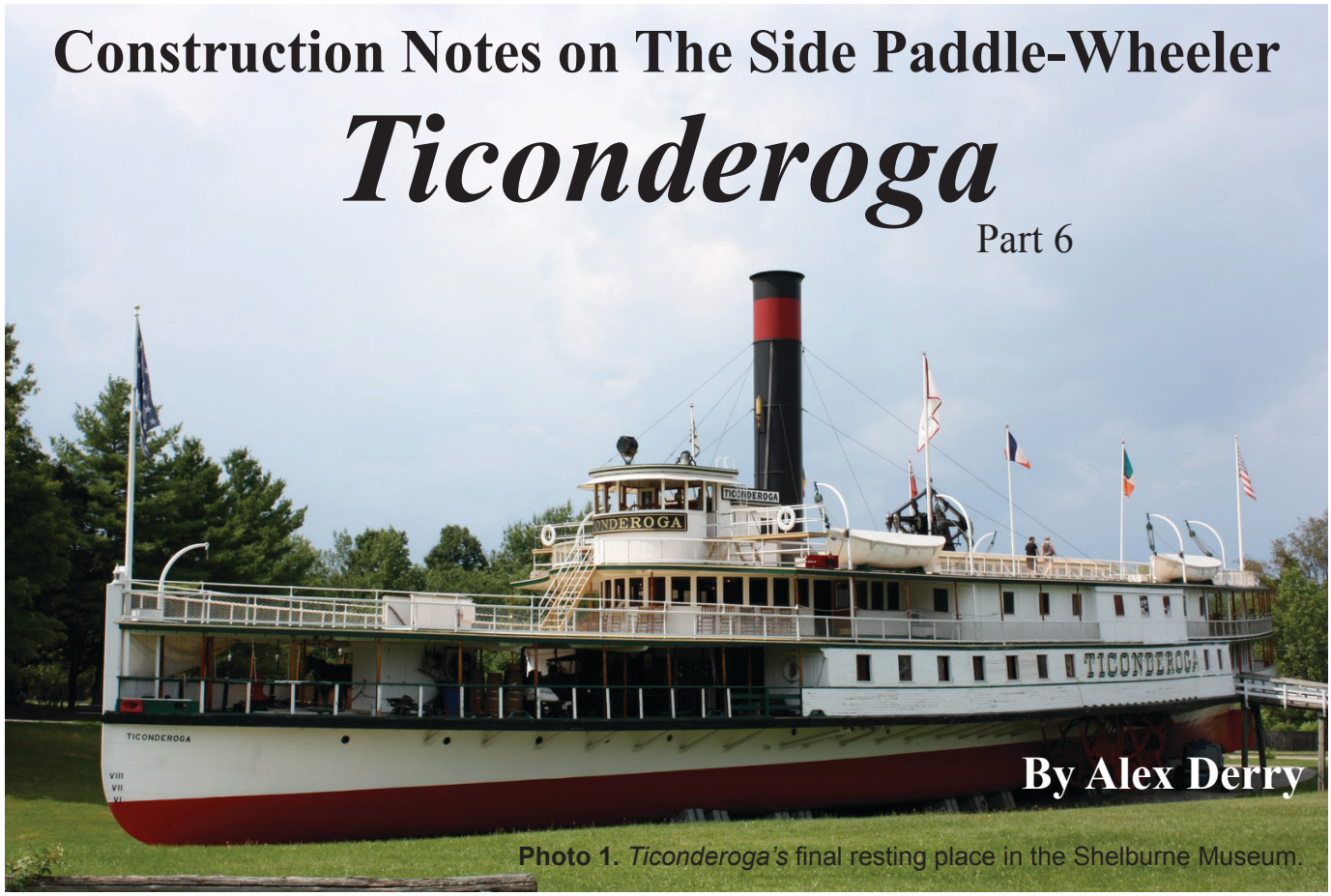
Construction Notes on The Side Paddle-Wheeler

Ticonderoga

Part 6



By Alex Derry

Photo 1. *Ticonderoga's* final resting place in the Shelburne Museum.

Welcome back. Last time, I had finished discussing the construction of the dining salon with the exception of the bulwarks surrounding the planked walkway. **Photo 147** shows a portion of that walkway. Once again I needed to laminate the bulwark on a jig as it needed to form the tight curve of the stern. **Photo 148** shows the jig and the beginning of the application of the two-sided tape onto which the first layer of Evergreen simulated tongue in groove styrene will be attached. The bulwarks required two layers since the inside needed to show the tongue in groove as well. Each layer needed to have impressions added to show the locations of the butts of each board. I used a section of the styrene as a jig to determine the location of each butt as is shown in **Photo 149**. The dots at each end of the jig indicate the location for the application of the impression.

Photo 147. The walkway onto which the bulwark will be attached.

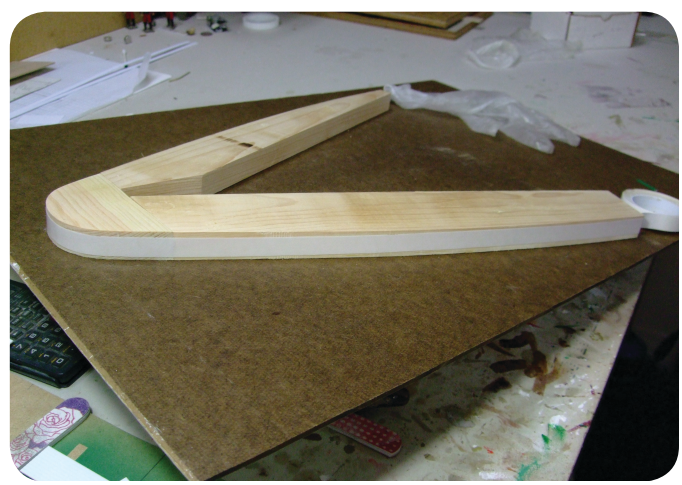


Photo 148. The jig that was used to mount the bulwarks for gluing. The two-sided tape has been partially readied for the task.

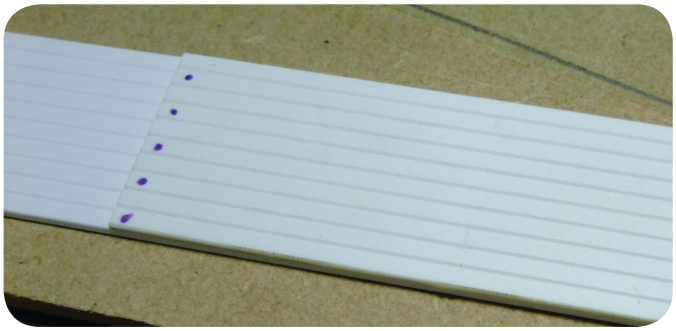


Photo 149. The jig used to mark the butt ends of the simulated tongue in groove bulwarks.

