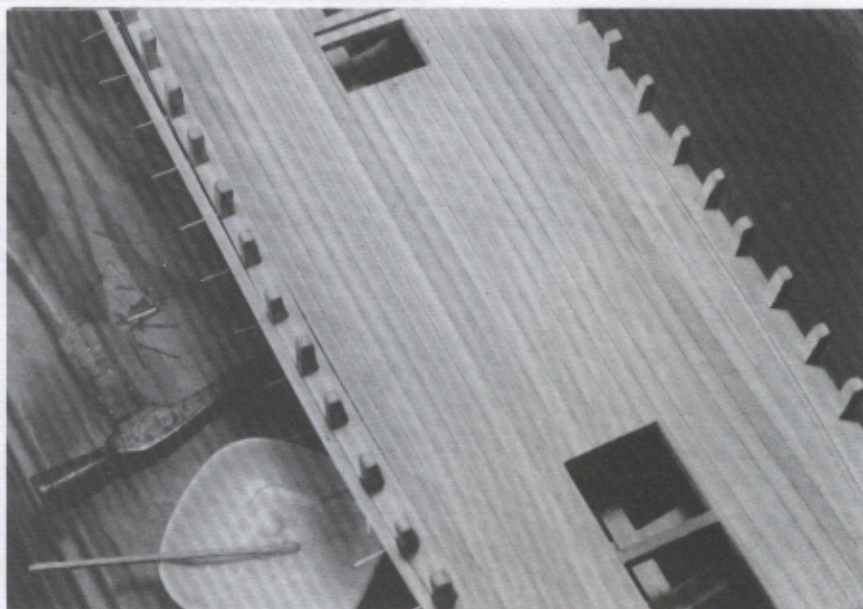
55. The bowspit has been made to the plans and the dimensions for making it eight-sided are being determined.

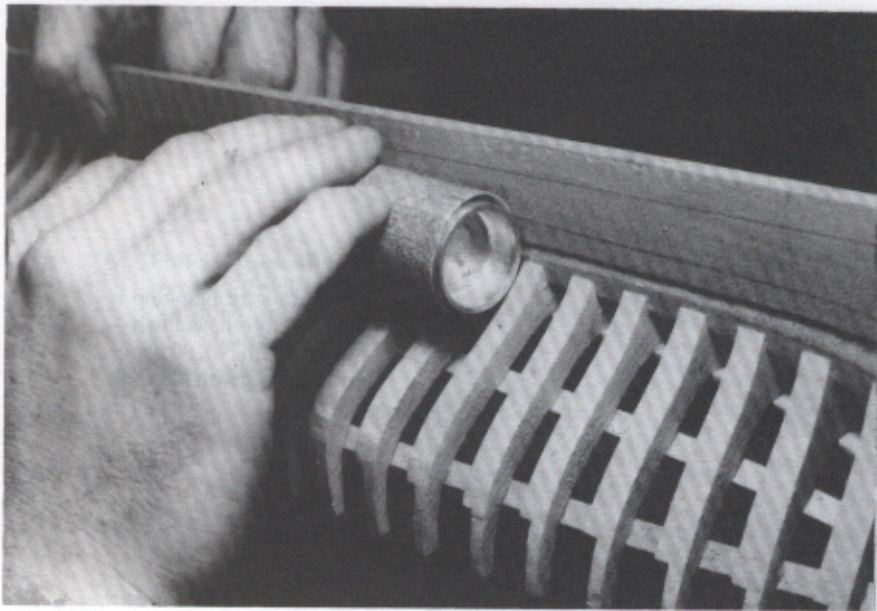
56. Here the shape of the stern is being taken off in a paper template to work out the planking arrangement of this area.



