

Scratchbuild A Backwoods Water Tank

Part V - Making the Frost Box and Hanging the Water Spout

By Dwight Ennis



In this section, we're going to make the **Frost Box**, and we'll build the **Spout Hanger Assembly** and hang the water spout.

Download the Drawings

The following drawings are for this section:

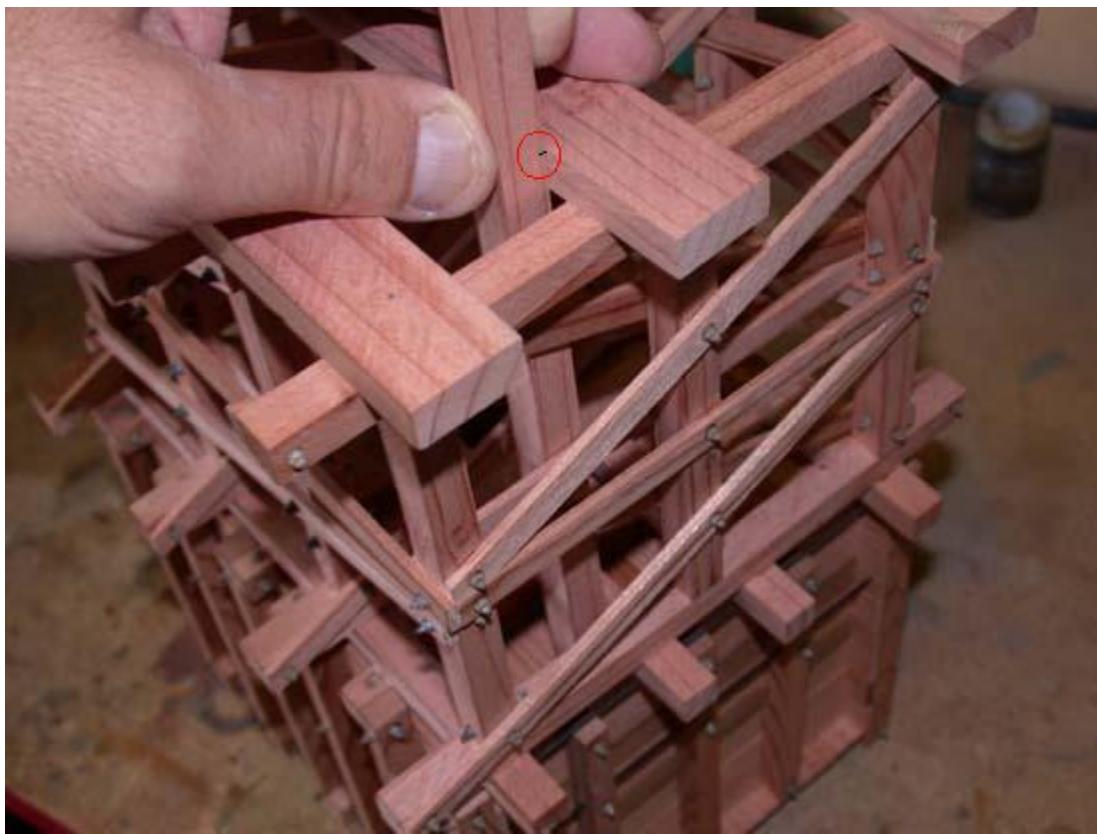
- [Drawing Thirteen - Frost Box](#)
- [Drawing Fourteen - Spout Hanger Part 1](#)
- [Drawing Fifteen - Spout Hanger Part 2](#)
- [Drawing Sixteen - Spout Hanger Details](#)

After downloading the drawings, print one or more copies.

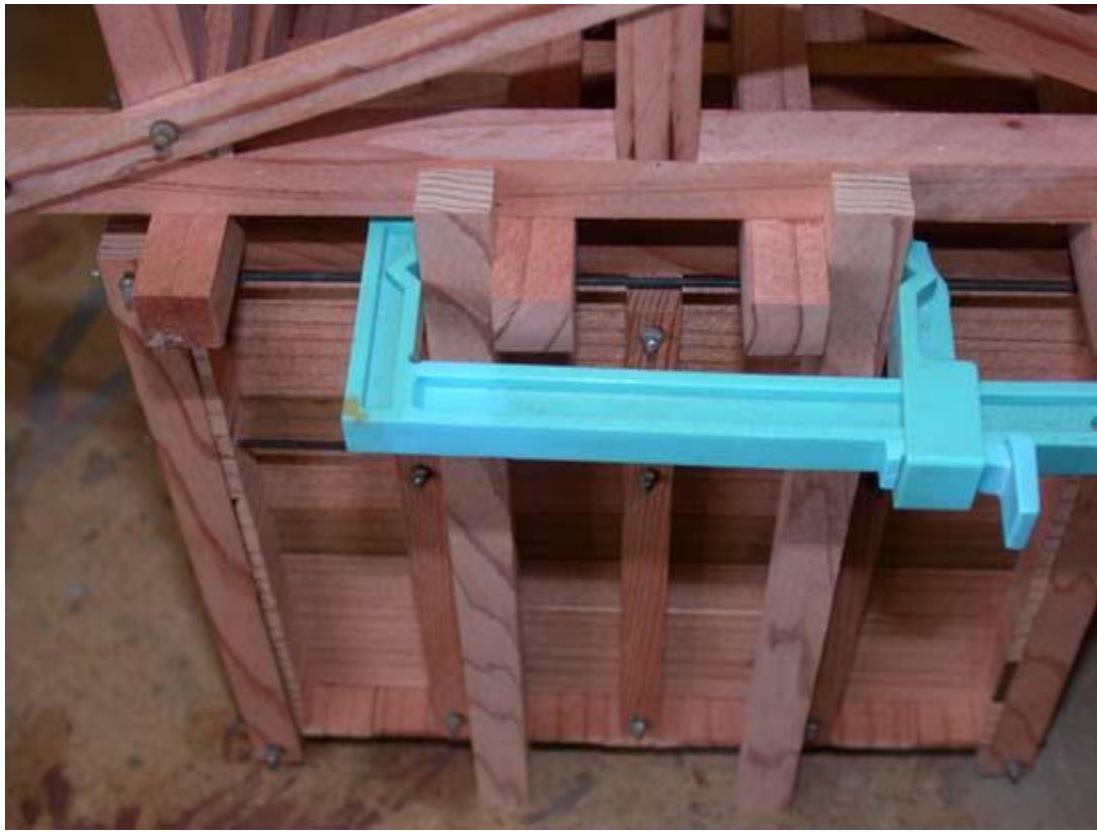
Making the Frost Box

First, we need to construct a basic frame, over which we'll put sheathing. I made my frame from 6 x 8's (0.30 x 0.40) left over from the water tank supports in **Part II**. It doesn't really matter what's used here, since it won't show anyway. Use whatever you have that's left over from previous assemblies. For the sake of description, I'll assume you're going to use 6 x 8's.

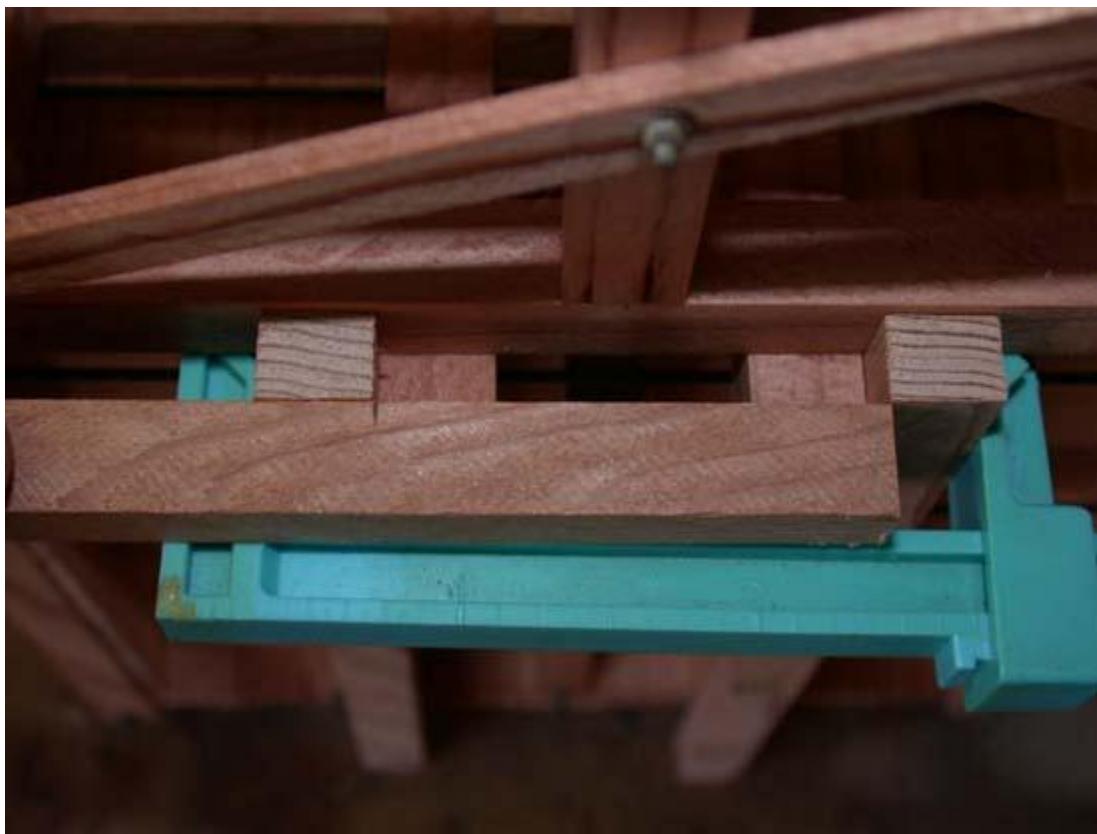
Start by placing a 6 x 8 down inside the rear bent until it's resting on the water tank bottom support. Its rear edge should be snug against the rear bent inner sway braces, and its inner edge should rest against the back of the Inner Water Tank Support Beam from **Part IV** (the two inner beams that the tank assembly rests upon). Maneuver this 6 x 8 until it touches all appropriate points just mentioned, and at the same time is relatively vertical (aligned with the center leg of the rear bent). Take your remaining Foundation Beam and lay it across the bottom of the bents, then slide it over until it touches the 6 x 8. The edge of the Foundation Beam closest to you (its eventual bottom surface), determines the length of the 6x8. Mark the 6 x 8 here and cut four pieces this length to become the Frost Box uprights.