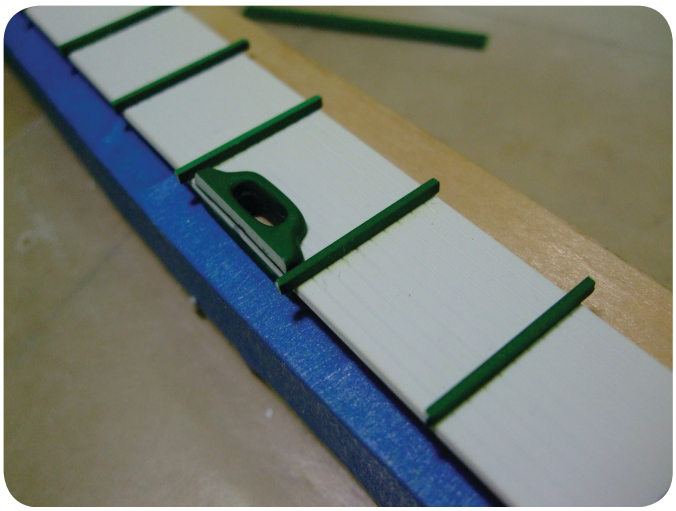


Photo 150. The application of the fairlead and the right angle base of the bulwark used a tape covered surface to ensure that all attachments were placed at a consistent height relative to the base.

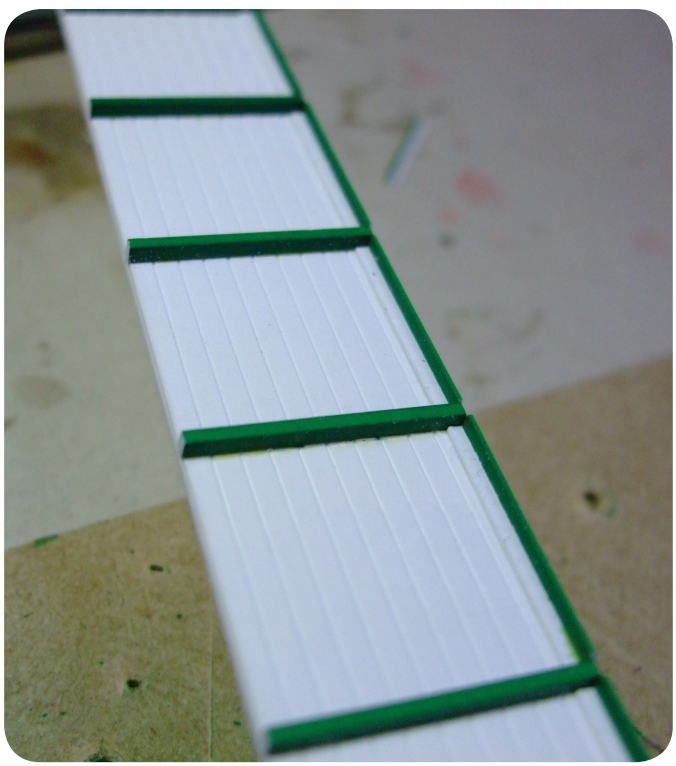


Photo 151. The right angles and stanchions have been attached.

On the left, the blue dots occur on every other board while on the right the black dots mark the alternate boards. The jig was laid down onto bulwark and using a sharpened small blade screw driver; I tapped in a slot impression at each of the dotted locations. The jig would then be moved to the right or left two spaces. Then the jig was used again to mark the butts at each end. The pattern then showed that each board was two lengths of the jig long and their butt locations alternated to maximize the distance between adjoining plank butts. The Evergreen Scale Models Inc., styrene simulated tongue in groove is available in different thicknesses and board widths. I used the 0.020" thickness for both sides as the resultant thickness of the laminate was a good scale thickness. I also chose to use part number 12080 since it comes in 24" long sheets and the board width was to scale. This allowed me to reduce the need for butt joints of the bulwark. I chose cyanoacrylate glue here to quickly set the washed surfaces together. Once the bulwarks were set, they were painted. At this stage of the build, I was using Polyscale Acrylic Reefer White paint. As I mentioned previously, this brand of paint was discontinued during the build, so it became a challenge to find. Fairleads were required along with a top rail, vertical support stanchions, and right angle footings. **Photos 150** and **151** show these installed with the exception of the top rail. The fairleads were molded from a master. The top rail and stanchions were made from strip styrene from Evergreen. The tight radius of the bulwark required the top rail to be cut from the stalk and carefully trimmed to the width required. Patience was required to ensure that this piece was a perfect match in dimension. In **Photo 151** a styrene right

Photo 152. The form used to build up the bulwarks was used to mount pine guides that would provide support while they are glued in place.

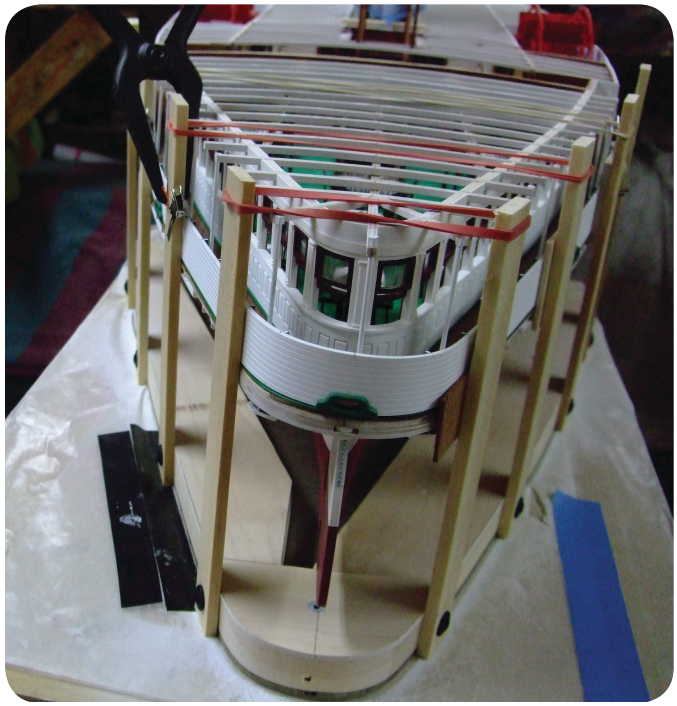


Photo 153. Elastics were used to firm up the pine guides to ensure the quality of support provided.

Photo 154. The bulwarks as they appear once attached.

Photo 155. The finished double doors that lead out to the promenade walkway around the salon.

angle was used for the inside base of the bulwark. These were cut to size and painted on one side with green while the white side was glued to the white bulwark. The right angle served to increase the surface area used to attach the bulwark to the deck.

At this stage, I needed to devise a method of bracing the bulwark during its gluing phase. For this task, I used the form that I had used to build up the bulwarks onto which I attached vertical pine guides. **Photo 152** shows this arrangement. The pine guides were then fortified by elastics as is seen in **Photo 153**. This ensured that their strength would be up to the task while clamps were used to hold the bulwark during the gluing. I used epoxy glue since I needed the set time to be long enough for adjustments. You may have noticed that I had installed pillars before the bulwarks; however, these were eventually replaced once I had solved one of the most perplexing challenges of this build. More on that to come later. **Photo 154** shows the bulwarks in place.

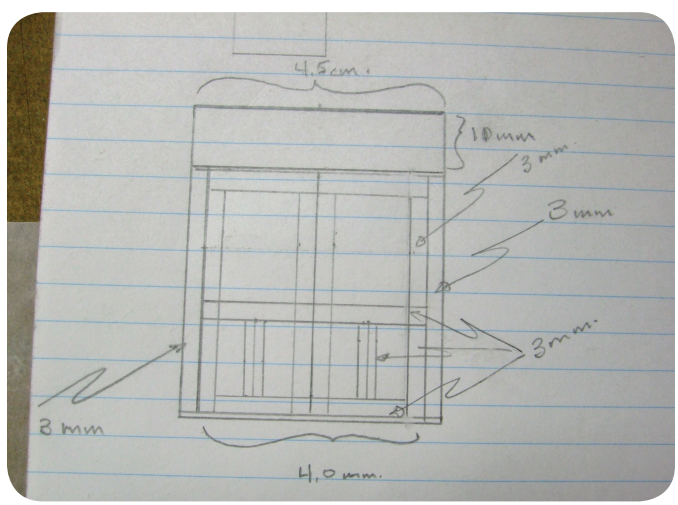


Photo 156. The drawing used to plan the build.