57. After the stern planking piece is made up, it is glued in place with as many clamps as is possible.

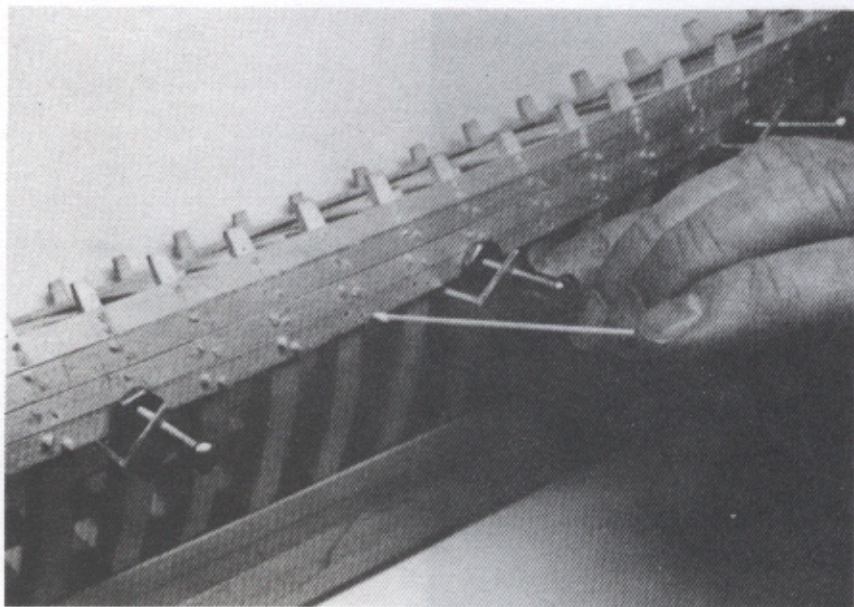
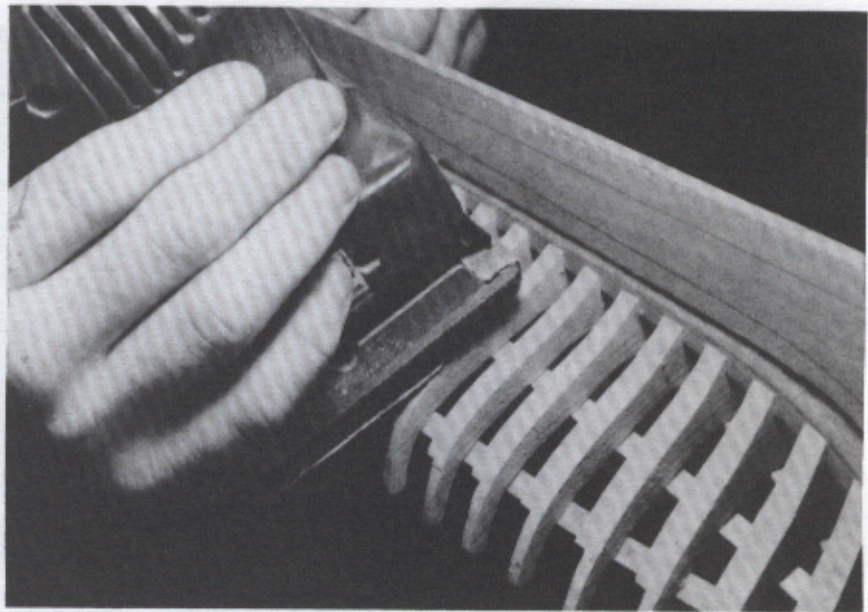
58. The outside strip of the planksheer is glued into place, using pin fastenings in each timberhead.





59. Final sanding of frame hollows requires a cylindrical sanding block, with care used not to touch the rabbet edge.

60. Smoothing the balance of the frames can be done with a hand sander and No. 220 paper.

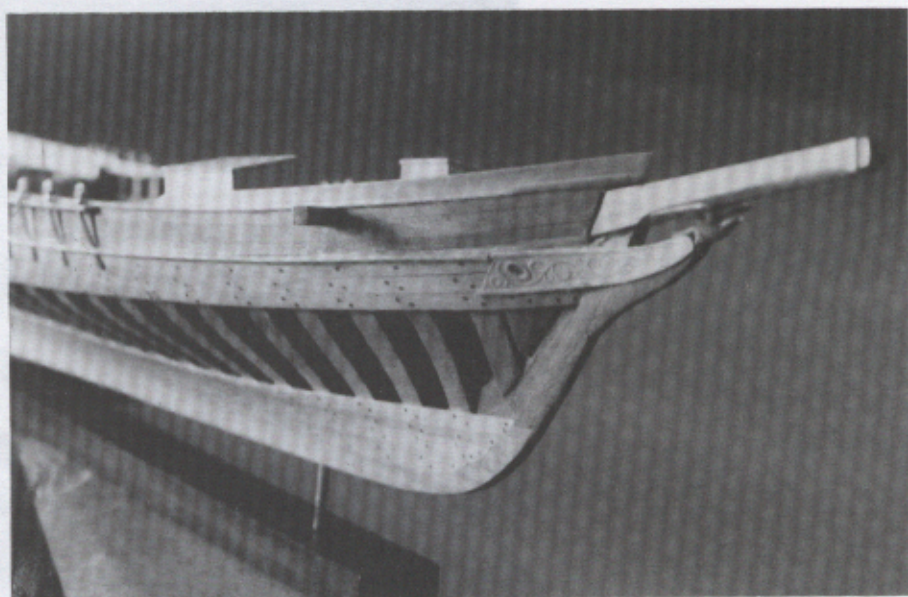


61. This is a view of fitting the planks and fastening with tree-nails. After drilling, a tree-nail length is dipped in glue, pressed home, and clipped off. (Hull of the *America* shown)