Take two of the uprights just cut and clamp them to the outside edges of the Inner Water Tank Support Beams.



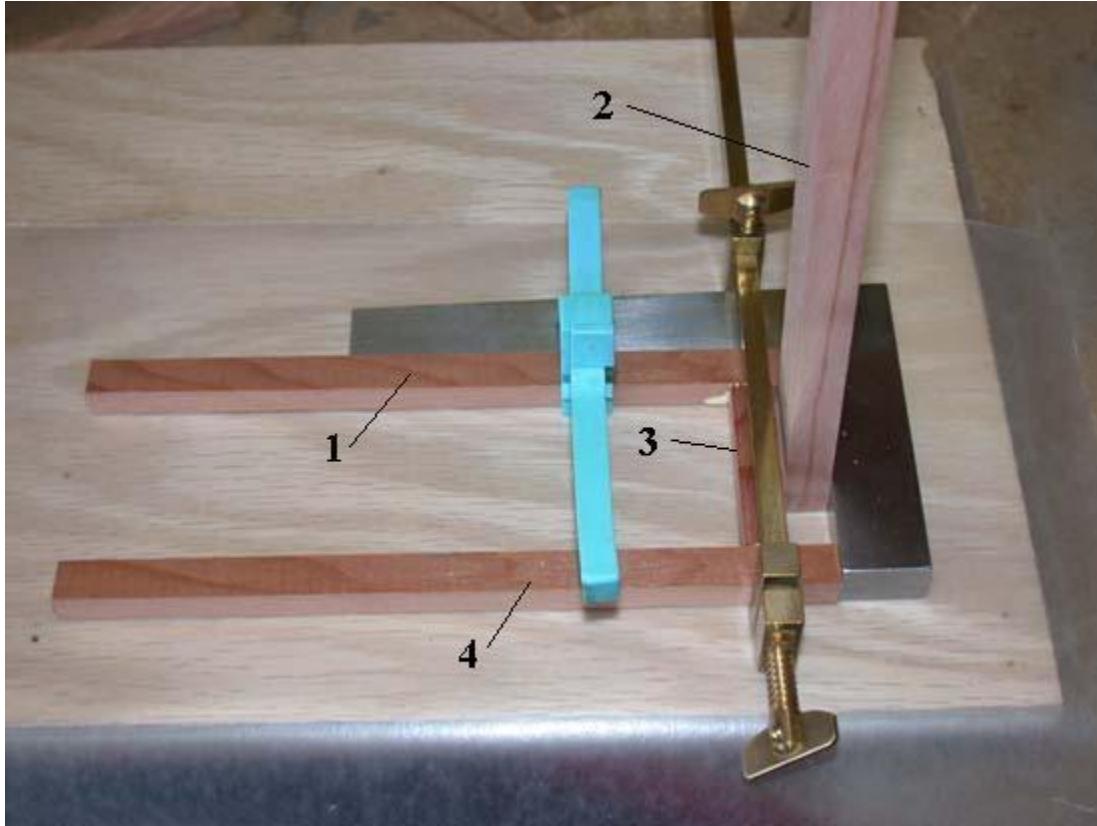
Lay a 6 x 8 along the clamped uprights, with its edge butted against the inner edge of one of them. Mark where it meets the inner edge of the other.



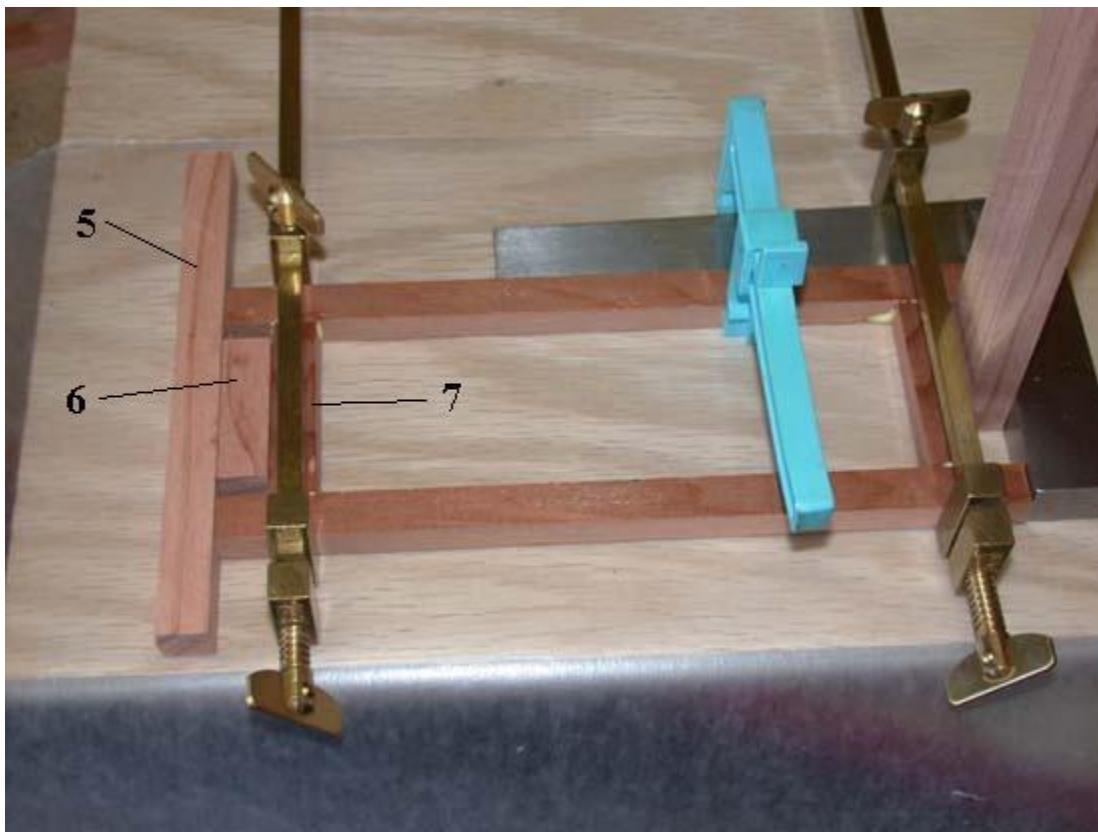
Cut the piece where you marked it, and ***test fit it*** into the clamped uprights. It requires a ***good tight inner fit***. If it's too loose, the Frost Box will make an interference fit with the Water Tank Support Beams instead of sliding snugly over them. If your piece is too short, mark and cut another until you get one that fits properly.



Once you have a piece of the correct length, cut three more just like it. Lay a piece of waxed paper on a flat surface. On this, clamp one of the uprights against a square (1 in the photo below). Put glue on both ends of one of the five short pieces just cut. Place the remaining Foundation Beam vertically against the square (2), and position the short piece with its edge against the Foundation Beam (3). Position another upright against the opposite edge of the short piece and butted against the square and clamp over the short piece. This is the bottom of the Frost Box Frame.