As promised in Part 5, I wanted to share with you my method of building up scale doors. To this point, I had done two sets of double doors found in the grand staircase area and two others for the captain's quarters and the Purser's office. In all of these cases, their scale dimensions were carefully calculated, but their thicknesses exceeded what I felt would be perfect in scale. The problem always begins with the method of glazing their openings. I wanted to be able to slide the glazing into its location so no glue would be needed. **Photo 155** shows one set of these double doors which, allowed access to the promenade around the outside wall of the salon. The outside of the doors was painted while the inside was cherry wood. Both sides of theses doors were built up paneling. Drawings were

made as is shown in **Photo 156** to force me to plan in detail. I then transferred these dimensions onto 0.5 mm thick plain styrene sheet and carefully cut out each door shape. The header for the door shown as a separate piece was added later. **Photo 157** shows these components. It is difficult to cut out this thickness without distortion, but with a fresh scalpel blade and the complexity reduced by adding the top of the door later, it worked well. All of the styrene surfaces were painted in preparation for the addition of the cherry. **Photo 158** shows the next step. The glazing needed space to slide into so a frame work of 0.25 mm styrene strips were added around the inside of the opening such that space was left on all sides for the glazing to fit into once the cherry strips were added. On the right of this photo, one of the cherry strips has been added to the top of the door frame, creating a slot for the glazing. The bottom of the door also needed the 0.25 mm styrene filler as the cherry needed that surface onto which to be glued. This area was painted maroon to provide the contrast that would highlight the edges of the raised paneling of the cherry. **Photo 155** shows this affect. I discovered this technique through my efforts to represent the raised paneling done in cherry. I found that when I left no space between the raised paneling, the wood grains blended and the affect was lost. The last step was to add the doorknobs and their hardware, the hinges and finally, the glazing was slid into place. I chose to mount these doors as open to allow the viewer access to the interior where they would see the grand staircase and surroundings.

At this point, my attention went to the forward deck as bulwarks were needed along with a stand alone staircase plus the ground tackle needed to be added. **Photo 159** shows the forward deck onto which the stand alone staircase the capstan and a chain locker entrance have been added. The deck surface here is sparse since this is the area that accommodated cargo. In this photo, you will notice that the staircase had a side entrance, which lead to a set of stairs that went down to the crew's quarters. **Photo 160** shows the staircase which gave access to the second deck. I used the same strategy to build up these stairs as for the grand staircase, however, the bottom side of the steps had to be sanded flat to provide clearance for the next flight of stairs below. **Photo 161** shows the unfinished stack of lifts and **Photo 162** shows the ready stair set. Each step had a kick plate added. The sides of the staircase needed to be paneled as is seen in **Photo 163**. There are some added details here. The fire hose and hose pipe plus the hand pump are there to ensure safety.

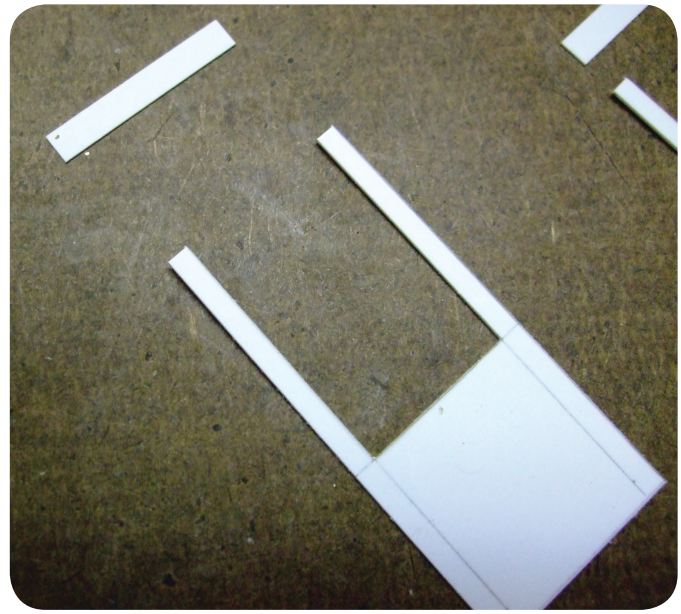


Photo 157. The .25 mm thick styrene has been cut for the outer half of the door.

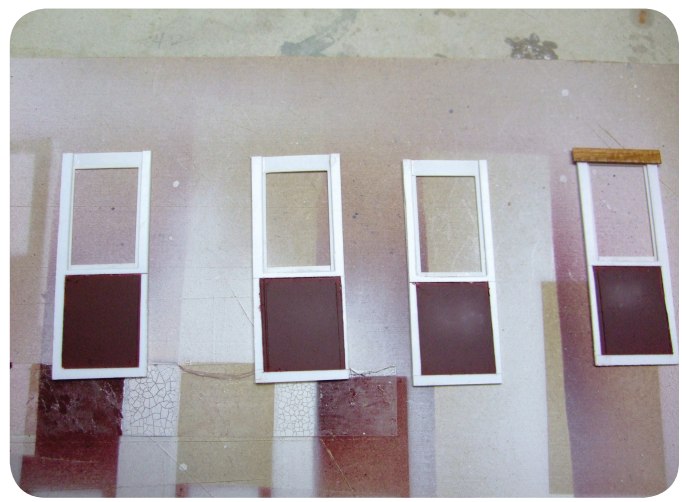


Photo 158. The core of the door has been built up to provide the pocket for the glazing. Next, the cherry strips go on. The maroon paint is used for contrast between raised panels.

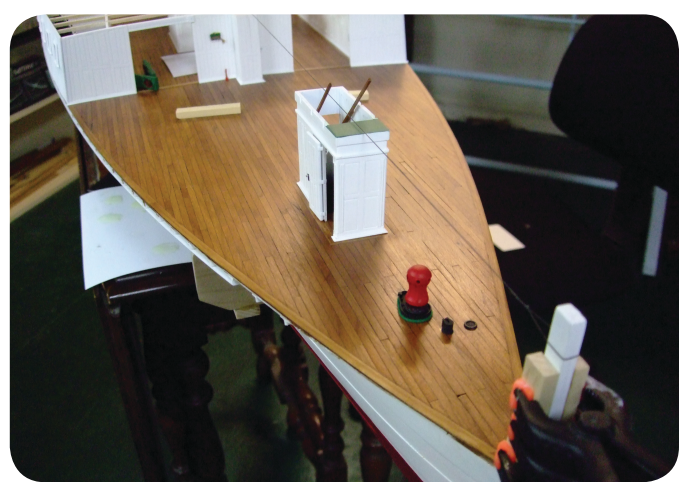


Photo 159. The forward deck furniture is sparse as this area was used for cargo.

Photo 160. The lone staircase giving access to the second and lower decks. I used the same technique to build up the stair as I used for the grand staircase.