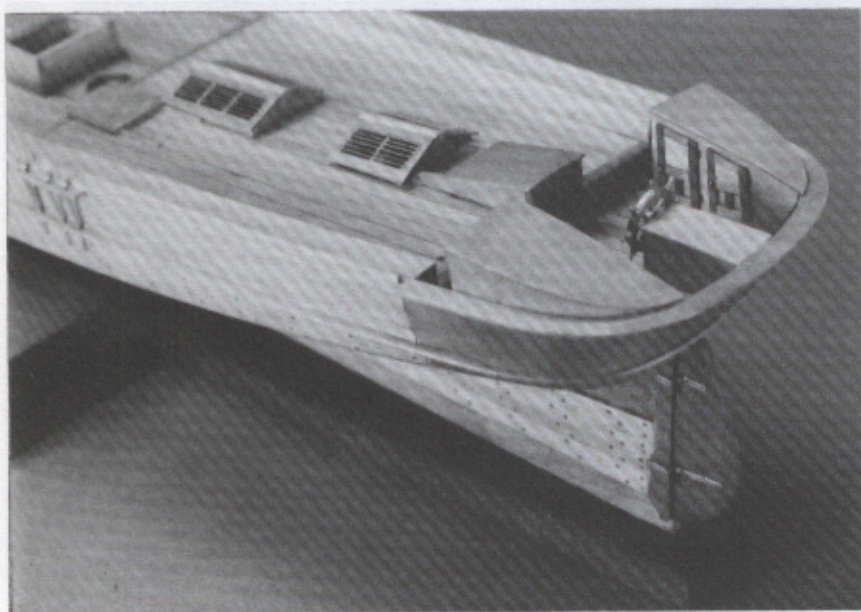
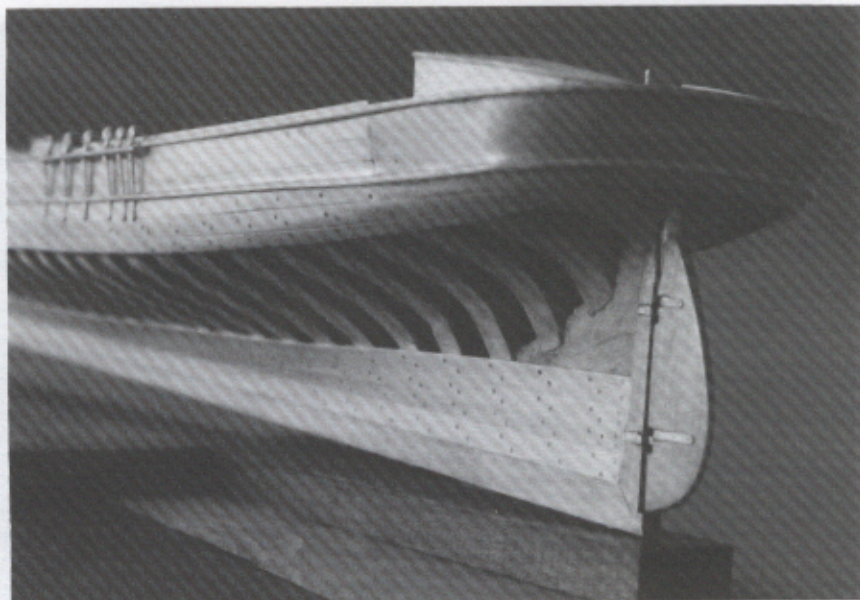
62. Final stage of planking is sanding tree-nails flush—starting with No. 80 paper and finishing with No. 220.

63. Here the trailboards, figurehead and bowsprit have been fitted into place.



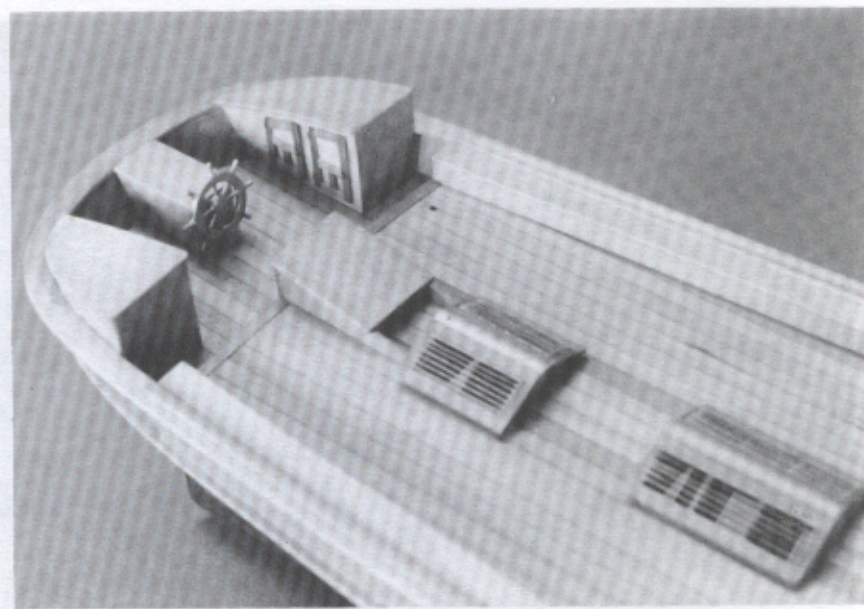
64. Now the rudder is completed, the gudgeon and pintles fitted and the rudder hung on the sternpost.

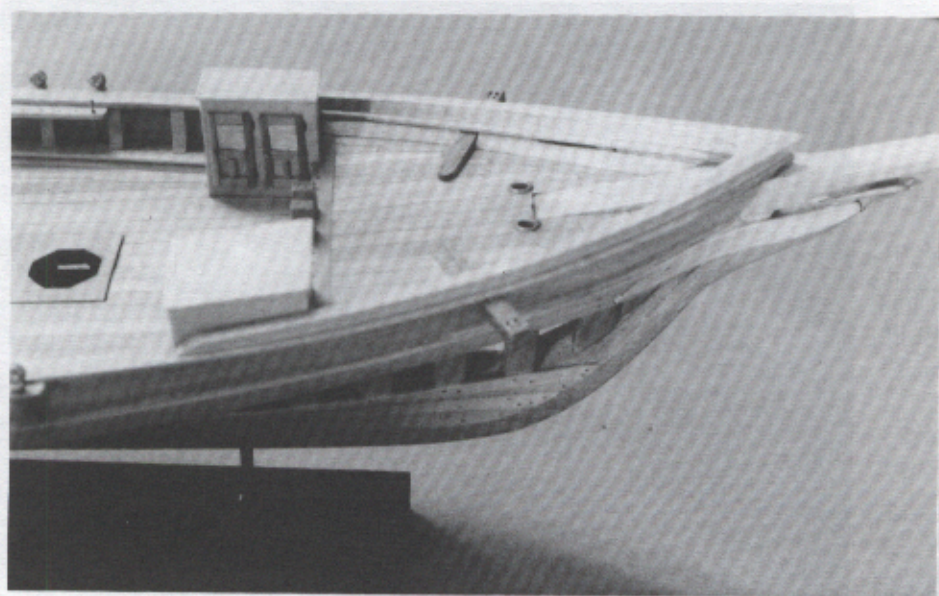
65. This shows the stern completed with the rudder hung and wheelbox and steering wheel in place.