Take a scrap and butt it against the remaining edges of the uprights (5 in the photo below). Against this, lay a scrap of the same 8 x 8 (0.40 x 0.40) material used to make the Water Tank Support Beams (6). Apply glue to both ends of another short piece and glue it in place against the 8 x 8, then clamp (7). This is the top of the Frost Box Frame.



Once the glue dries, mark the Bottom and Top so you know which is which later.



Test fit the frame into the rear of the trestle work. It should slide snugly over the Water Tank Support Beams, and should just touch the remaining Foundation Beam laid across the bottom of the bents, with the bottom edges of the uprights even with the edge of the Foundation Beam nearest you. If it doesn't fit properly, modify

it until it does, or throw it away and make another. Once you have one that fits, make another just like it, and test fit it as well.



The frames are sheathed with 1 x 8's (0.05 x 0.40) siding. This siding needs to be flush with the outer edges of the frames. Starting at the bottom, the first board also needs its edge even with the bottom short piece. The remaining boards simply butt against the previous one as you work your way up. Apply glue to the entire outer surface of the frame and lay the sheathing boards. Wipe off any excess glue that squeezes out between the boards or along the edges - if you spread the glue with your finger before laying the sheathing (as we've done before), you shouldn't have much of a problem in this area. Sheath both frames.



Once the glue dries, turn the frames over and glue a 6 x 8 down the middle. Take an 8 x 8 and, while holding it snugly against the top inner corners of the frame, scribe the top sheathing along the inner edge of the 8 x 8. Remove the sheathing in the corners. If you need to glue a reinforcing scrap to hold in what remains of the top sheathing, do so. When the sheathing dries, sand or trim the edges of the sheathing flush with the outer edges of the frame (I used a sanding block with #180 paper).



To emboss nail heads, I use a disposable Bic 0.5mm drafting pencil. Lay a straight edge about one scale foot (0.05) back from the edge of the sheathing and, while holding the pencil vertically, twirl it a couple of times to leave an impression. You'll find that some areas are very soft, so be gentle - you don't want to drill a hole, but leave a slight impression. In other areas, you'll hit grain and have to press harder. Don't worry if some seem barely visible. You'll never notice once the model is complete. Place your nail heads two per end, about 2" (0.50) from the upper and lower edge of each board.



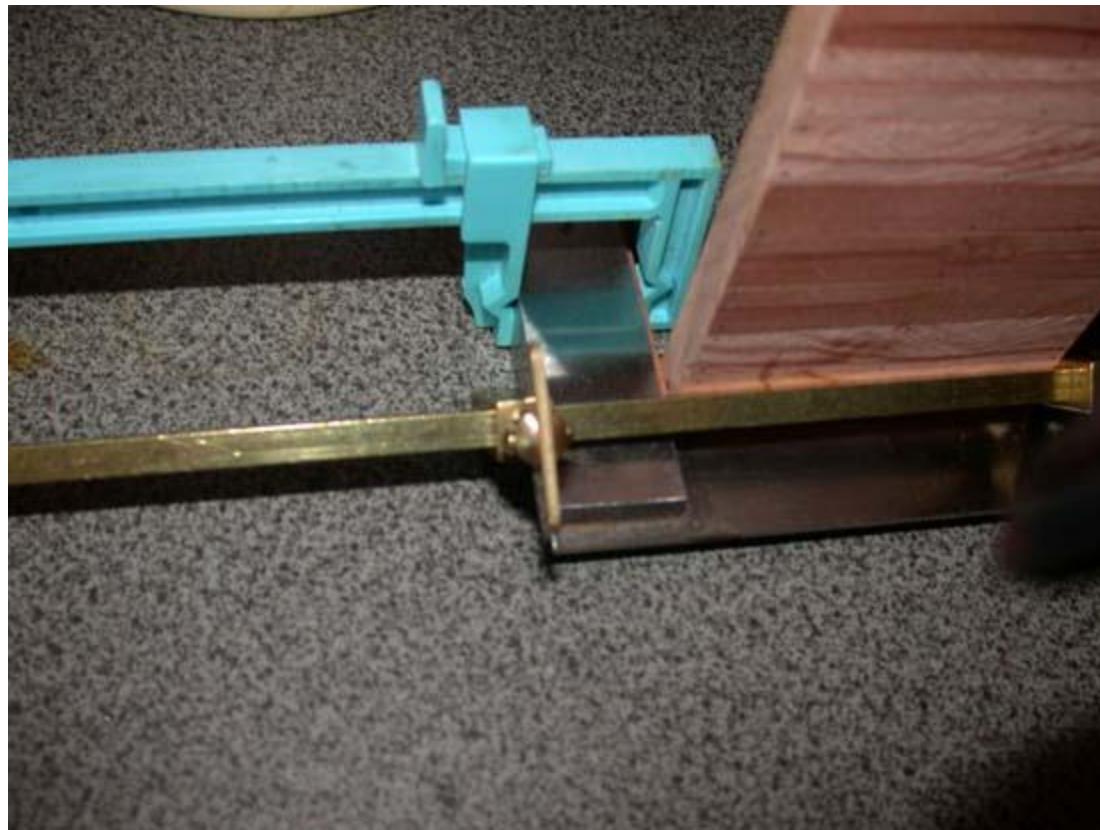
Run another line of nail heads down the center of the sheathing. Complete sheathing and embossing the other frame.



Slip a length of 1 x 8 sheathing material through the rear bent aligned with the center sway braces. Butt the end of this piece against the near center sway brace of the next (central-rear) bent. Mark the piece to determine the distance between the sway braces. Cut this piece to length and clamp it to a square flush with a flat surface.



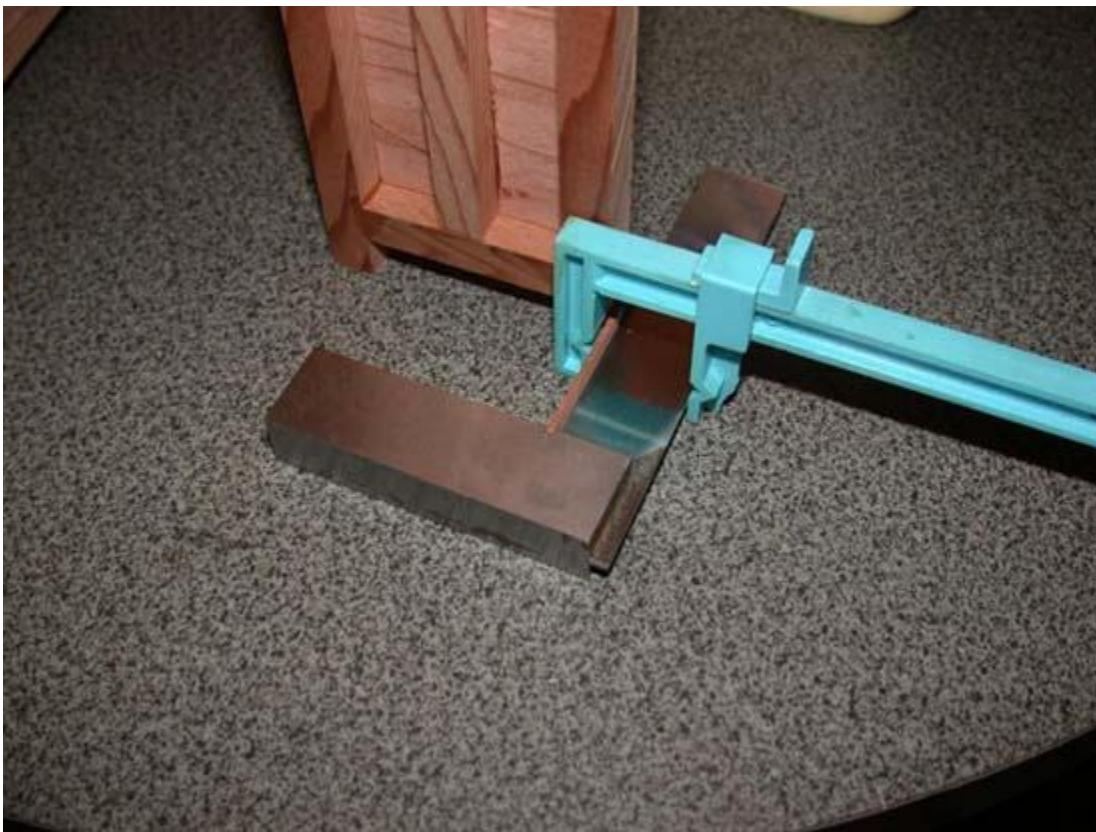
Glue the bottom end of one completed Frost Box side to the piece of sheathing that's clamped to the square (remember, the bottom sheathing board is missing from the Frost Box side, so slip a piece between the side and the square while gluing).