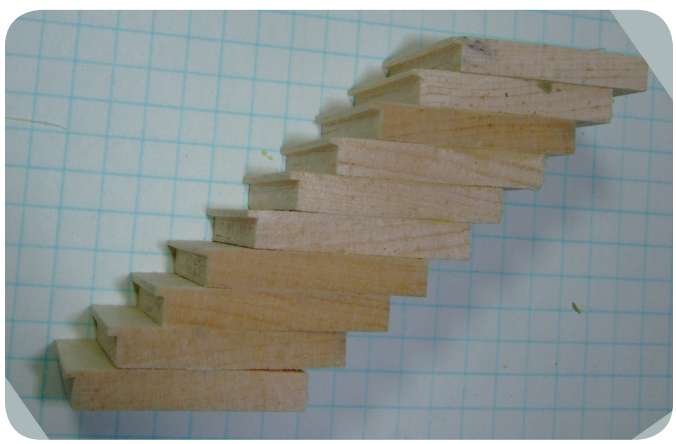


Photo 161. The stacked risers.

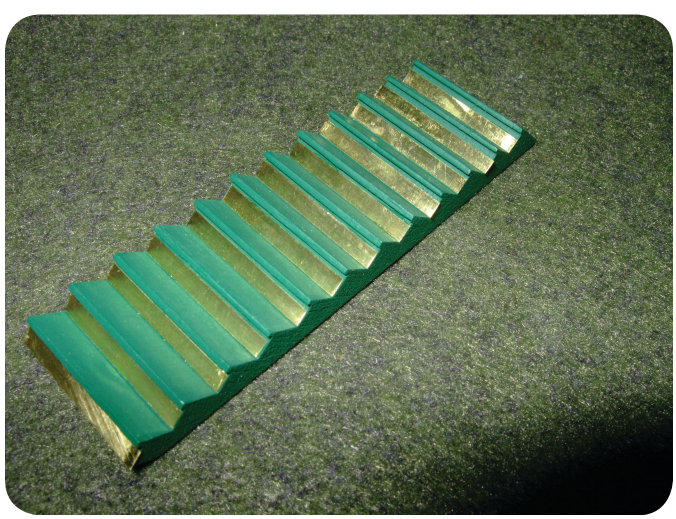


Photo 162. The finished staircase including brass kick plates. The under side has been sanded away to make space for the descending staircase leading down to the crew's quarters.

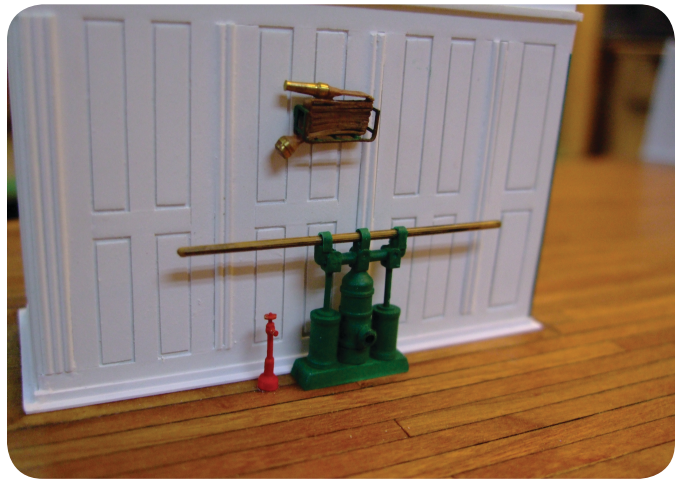


Photo 163. The paneled sides of the staircase where fire suppression equipment is kept.

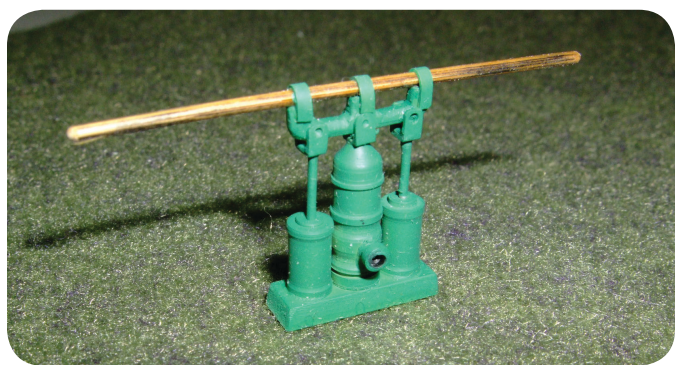


Photo 164. The hand pump built using brass with a wooden handle.

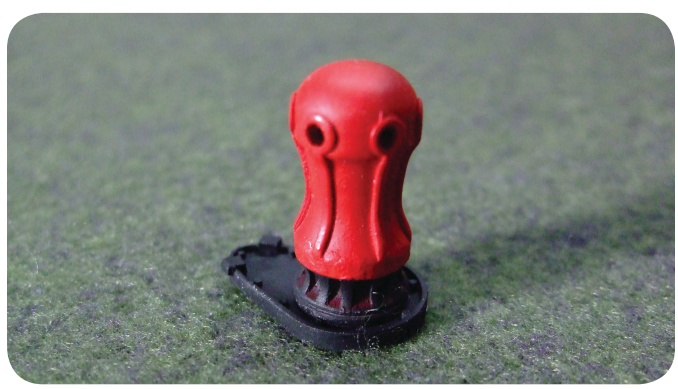


Photo 165. The capstan built up from a brass core with styrene embossed details.

Photo 166. The chain locking ribs are shown here along with one of the two cable stoppers.

Photo 167. The anchor is mounted on the inboard side of the starboard bulwark.

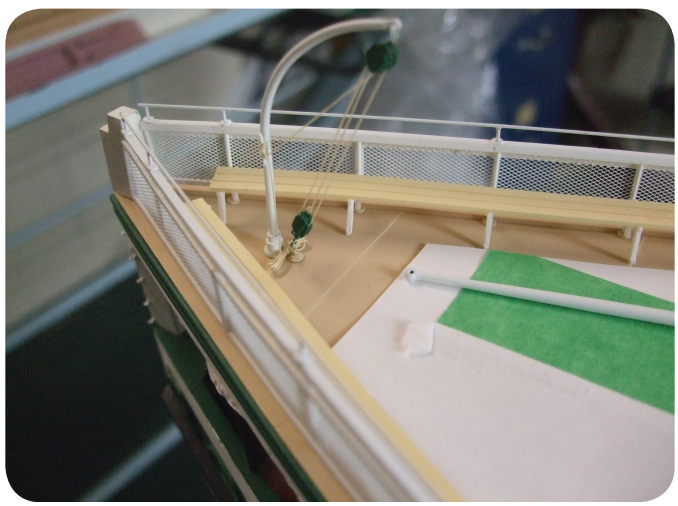


Photo 168. Anchor davit located on the second deck.