66. Another view of the finished stern and rudder. The officers' heads are in place.

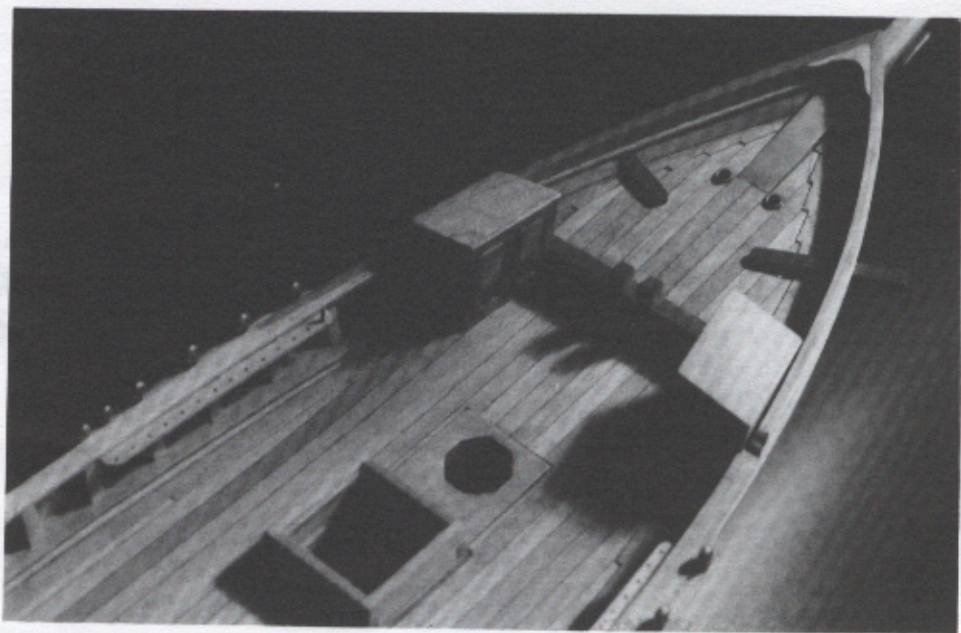
67. Looking aft towards the stern. No hardware such as blocks and cleats have yet been installed.





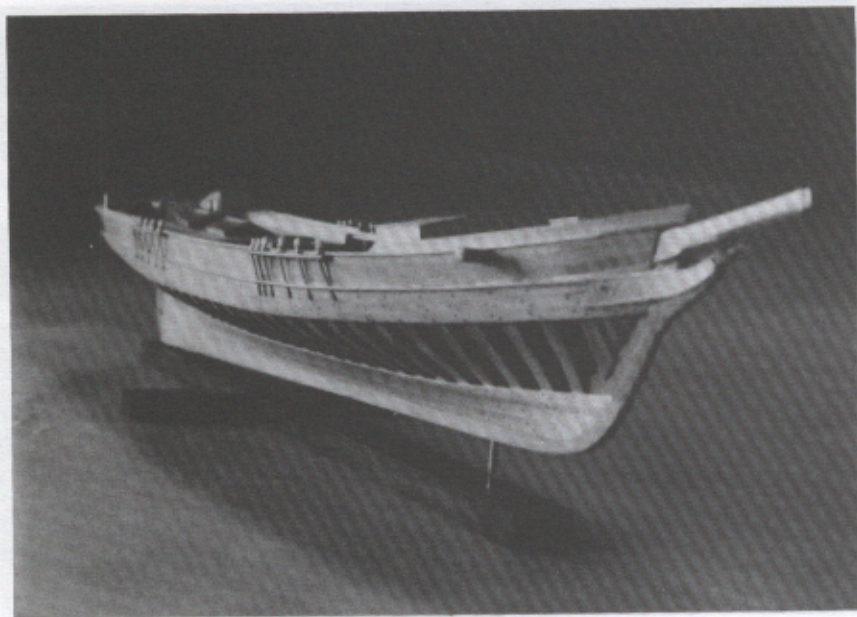
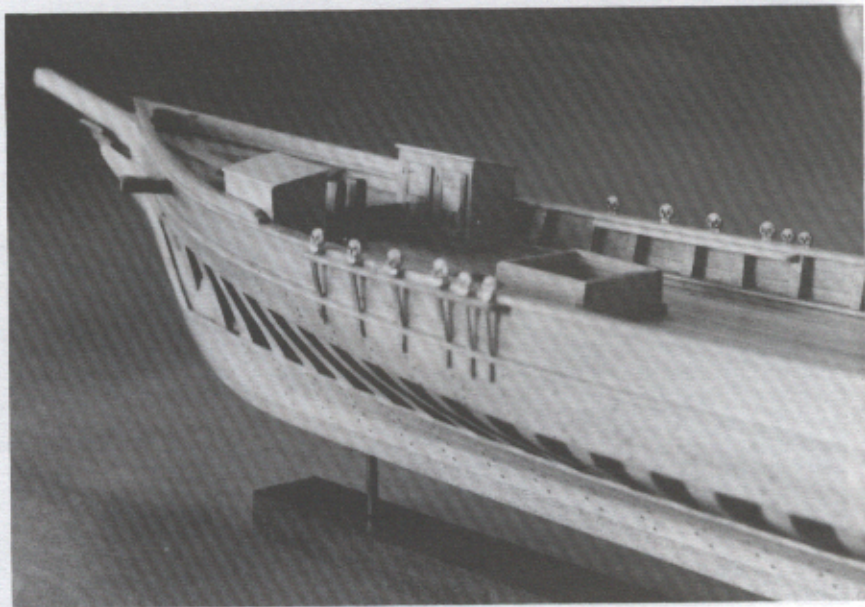
68. Looking at the foredeck. Details, such as the galley smokehead, have not been fitted.