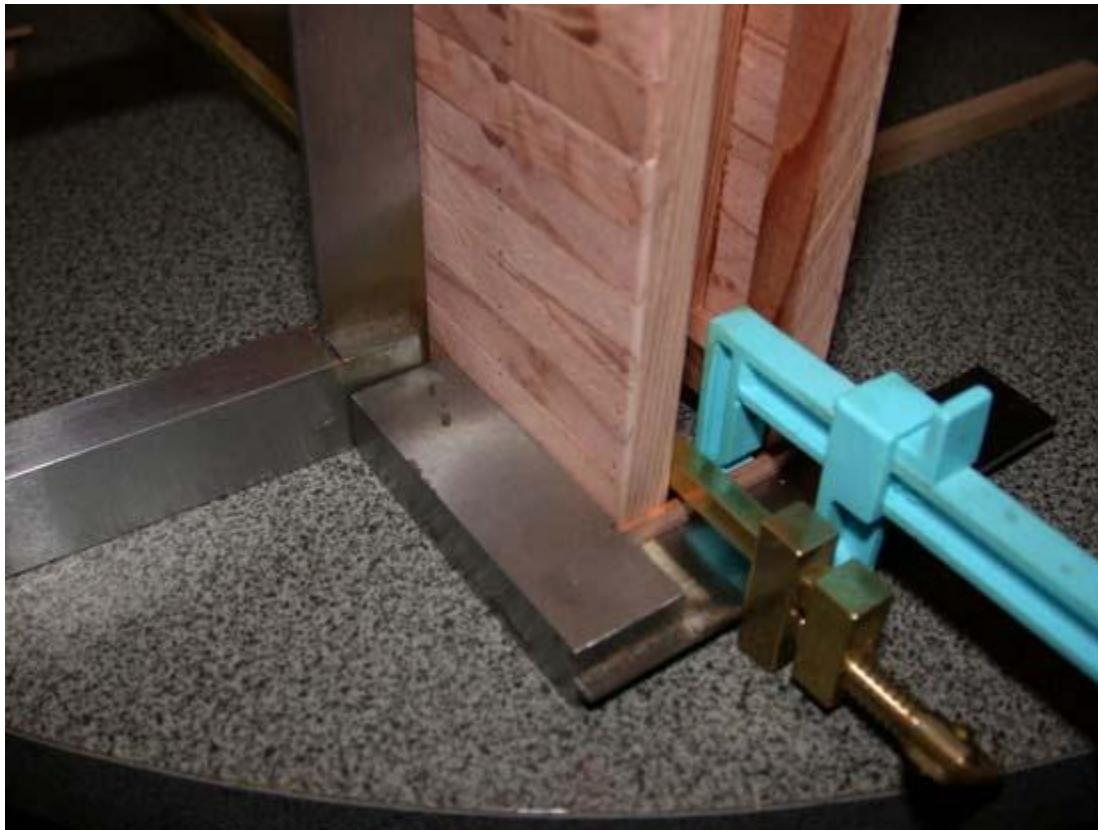
Use a second square along the back side to ensure that the Frost Box side is vertical while you clamp the pieces to dry.



Once dry, reverse the square and clamp the same piece of sheathing material (now glued to one side), to the square.



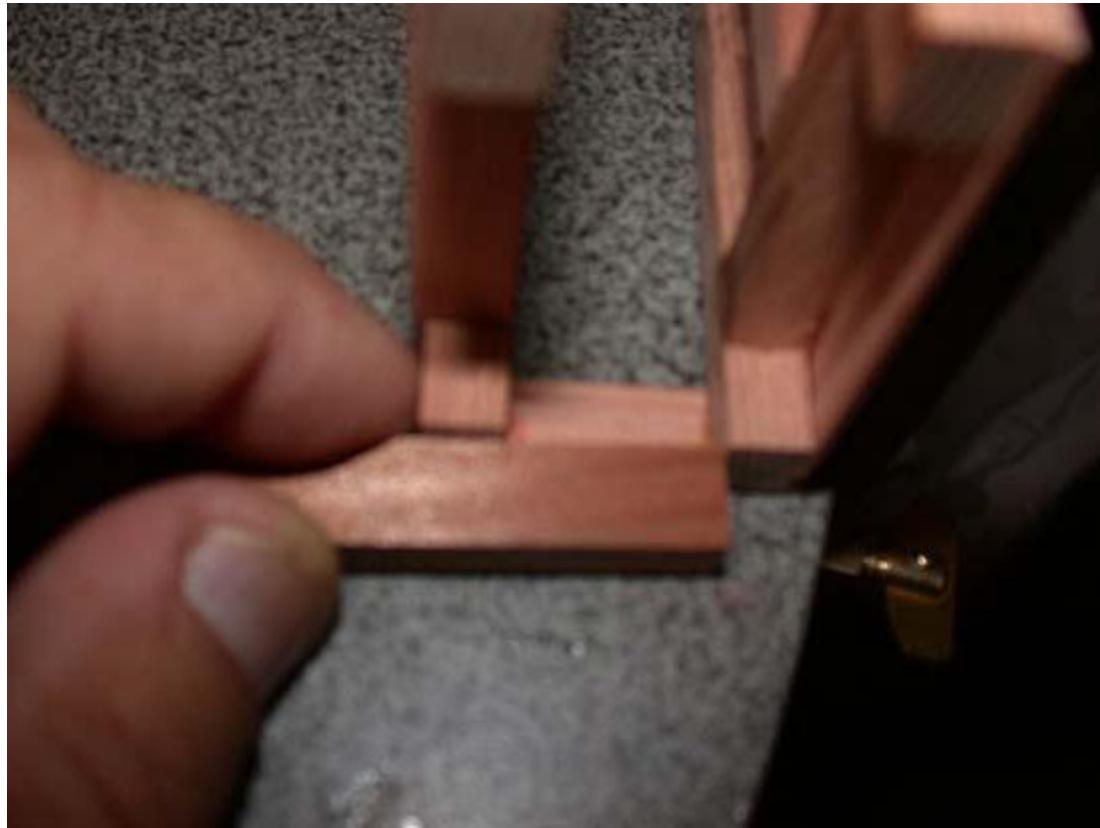
Glue the other Frost Box side to the sheathing material. Again, use a second square to keep things aligned, and slip a piece of sheathing between the side and the square.



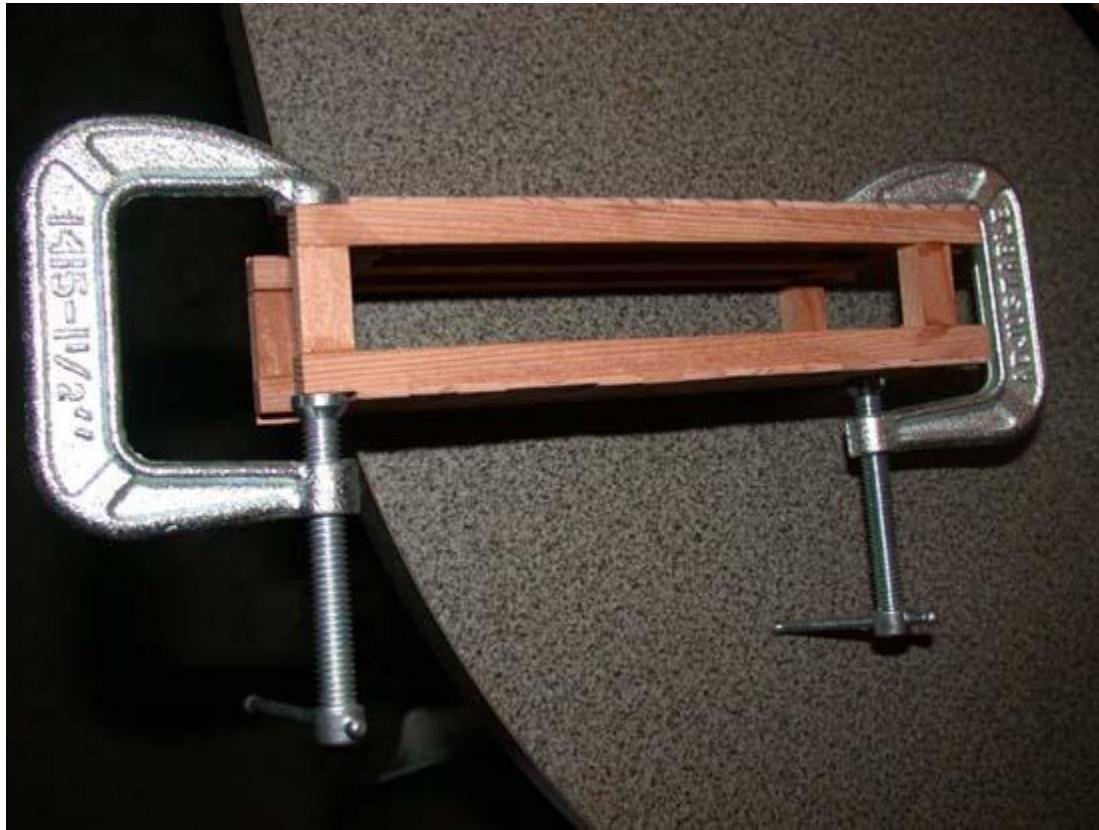
Once dry, flip the Frost Box on its side, with one end laying on the piece of sheathing material now holding them together. Slip another piece under the other end to hold things straight, and lightly clamp the assembly to a flat surface.