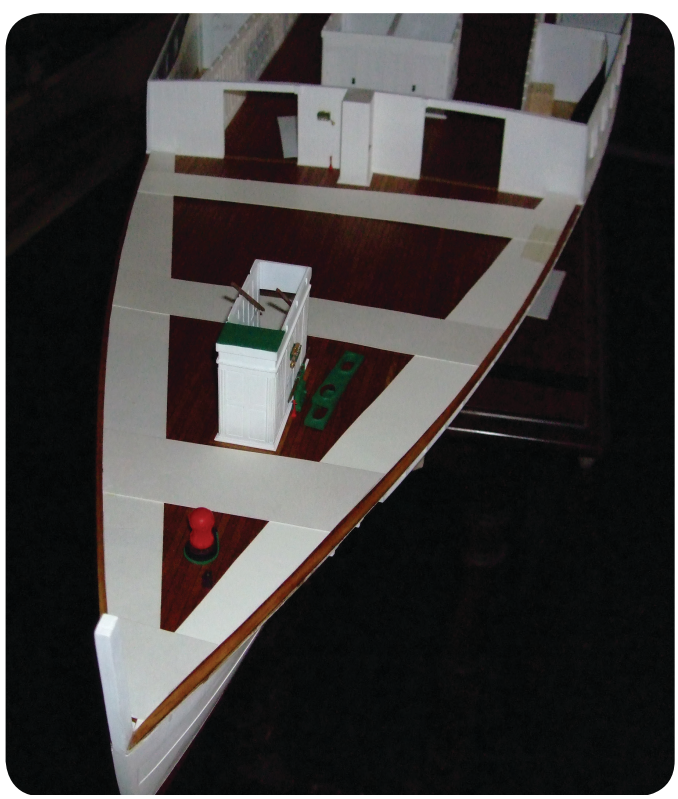


Photo 169. A paper pattern was taken from the foredeck.

The hand pump was made of brass turned on my Tiag lathe, and the handle is wooden (**Photo 164**). The hose is a styrene strip folded into a basket of brass fixtures. The nozzle was turned on my lathe. Hoses lie flat until filled, so the strip styrene works but to attach it to the nozzle I needed to build up its diameter. The same occurs where the brass coupling is located. I used five-minute epoxy as a filler. A reel of regular hose was added later. The smaller hose pipe was its source of water. A larger diameter hose pipe was also added later to accommodate the larger coupling for the fire hose.

The capstan shown in **Photo 165** is located forward of the stand alone staircase. The core of the capstan was turned in brass which was first placed into my machinist's turn table so that holes for the manual handles could be fitted. If the steam power wasn't available to rotate it, the crew would mount the handles and manually turn the capstan. Styrene was used to emboss these holes and to make the purchase ribs that run down to its base from each hole location. At the bottom, styrene was used to build up the mount for this mechanism. Part of this mount shown in **Photo 166** is the chain locking ribs which would ensure that a suitable grip could be maintained on the chain while being drawn in or let out. This photo also shows one of the two cable stoppers. These devices trap the links of the anchor chain to ensure its stable storage. A rack was built later to provide storage for the wooden handles that would fit into the holes in the capstan. This rack was mounted on the inside of the port bulwarks. The anchor was mounted on the starboard inner side of the bulwarks (**Photo 167**). A davit was built which resided on the second deck as is shown in **Photo 168**, that was used to lift the anchor on the outboard side of the starboard bulwarks.

The forward bulwarks were built using the same method and details as discussed for the abaft bulwarks. I needed to make a form onto which the simulated tongue in groove lamination could be done. **Photo 169** shows the pattern made to cut the form seen in **Photo 170**. This form was then glued onto a Masonite sheet so that braces could be attached there to hold the bulwarks in place while being glued (**Photo 171**). Waxed paper was used to prevent any glue from attaching the bulwarks to the base of the form. The bulwarks once prepared were then glued onto the forward deck. **Photo 172** shows the finished product. There was the need to install the double fairlead shown in the foreground to both sides of the bulwarks. These pieces were constructed out of styrene. **Photo 173** shows the bottom mount for the foremost mast. More on its

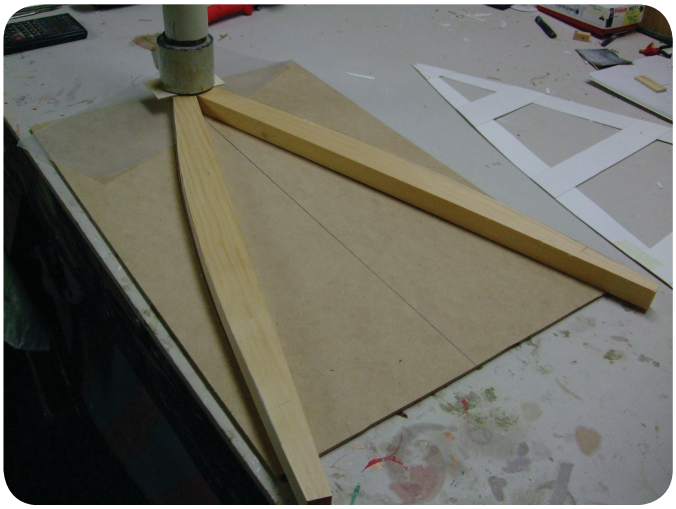


Photo 170. A pine form was built and attached to a sheet of Masonite.

Photo 171. The simulated tongue in groove laminates were made using this form.

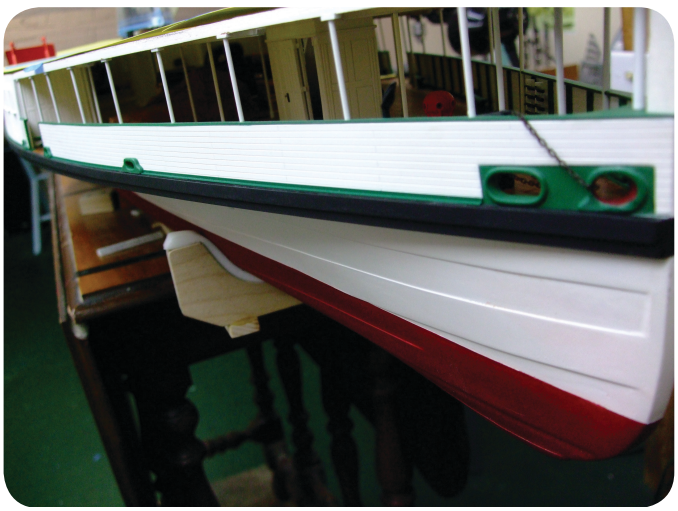


Photo 172. The finished bulwarks including the top rail and the double fair lead on both the port and starboard sides.

Photo 173. The mount for the most forward mast.

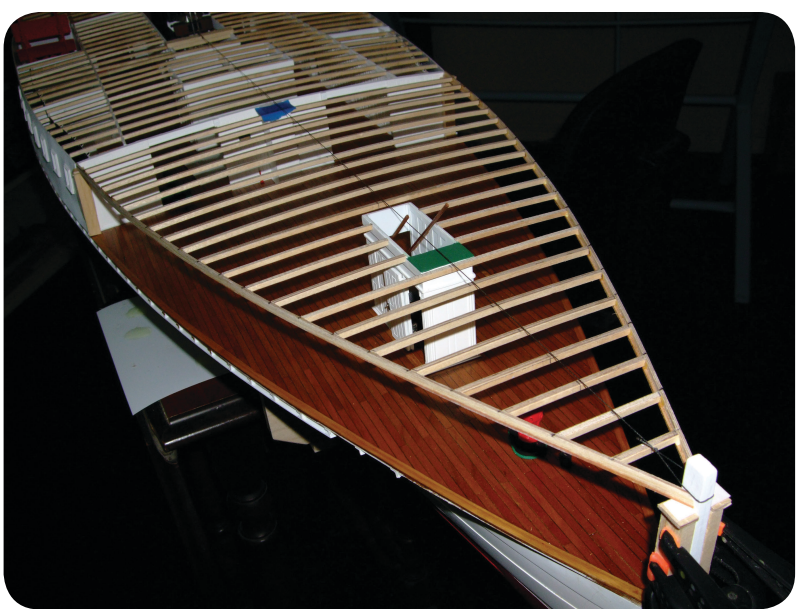


Photo 174. The framing of the foredeck ceiling/second decking is partially finished with supports in place to test its fit.