69. The foredeck from above shows the effectiveness of carefully fitted wood joints. This is all bare wood without the hiding quality of paint.



70. Slightly different angle. The louvers on the doors have been cut from the single strip.

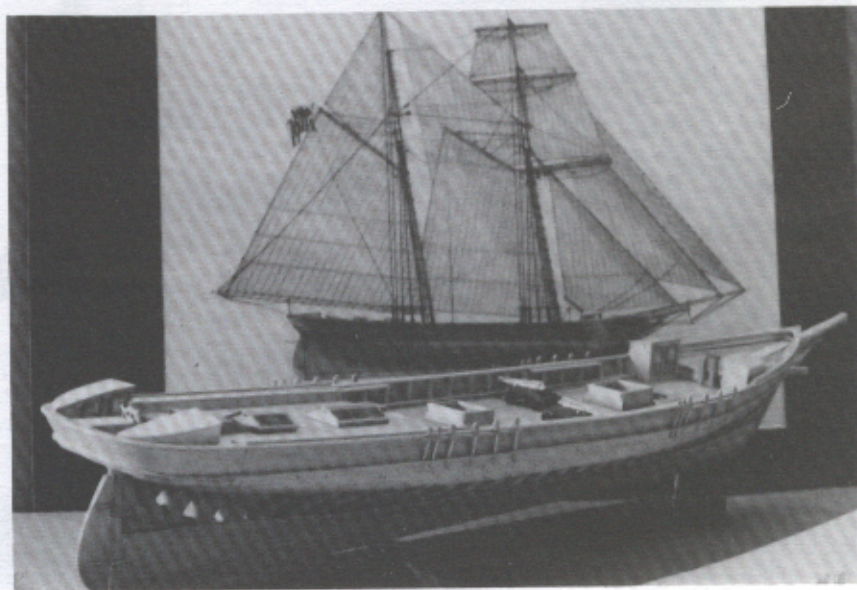
71. Looking forward from the port beam. The chain-plates are installed differently from plans, but either way is suitable.