Take a piece of 4 x 8 material and, working on the glued end, butt one end against one side and mark where it meets the other side. Cut it to length and test fit it between the sides. If it's the right length, cut four more just like it.



Glue two of these pieces flush with the bottom edges of the sides, and two aligned with the top cross braces of the side frames 0.40 back from the top edges.



Starting at the bottom, sheath one end of the Frost Box assembly, sand or trim the ends of the sheathing flush with the side sheathing, and emboss nail heads.



Turn the Frost Box over and mark the side frames 3.60 from the top edge of the bottom cross-piece, or 4.00 from the bottom edge. Glue the fifth short cross brace with its bottom edge on this mark.



Cut a length of leftover 2 x 6 Sway Brace material to form a door sill, and glue it flush with the bottom edge of the Frost Box. Cut three lengths of 1 x 8 (0.05 x 0.40) sheathing material 3.80 long and glue them vertically to form a door. Ensure that they're centered on the Frost Box. Cut two pieces of 1 x 8 to act as horizontal braces for the door. These are attached 1/2" back from the door's top and bottom. Cut a diagonal brace to fit between the horizontal braces and glue it in place. Frame the door on both sides and on the top with 2 x 2 (0.10 x 0.10) lumber. Sheath the remaining space above the door with 1 x 8's as before and emboss nail heads on the sheathing and on the door braces and frames.



Apply two hinges on one side of the door, and a handle on the other. I affixed the hinges with super glue, then pushed the nails in place with small needle nose pliers. The door needs to be drilled for the handle I used (actually an O-Scale grab iron - see Materials List in Part I), and I affixed it with super glue as well.



Installing the Frost Box

Put glue in the four notches atop the Frost Box and slide it into place. Make sure the door is oriented to the side with the opening in the sway braces in the trestle work. Temporarily clamp the remaining Foundation Beam in place to apply pressure to the Frost Box while its glue dries.



Measure from the center of the outer bent's lower beams and establish the location of the last Foundation Beam, scribe glue guide lines as before, and glue the Foundation Beam in place (glue it to the bottom of the Frost Box as well as the bents). I used scraps for clamping bearing surfaces. Once the glue dries, nail this last Foundation Beam to the bents as before with 3/4 x #20 brads.

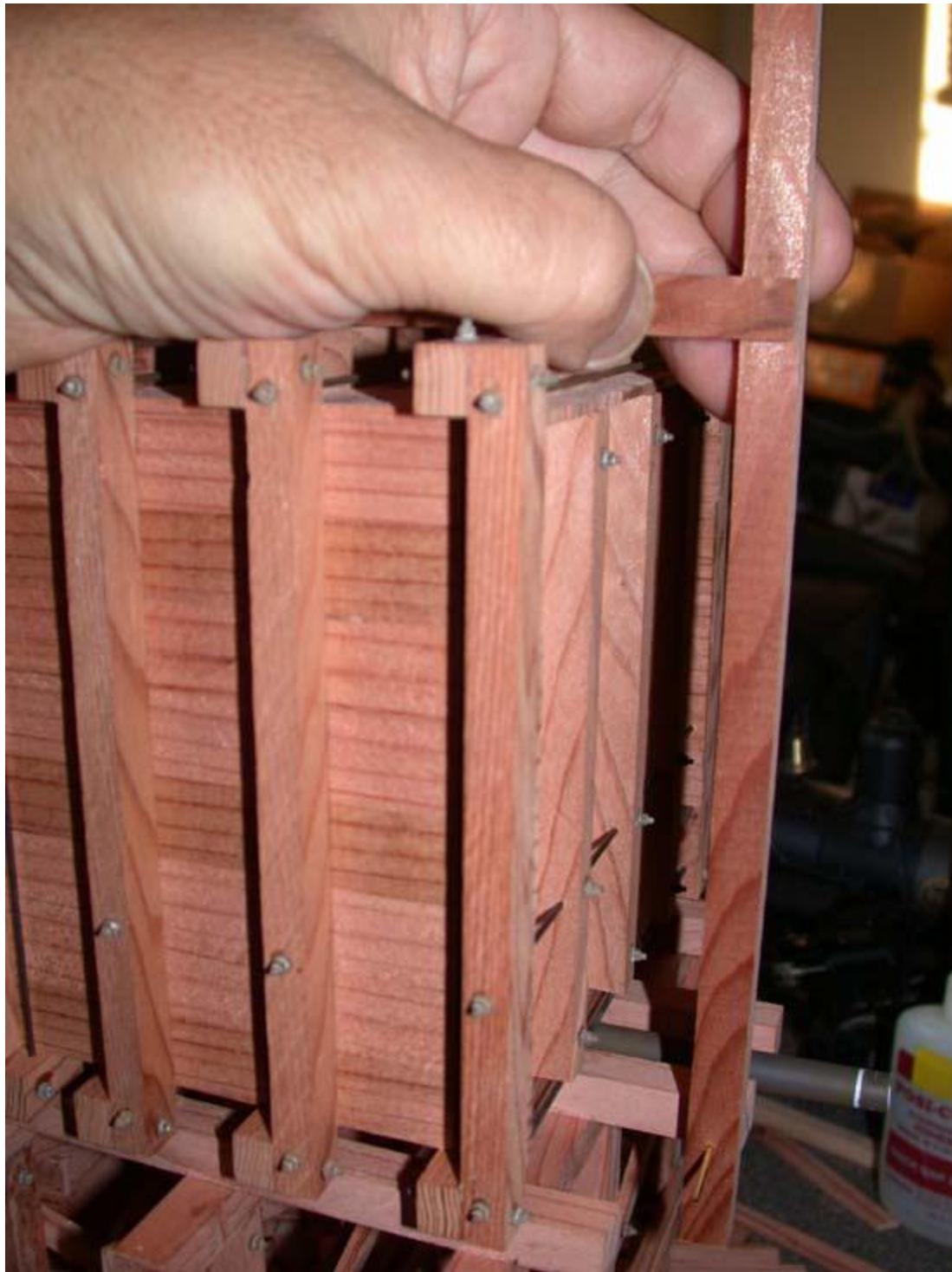


Making the Spout Hanger

Start making the **Spout Hanger** by cutting two 6x8 (.30 x 0.40) pieces 16'-6" (9.90) long. On the wide (0.40) side, lay out a hole on one end of each piece that's 17" (0.85) from the end and 4" (0.20) from the edge - i.e. centered on the beam. Drill through each piece using the #53 (0.0595) drill bit.

One at a time, align the hole in these **Vertical Spout Hanger Beams** with the hole in the **Inner Tank Support Beam** and slip a length of 0.052" diameter brass wire through them (note that the Vertical Spout Hanger Beam goes to the outside of the Inner Tank Support Beam). Lay another piece of 6x8, narrow side up, on the top tank supports and hold it against the **Vertical Spout Hanger Beam** as shown in the photo. Measure from the inner edge of the Vertical Beam to the tank at the bottom, and align the top so it's the same distance from the tank. You want the Vertical Beam to *be* vertical, parallel to the front of the tank. When you're satisfied that everything is all lined up, parallel, and square, scribe a line on the Vertical Beam where it intersects the piece laying on the top of the tank. Repeat for the other side.

While you're at it, check the length of the horizontal piece laying atop the tank. It should end up flush with the front of the Vertical Beam, and extend back slightly past the rear edge of the second-from-the-front **Top Tank Support** (mine were 3.20" long). Cut two pieces this length. These are the **Spout Hanger Top Braces**.



Glue the **Top Braces** to the **Vertical Beams** using the scribed lines as a guide, and ensuring they're square. Note that one assembly is a *mirror image* of the other.