construction to come later. As in the case of the salon, the next step was to build the ceiling/second deck support structure for the forward deck. **Photo 174** shows this structure nearly finished. Five support beams that ran fore and abaft will be added later along with the pillar system. I started by laminating 1/16th plywood strips for the side beams using the bulwarks form. **Photo 175** shows this part of the build. Once the sides were cured, they were shifted to the top of this form and were held in position by supports as is shown in **Photo 176**. I carefully drew a bisecting line so that a right angle could be used to determine the position of the cambered ceiling beams. **Photo 177** shows this process in close up. Each beam was lined up, so its center mark fell over the

bisecting line. They were then cut at each end to meet flush with the side beams and glued in place. Not all of the beams could be assembled here as beams needed to be fitted to the stand alone staircase. **Photo 178** shows this assembly nearing its readiness for attachment. This photo also shows the forward most point of the side beams which have been prepared to fare into the fore stem. Look back to **Photo 174** to see the braces that would be used to position this assembly once it was completed and painted. **Photo 179** shows the painted finished structure. The five main fore and abaft ceiling beams have been added below the cambered beams.

This structure was supported by 28 pillars. This brings me back to the pillar issue. The majority of the pillars on *Ticonderoga* were wooden. I went through many attempts to solve the problem of building a tapered and turned pillar. I won't describe all of these but suffice to say; none worked to my satisfaction. The problem with turning any wooden dowel down to a 1.8 mm to 2.0 mm taper was that the grain was wrong. What was needed was a grain that ran parallel to the length of the pillar. Every attempt I made resulted in the grain failing to hold together in the lathe. Turning wood down to this small a diameter can only tolerate a certain amount of the pressure of the cutting tool. Even though I would stop cutting early enough to prevent failure and continued with fingernail emery boards, the grain still failed. A long time back I built a model of a Neuport 11 WW1 fighter plane which had small diameter bamboo dowels incorporated in its components. I had observed that bamboo's grain runs parallel to its length. I was impressed by their strength and flexibility, however, my search for these came up empty. The only source that I could think of was cooking skewers, which happen to be bamboo. This meant that if it worked I would be tasked with over 100 pieces to build. **Photo 180** shows the lathe set up. I needed to prep each blank so it would fit into the headstock collet. The tailstock held an adjustable chuck into which I put a section of brass tubing. Its inside diameter was just large enough to allow the dowel to spin. I cut to a maximum depth and then used the emery board to file the rest of the way. To be precise, one hand guided the emery board while the other on the opposite side provided support against excessive flex. Frequent measurements with the calipers allowed me to create the taper. A light touch with a file edge allowed me to make a simple turning at its top end and a razor saw gave me clean cut offs. **Photos 181** and **182** shows

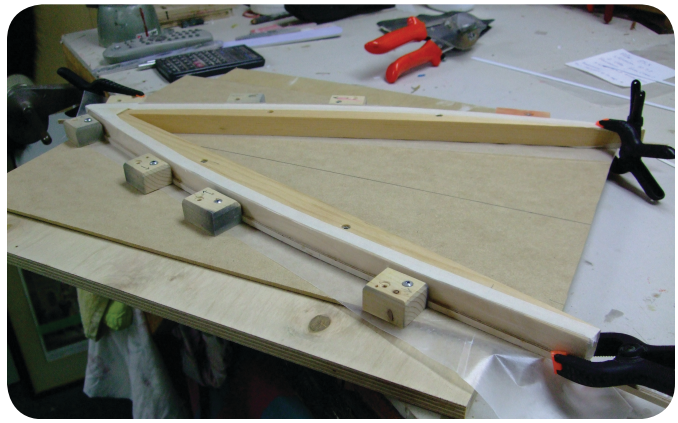


Photo 175. The same form used for the bulwarks was used to laminate 1/16th plywood strips to build the side beams for the ceiling framing.

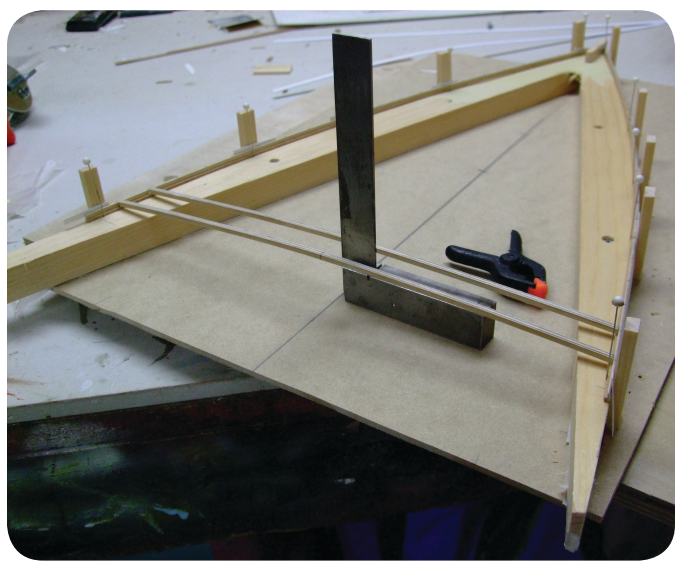


Photo 176. Once the side beams were cured they were placed on top of the form and held in place by braces while ceiling joists were measured and glued in place.

Photo 177. A square was used to align the center of each ceiling beam to the center of the form. The ends were cut from each ceiling beam so that they would fare into the side beams.

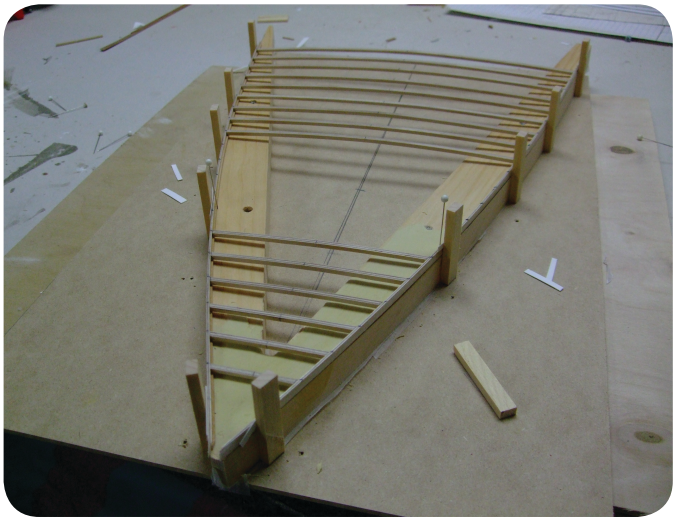


Photo 178. The framing is nearly complete. Some ceiling beams will need to be added once the framing is in place as the stand alone staircase must be accommodated.

Photo 180. The configuration for the lathe for turning the bamboo pillars.