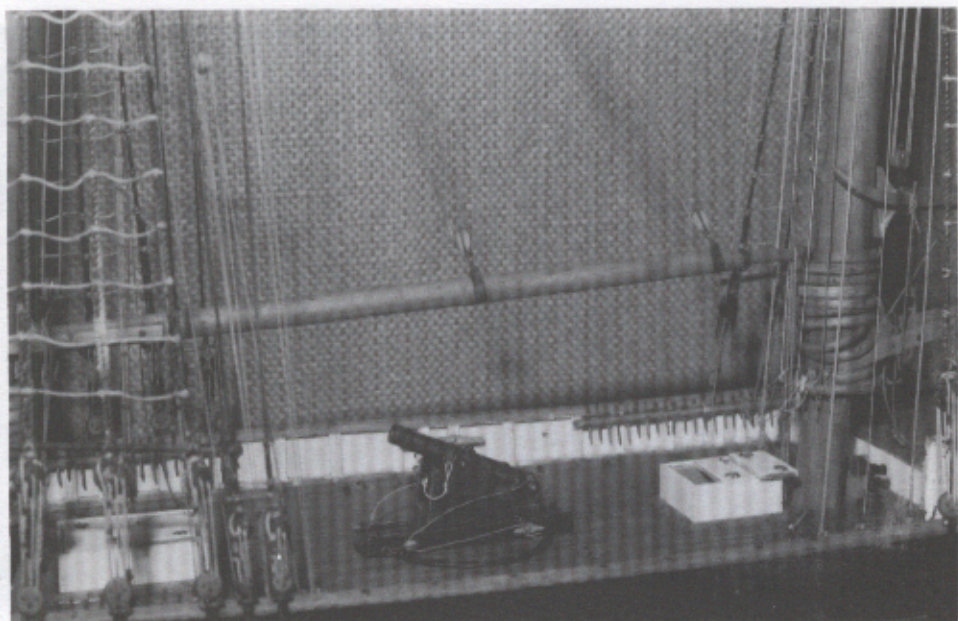


72. Seen from the starboard bow, the model shows up well on a very simple walnut mounting.

Notes on

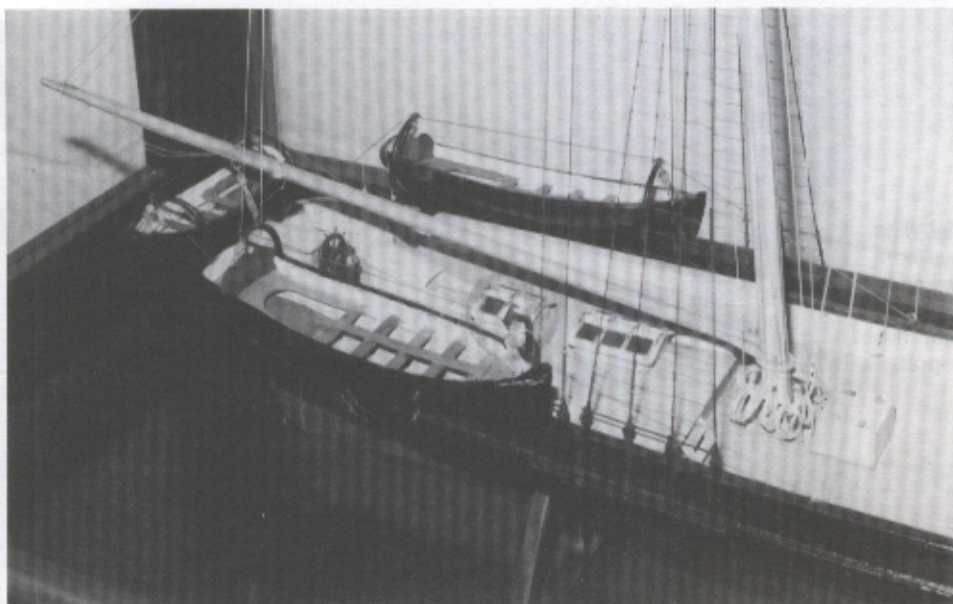
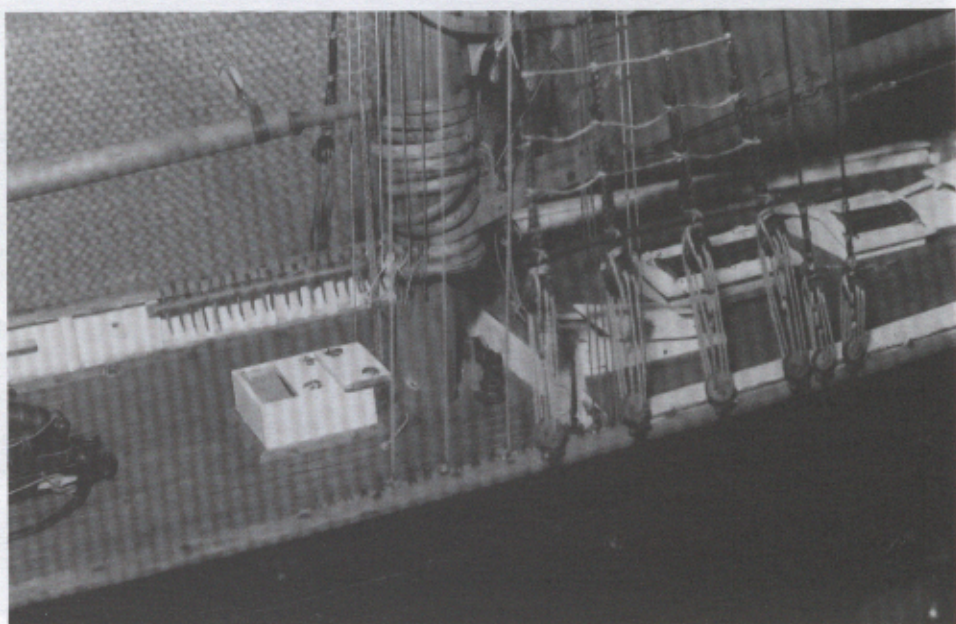
73. The finished model. The building could have continued to full completion as the print in the background shows. But this was the author's preference.



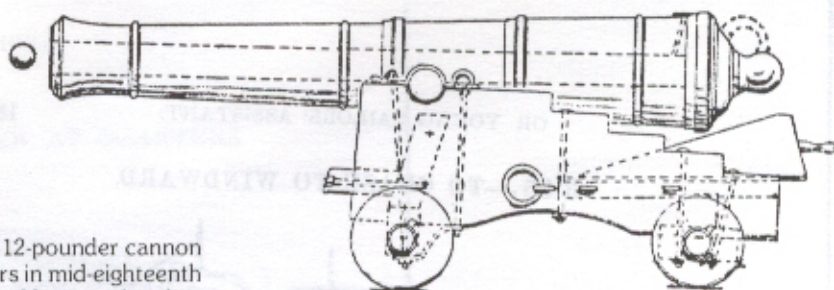


74. A well detailed model of the Joe Lane in the New London Museum of the Coast Guard Academy, shows a single gun in a pivot mount.