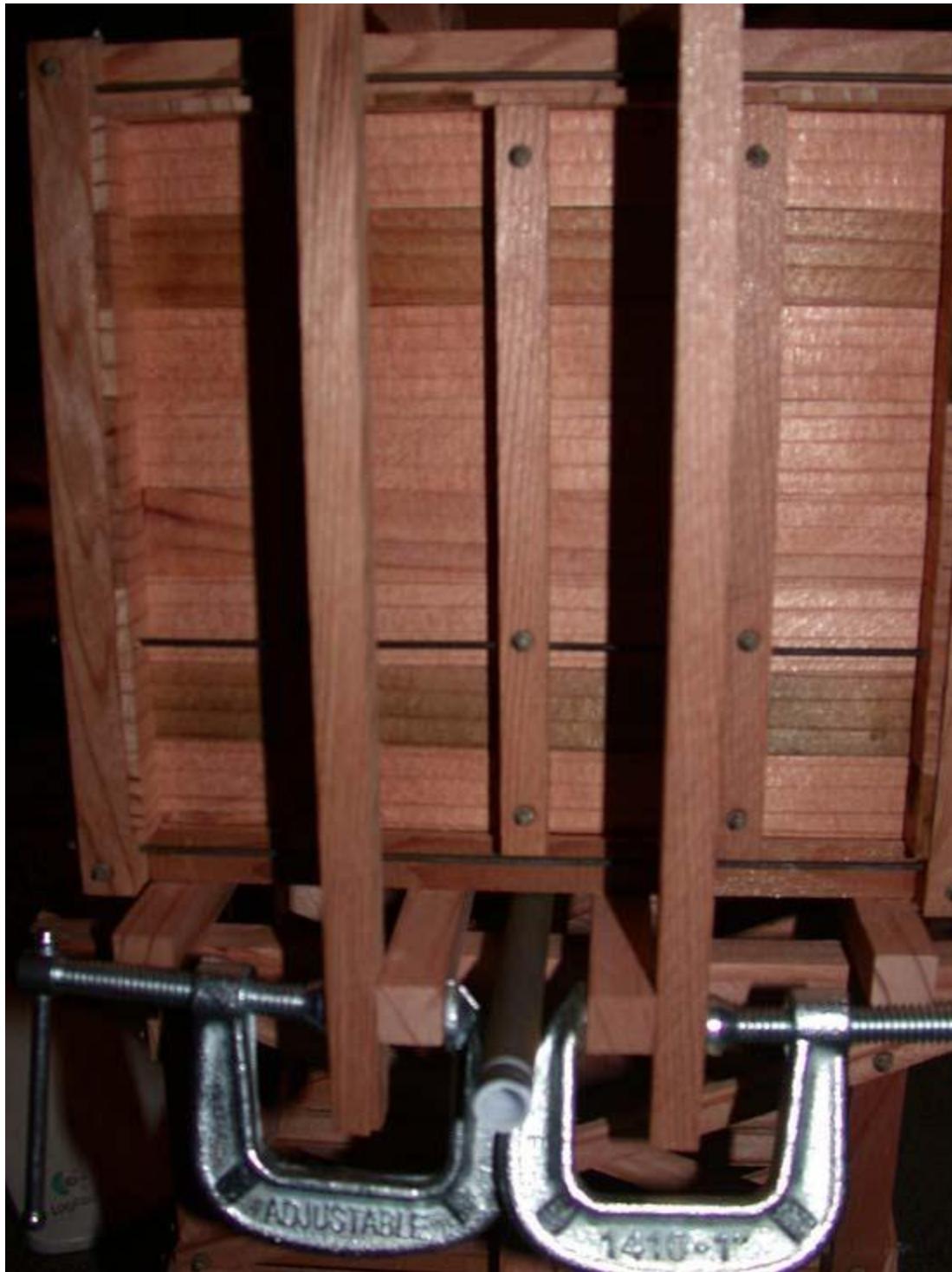
Lay out a hole on the **Top Brace** centered on where it intersects the **Vertical Beam**... 0.20" in from the edge and the end. Drill through both pieces using the #53 (0.0595) drill bit for the NBW's.

'Hanging' the Spout Hanger

One at a time, slip a piece of 0.052 wire as before through the **Vertical Beam** and the **Inner Tank Support Beam**. Make sure the Vertical Beam is truly vertical in **both** directions and scribe glue guide lines on the **Top Tank Supports** where they're met by the **Top Braces**. Apply glue to the Top Tank Supports and Inner Tank Support Beam and glue the Spout Hanger in place. Nail the **Top Braces** to the **Tank Support Beams** with 3/4 x #20 brads... this should provide all the clamping you need. Try to nail slightly off-center of the intersection points, as you'll be drilling these for NBW's. With care, you'll be able to center the NBW's and hide the brad heads at the same time.

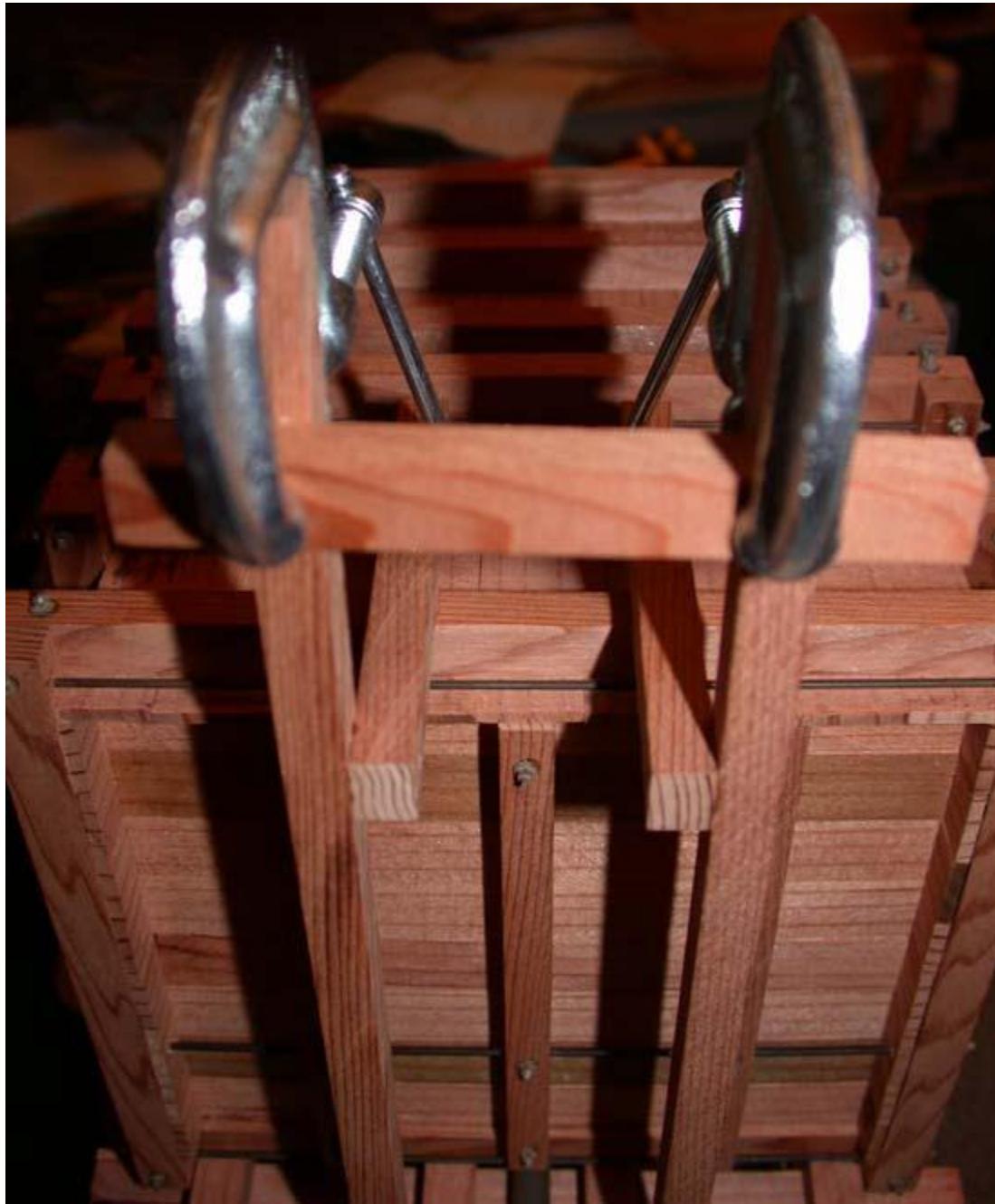


Taking care not to disturb the hole alignment, remove the wire at the bottom joint and clamp it.



Making the Spout Hanger Horizontal Support

The **Spout Hanger Horizontal Support** is made from one 6x8 piece that's 5'-5" (3.30") long. On the narrow (0.30) side, lay out a hole 4" (0.20) from each end and 3" (0.15) from the edge for the pulleys. Drill through the piece using the #53 (0.0595) drill bit. The **Horizontal Support** mounts to the **Vertical Spout Hanger Beams** with its bottom edge 14'-5" (8.70) up from the bottom ends of the **Vertical Beams**.