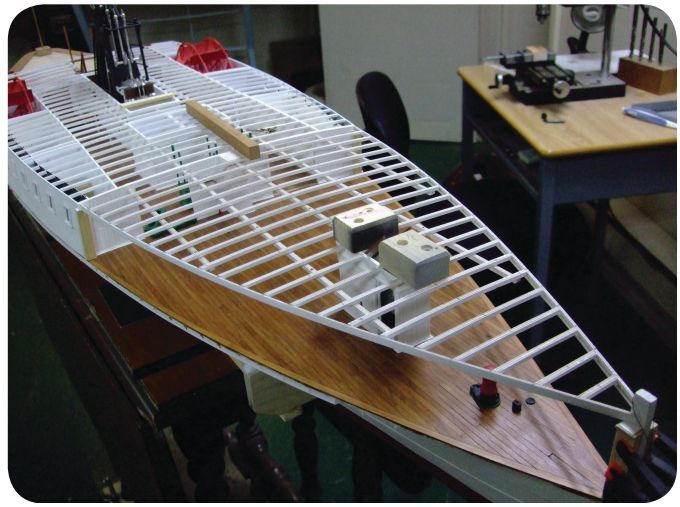
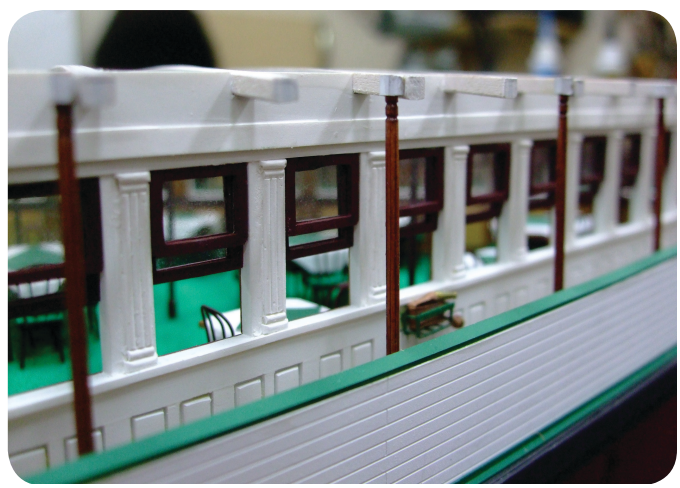
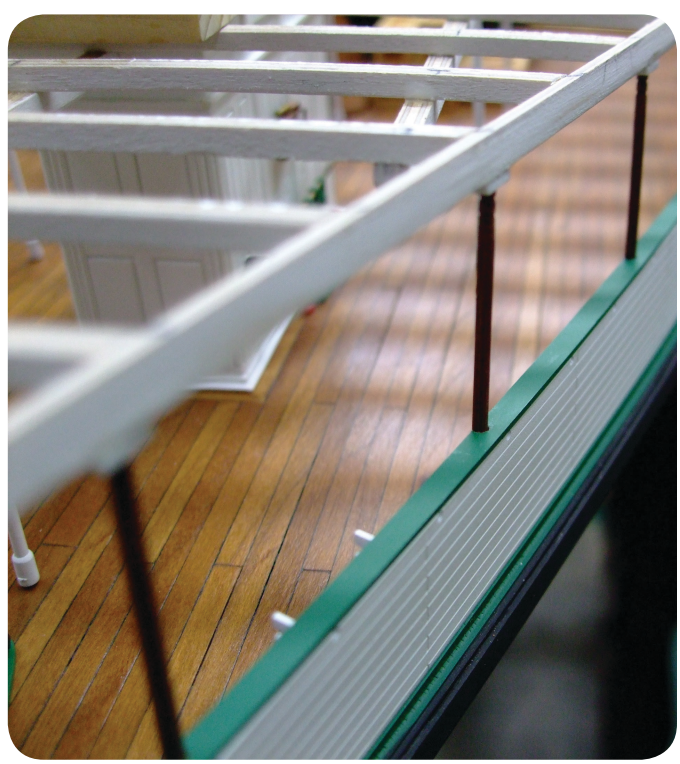


Photo 179. The completed framing in place.



Photos 181 (above) and 182 (below). The finished product in place.



some of the finished results. Staining and varnish provided surprisingly accurate color matches to the real pillars. In solving this problem, I had a new technique to add to my experience. Pillars are found in the salon, the foredeck, and areas on the second deck. Their locations are along the paths associated with the fore and abaft ceiling beams. Generally, these beams were drilled out at the appropriate locations to a diameter that would allow the pillar to be slid through to the deck below. In all cases, each beam had a footing to set into. I turned these footings out of brass and painted them green (**Photo 183**).

Each pillar was carefully positioned to be vertical before gluing. This was not an easy task as vertical

Photo 183. Each pillar needed a footing. Each of these were built on the lathe in brass and then painted green.

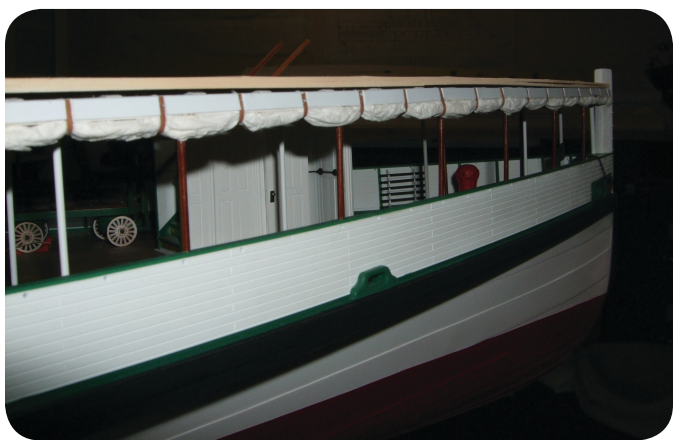


Photo 184. The canvas curtain was simulated in the stowed position by using a water/white glue solution and a Kleenex roll fastened with styrene straps.

references on this ship are rare.

Another detail that needed to be added to the foredeck superstructure was the curtain that was stored under the side beams as is shown in **Photo 184**. To protect cargo from exposure to the elements, canvas curtains would be lowered and fastened to the outside of the bulwarks to shed rain or block unwanted sunlight. **Photo 184** shows this curtain in the stowed position. Leather straps and buckles were used to hold the curtain in position while being stowed. These straps were represented by tan colored styrene strips. If you look carefully, you will see the holes in the top boards of the bulwarks through which tie-offs would be threaded to hold the bottom of the curtain in place. I chose to represent the curtains in the stowed position since I wanted the viewer to be able to see into this deck. Representing cloth on models has always been difficult as materials selected usually do not drape

Photos 185, 186 and **187.** Cargo was added along with a 1942 Ford Pickup and a railroad cargo trolley to simulate the type of things that traveled on board the *Ticonderoga*.