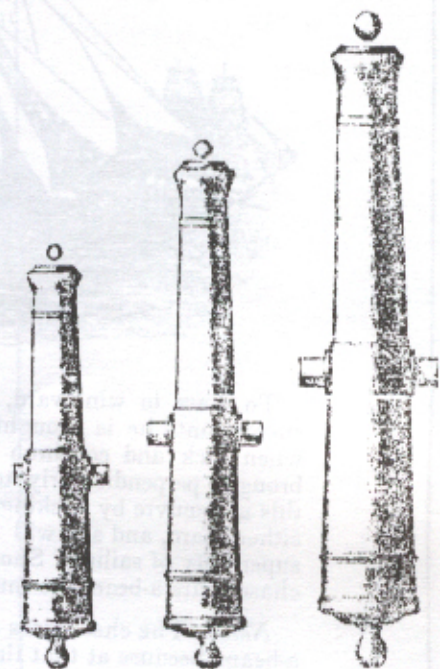
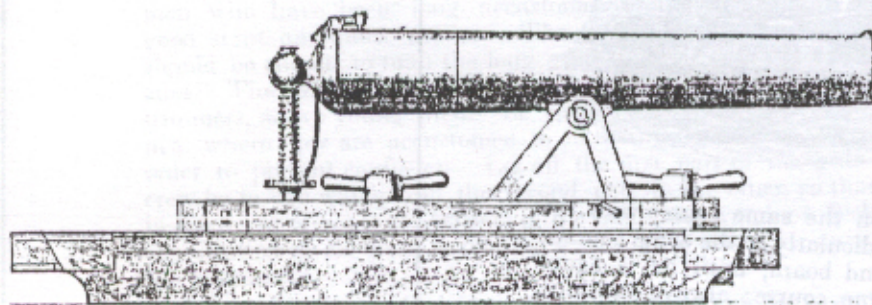
75. Another view of the Joe Lane model at New London showing detailing at the rail. The ratlines and lanyards should be black.



76. A more simply detailed Joe Lane model at New London shows a typical arrangement of the boats. Often, they were simply carried on deck.



Right: Typical mount of an older type of 12-pounder cannon commonly found aboard Revenue Cutters in mid-eighteenth century. Below: 12-pounder Dahlgren Boat Howitzer fitted on carronade carriages for use either at the rail or as a central pivot gun. Below right: Comparative sizes of 4-pounder, 6-pounder and 12-pounder guns. The larger the gun, the fewer carried, as a rule.



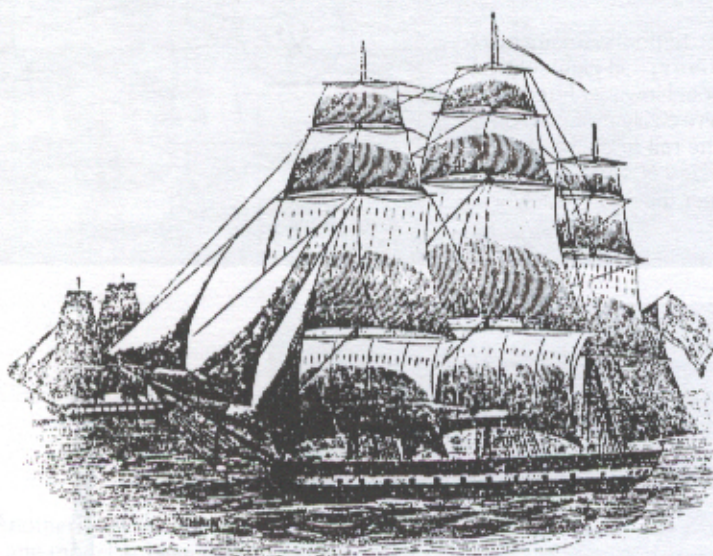
12 PDR. AND BOAT CARRIAGE.

BY J. A. DAHLGREN

Notes on Armament

There was no set rule as to the size and number of guns carried on the Campbell Class of Revenue Cutters. It was often left to the Captain to secure whatever ordnance he could from available army or navy spares. Gunports were cut in the bulwarks as required. When the *Jefferson Davis* arrived at Port Townsend, Puget Sound, in 1855, she was

described as having "several" 12-pounders, which could have meant two, three, or four guns. The *Joe Lane* apparently had a single 12-pounder amidships in a pivot mount. For specific vessels, refer to deck logs, tally of ship's armament, National Archives, Washington, D.C.

345.—TO CHASE TO WINDWARD.

To chase to windward, run upon the same course with the enemy, until he is brought perpendicularly to the same course; when tack and continue the second board, until he is again brought perpendicularly to the same course; always continue this manœuvre by tacking every time the chase is a-beam, on either board, and she will come in the shortest method by your superiority of sailing. Should the chase pass the point, when the chase bears a-beam, he must go about with all dispatch.

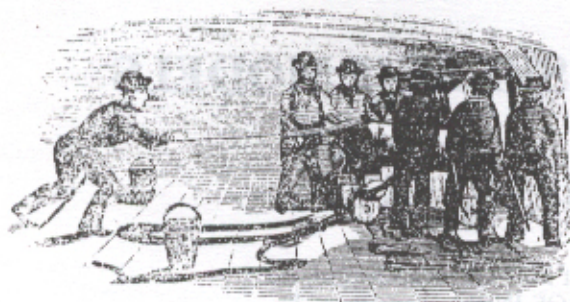
Note.—The chase goes about as soon as the chase is exactly a-beam, because at that time, the distance between them is the least possible upon the different boards they hold.