After the **Horizontal Support** is glued in place, lay out a hole centered at each intersection and drill through both pieces using the #53 (0.0595) drill bit for the NBW's. Speaking of NBW's, now's the time to install some. Four are used where the **Vertical Beams** connect to the **Inner Tank Support Beams**...



... four more where the **Top Braces** and **Vertical Spout Hanger Beams** intersect, four more where the **Horizontal Support** connects to the **Vertical Beams**, and four more where the **Top Braces** connect to the **Top Tank Supports** (you'll need to drill for these).



Making the Pipe and Spout Supports and the Pipe Boss

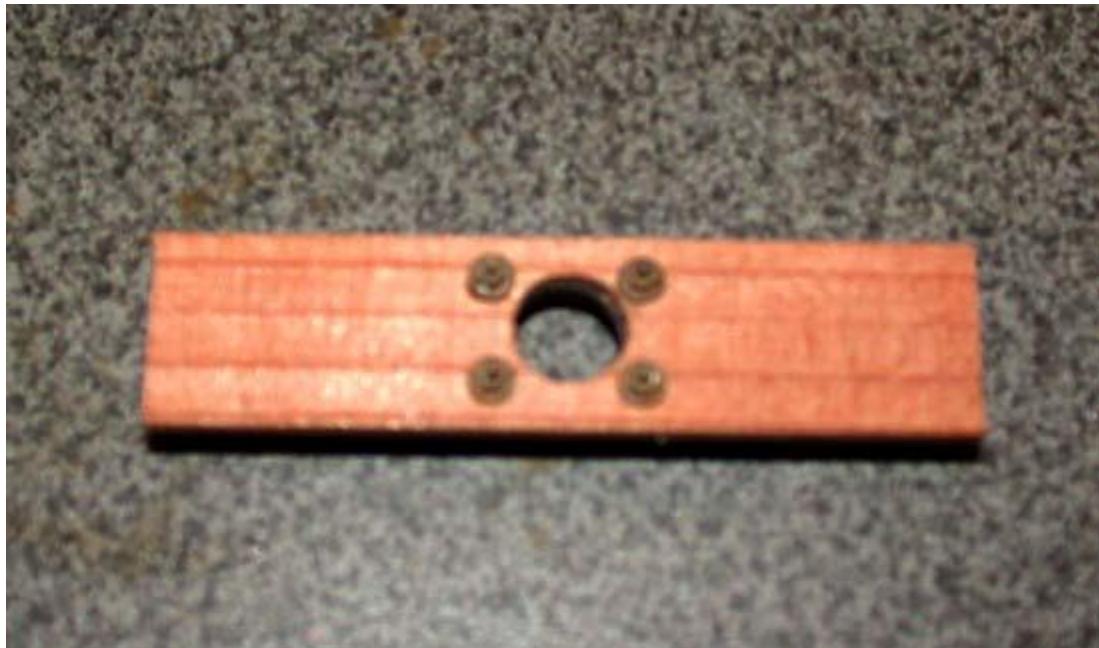
The **Pipe and Spout Supports** are made from 2x12 (0.10 x 0.60) material, and are long enough to end up flush with the outer edged of the **Vertical Spout Hanger Beams** (approximately 42", or 2.10"). Both have two holes in each end for NBW's where they intersect with the **Vertical Beams** (see [Drawing Sixteen](#)). You can drill these now or later - it's up to you. The **Pipe Support** also has a hole drilled in its center for the **Water Pipe** to pass through. We made the Water Pipe from 5/16 diameter styrene tube, so you can use a 5/16 drill here and file it out a little if you like. I bought a 21/64 drill bit since it's also needed for the **Pipe Boss**.



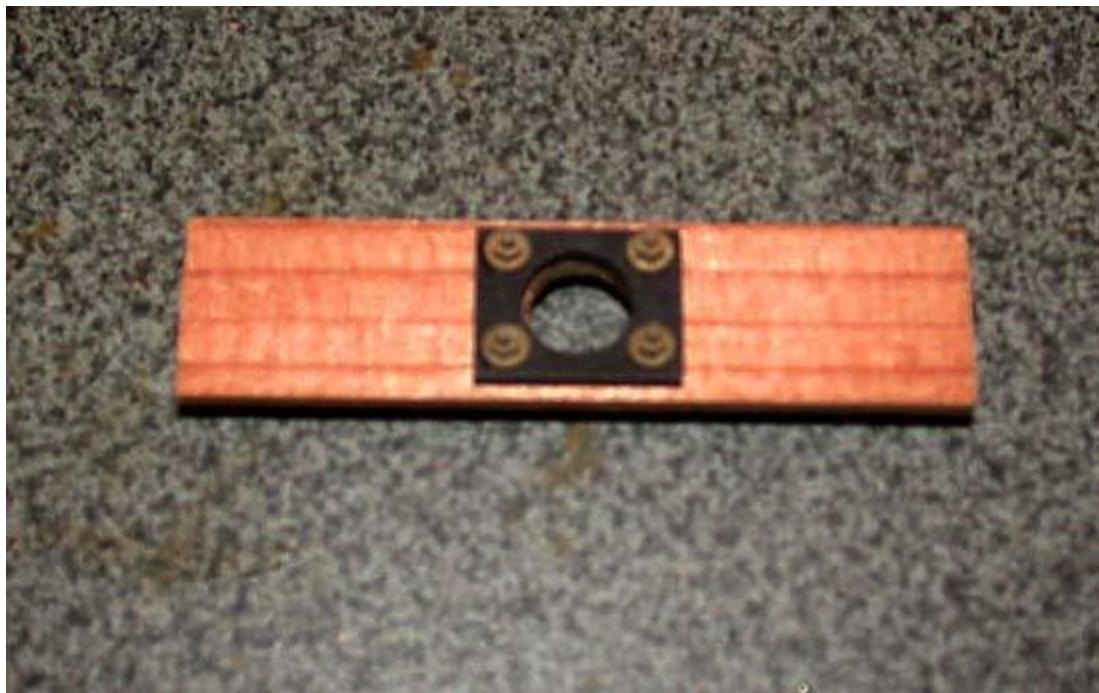
The **Pipe Boss** is made from 0.064 x 1/2" x 12" Brass Strip. Lay it out and drill it as shown in [Drawing Twelve](#) from [Part IV](#). Blacken it the same way you did the NBW's and glue it to the **Pipe Support**. I used two-part 5-Minute epoxy for this, since I'm told CA doesn't hold up well to water. Once the Boss is glued to the Support, drill the four NBW holes through the Boss and Support.
Cut off the pins on four NBW's leaving about 1/16"...



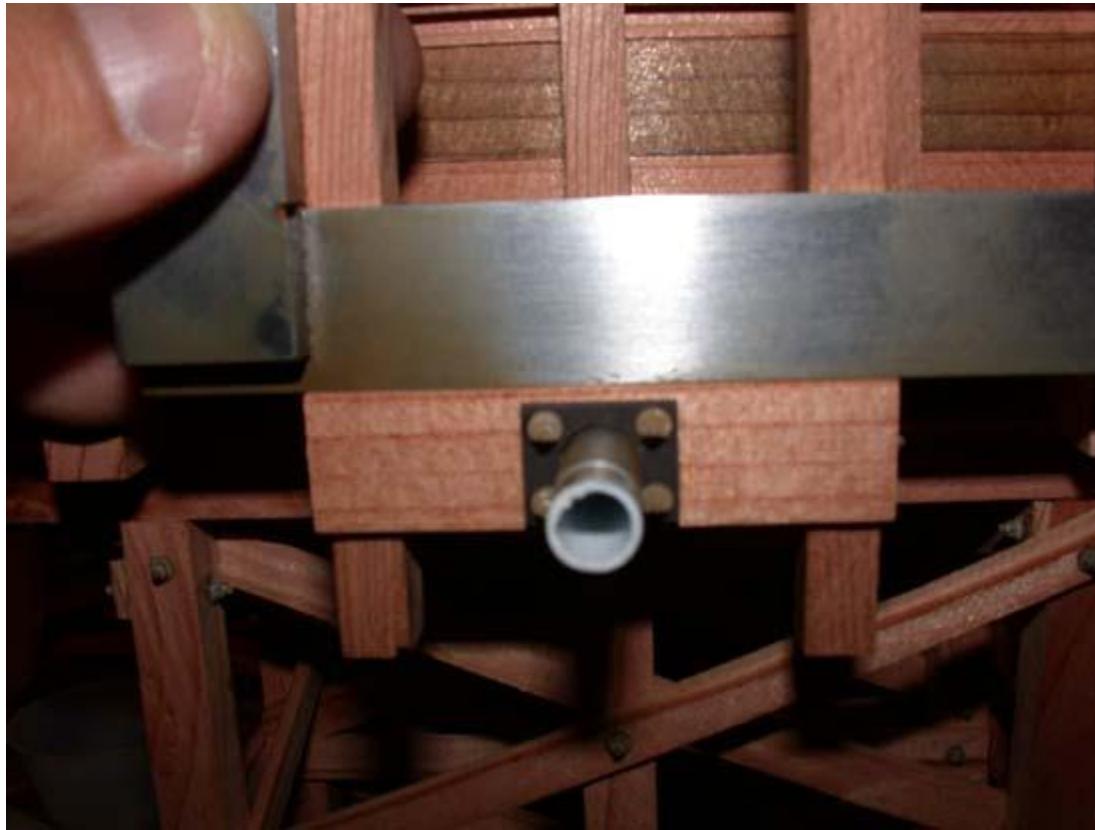
... and glue them in to the back side of the Support.