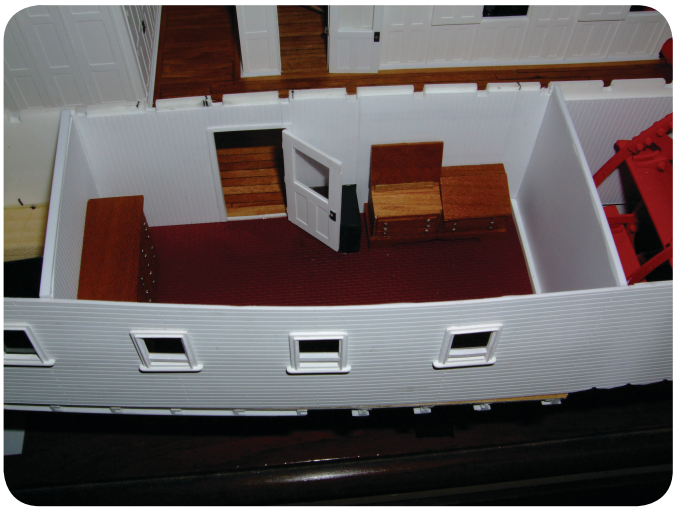
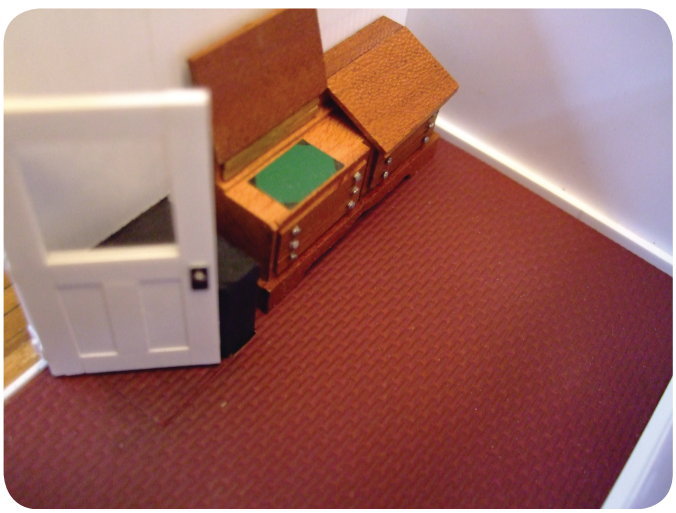


Photo 188. A work room was added to the outboard spaces just forward of the starboard paddle-wheel. A view of the engine control room is made possible to the viewer through a window and an open door.



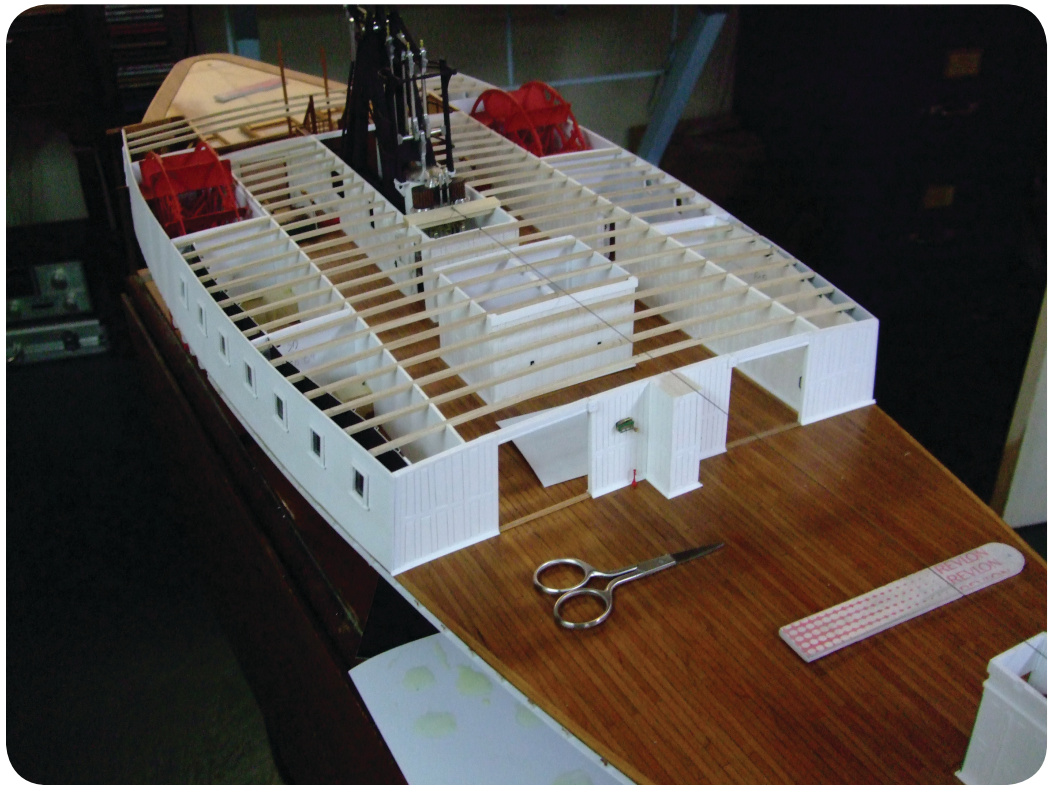
Photos 189 (above) and **190 (below).** The furniture found in this workroom.

properly and give unsatisfactory results. I used Kleenex for this job. Any tissue has laminations which can be separated and then overlapped to create any length needed. Once the length required was measured, the tissue laminations was over lapped and repeated enough to give a satisfactory thickness. Then it was rolled from the sides until the diameter required was enough for the desired affect. On a surface of waxed paper, a water and white aliphatic glue was applied to the tissue. The volume of the roll changed due to the soaking, so adjustments were made to get the correct size of roll. The water was allowed to evaporate partially and the glue served to hold the fibers together. The challenge here was the attachment to the side beams. The straps had to show their tension by squeezing the roll tighter at their locations. This must be done while the roll was still moist. I attached the extra long prepared straps to the inboard side of the side beams at regular intervals. I also laid waxed paper over the bulwarks to prevent any glue/water solution from contaminating the model. I waited until the Kleenex® had dried to a slightly less than moist state then started at the bottom abaft end of the side beam. Each strap wrapped around the Kleenex® roll from the inboard side to the outboard side. The open end of the strap was then pulled up to tighten around the Kleenex® and then using gap filling cyanoacrylate glue it was attached to the outboard side of the side beam. Caution here was needed since styrene strips will not tolerate thin cyano. I found that this worked well enough that even at the pillars it would conform to the reduced space. Once it was dry the excess strap material was trimmed off, and weathering powders were dry brush onto the Kleenex® to give it texture, and some aging affects. Simulated tongue in groove siding was applied over the side beams at a later date.

This deck needed the addition of some form of cargo, so I built up several wooden crates of which I placed a portion on the deck surface. The rest I loaded into a 1942 “Dinky Toy Collectors Casting” Ford Pickup. I took the time to give the truck some character by adding windshield wipers and dry brushing some grim onto the body of the vehicle. **Photos 185** and **186** show some of theses additions. The brown simulated canvas cover was made by draping moist tissue over a series of wood blocks off of model and then painted and aged by dry brushing with weathering powders. Weathering powders are available at most model train stores, or you can order them from Micro-Mark. One of the brands that they sell is Doc O’Brien’s, part # 81632. These are self-adhesive, and a little goes a long way. **Photo 187** shows a railroad luggage cart loaded with sacs of grain. I bought the wheels at a

railroad hobby store and built up the rest. Ticonderoga carried cargo throughout Lake Champlain, and part of that business was with the rail system so it would likely have carried "off loaded" cargo from the trains on these types of carts.

To finish the first deck for the next stage of the build, the ceiling beams needed to be added in the center section of this deck but, before that was done some of the rooms that occupied the outer central areas were furnished. The captain's quarters and the Purser's office have been mentioned previously. I also included a working room found just forward of the paddle-wheel on the port side. **Photos 188**,**189** and **190** show this space. I chose this space since it gave the viewer a line of sight to the control room for the steam engine. The open door and one of the outboard windows provided this view. LED lighting was added to aluminate this room as well. **Photos 191** and **192** show the addition of the ceiling beams for this central space. This finishes the work on the first deck with the exception of the paddle-wheels. Next, I will discuss their construction. This was another challenging part of the build that took longer than I had expected. In the mean time enjoy your projects.



Photos 191 and **192.** The ceiling beams have been installed in the central section of the first deck.