346.—OBSERVATIONS FOR A SHIP TO WINDWARD, WHICH IS CHASED.

The weather ship will always be joined, since it is granted that she does not sail as well as the pursuer, it will be then to her advantage to keep constantly on the same tack, without losing time to heave about, for tacking cannot be so favorable to her as to her adversary, whose sailing is superior.

The Kedge Anchor, a manual of seamanship of 1847, describes maneuvering under sail against an enemy. Procedure is similar used by Revenue Cutters to close on suspicious vessels for boarding and inspection.

238.—STATIONING THE CREW AT QUARTERS.



Captains of the guns should be chosen from among the sea men who have been long accustomed to them, steady, with good sight, and quick motion. The largest and stoutest men should be chosen to man the long guns, the others the cannonades. The boarders should be stout men—the firemen and sail-trimmers, active young men. Be particular to station them near where they are accustomed to do their duty as possible, in order to prevent confusion. Let all the first part of the gun's crew be in one watch, and the second part in the other, so that in the event of going to quarters in the night, the watch on deck can clear away the guns, while the watch below will clear away the hammocks.

To a twelve-pounder cannonade are stationed four men and one boy. All the men stationed at the long guns of a double-decked ship, should be armed with cutlasses, and called "boarders"—the first of the gun's crew to be called second boarders, and *vice versa*. They are only to be called on when required to "board," or in a case of great emergency to "repel boarders," and then every man will repair to the upper-deck, except the firemen, quarter-gunners, and powder boys, who will remain below to protect the ports, or to assist in extinguishing a fire.

All the men stationed at the cannonades should be boarders and sail-trimmers. As boarders, the first part should be armed with pikes; the second part with small-arms, who are to repel the boarders, but not to quit the ship.

In a single-decked ship, all the men stationed are boarders: the first part to be armed with cutlasses, and the second with pikes.

The battery being manned, distribute the rest of the crew as follows:—have a quarter-master at the signals, when in a squadron—topmen and marines in the tops, to repair damages, and act as small-arm-men—a quarter-master and two men at the relieving tackles—men stationed at the passages, to pass full and empty boxes; also others at the shot-lockers. Mastmen to see the rigging clear—cook, and armorer at the galley—the carpenter and his mates at the pumps and wings—the master-at-arms, and ship's corporal in the light-room—the gunner, his mates, quarter-gunners, and cooper, in the magazine, and the surgeon and assistants in the cock-pit.

Stationing crews for action stations as described in *The Kedge Anchor*, a seamanship manual of 1847. Similar station assignments were established for Revenue Cutters in preparation for action.

WHERE TO SEE SHIP MODELS

- Atwater Kent Museum, Philadelphia, Pa.
Bark STAR OF INDIA, San Diego, Ca.
Boston Marine Museum, Old State House, Boston, Mass.
Boston Museum of Fine Arts, Boston, Mass.
Buffalo Historical Society, Buffalo, N.Y.
Chesapeake Bay Maritime Museum, St. Michaels, Md.
Franklin Institute, Philadelphia, Pa.
Franklin D. Roosevelt Memorial Library, Hyde Park, N.Y.
Great Lakes Museum, Belle Isle, Detroit, Mich.
Maine Maritime Museum, Bath, Maine
Mariners Museum, Newport News, Va.
Museum of the City of New York, New York, N.Y.
Museum of Science & Industry, Chicago, Ill.
Mystic Seaport, Mystic, Ct.
Nantucket Whaling Museum, Nantucket, Mass.
New Bedford Whaling Museum, New Bedford, Mass.
New York Historical Society, New York, N.Y.
Old Fort Henry, Kingston, Ontario, Canada
Peabody Museum, Salem, Mass.
Philadelphia Maritime Museum, Philadelphia, Pa.
San Francisco Maritime Museum, San Francisco, Ca.
South Street Seaport, New York, N.Y.
Smithsonian Institution, Washington, D.C.
Truxton-Decatur Museum, Washington, D.C.
U.S. Maritime Commission, Dept. of Commerce, Washington, D.C.
U.S. Merchant Marine Academy, Kings Point, N.Y.
U.S. Naval Academy, Annapolis, Md.
U.S. Navy Department, Washington, D.C.



P.O. Box 425
Stockton Springs, Maine 04981

*Publishers of a catalog of scale wood ship models, model fittings,
plans, tools and other ship modeling essentials.*



Beginning as a copyboy and cub photographer in Philadelphia, Arthur C. Montgomery can trace a meandering path through commercial artis, short-order cook, combat motion picture cameraman in WWII, advertising writer and creative director, TV producer, wood ship builder, ship-model kit manufacturer, and most recently, a full-time writer, researcher and consultant in the field of maritime history. He has built wooden vessels and restored many others; founded the Norwalk Seaport, and in the process, sparked a waterfront restoration program. Besides sailing a black, clipper-bow schooner, which he launched in 1965 (same year as America's replica), his major interest is developing his new concept in ship model construction into a series. He hopes that "America started it all" will soon have additional meaning.

 **BLUEJACKET**
SHIP CRAFTERS