Glue four more NBW's to the front side of the Boss.



Apply glue to the back ends of the **Pipe Support**, slide it over the **Water Pipe**, square it up, and press it into place. Glue the **Spout Support** in place just above the **Pipe Support**, with its bottom edge against the top edge of the Pipe Support.



Making the Spout Hanging Brackets

The Spout Hanging Brackets are made from 0.064 x 1/4" Brass Strip. Begin by creating two pieces that are bent 90 degrees, with about 3/4" extending from each side of the bend. A gentle bend radius is better than a sharp one, both in terms of allowing the brackets to fit closer to the spout itself, and for long term strength.

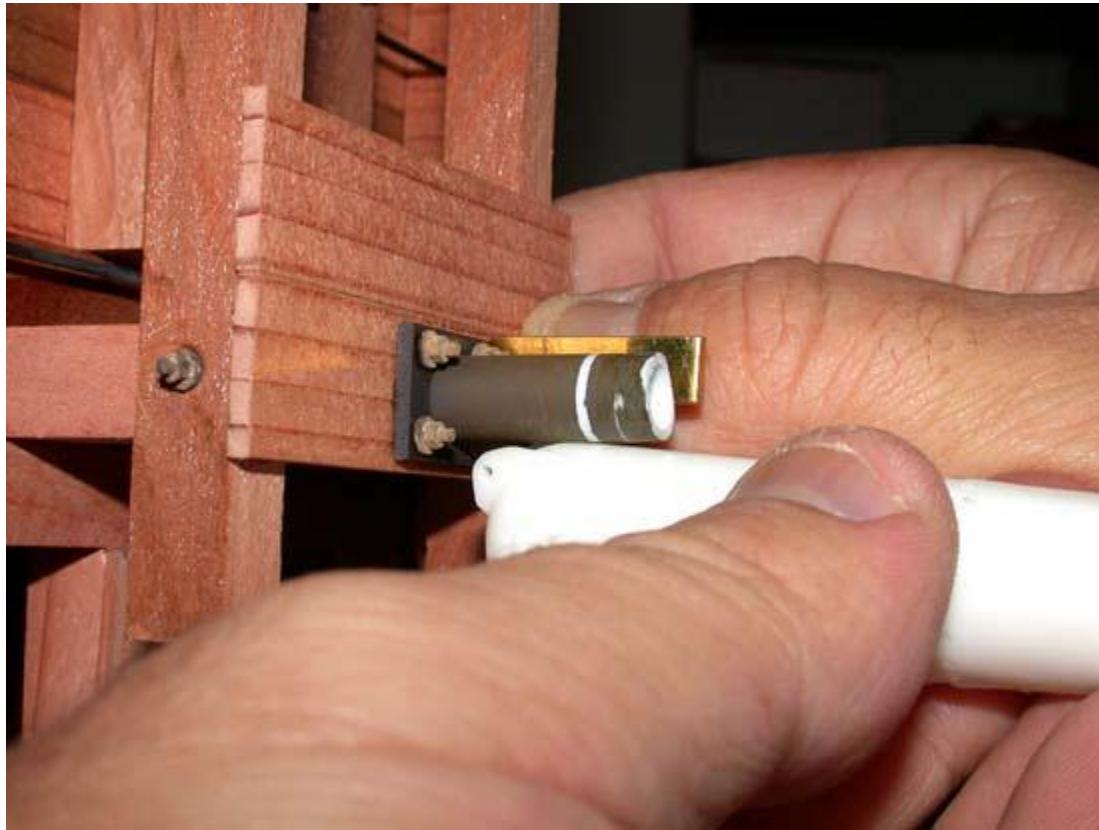


Hold one bracket against the Support pieces next to the Water Pipe.



Hold the **Water Spout** against the bottom of the **Water Pipe**. Line it up so it clears the NBW's on the **Water Pipe Boss**. There are two things to note and mark here...

- The distance from the pivot point on the Spout to the Supports. Mark that on the Bracket.
- The length that the Water Pipe itself needs to extend, and where it needs to be cut off. This is just inside the Spout. Mark that on the Water Pipe.

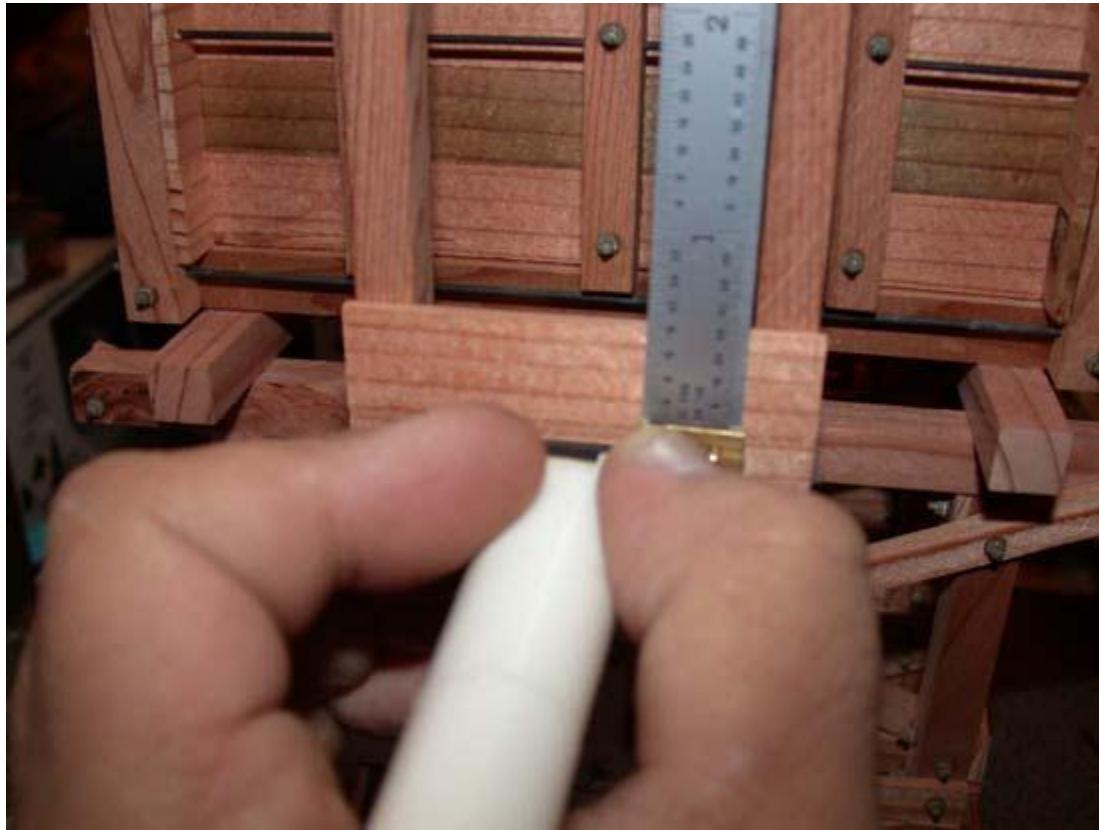


Drill the **Spout Hanging Brackets** at the pivot point. Take a look at [Drawing Sixteen](#) - you'll note that there are actually two drill sizes used here. The smaller 0.036 diameter hole goes all the way through the material. This is used for the 0.030 wire that will actually hang the spout. The other larger 0.059 hole is drilled on the outside for a depth of about 0.015 to 0.020. This is to give the pin on the NBW someplace to sit into. After the holes are drilled, round the face of the bracket on that end as shown in the drawing to clear the spout as it pivots.

Lay out and drill the two holes on the other end of the brackets as shown in the drawing. Cut the ends to final length.

Blacken the finished brackets.

Drill out the pivot holes in the water spout with a #64 (0.0360) drill. Make sure the holes are straight and parallel so the spout hangs straight. Slip a piece of 0.030 wire through the spout and **Spout Hanging Bracket**. Holding these together, slip the end of the spout over the end of the **Water Pipe** and measure the distance from the top of the **Supports** to the top of the **Bracket**.



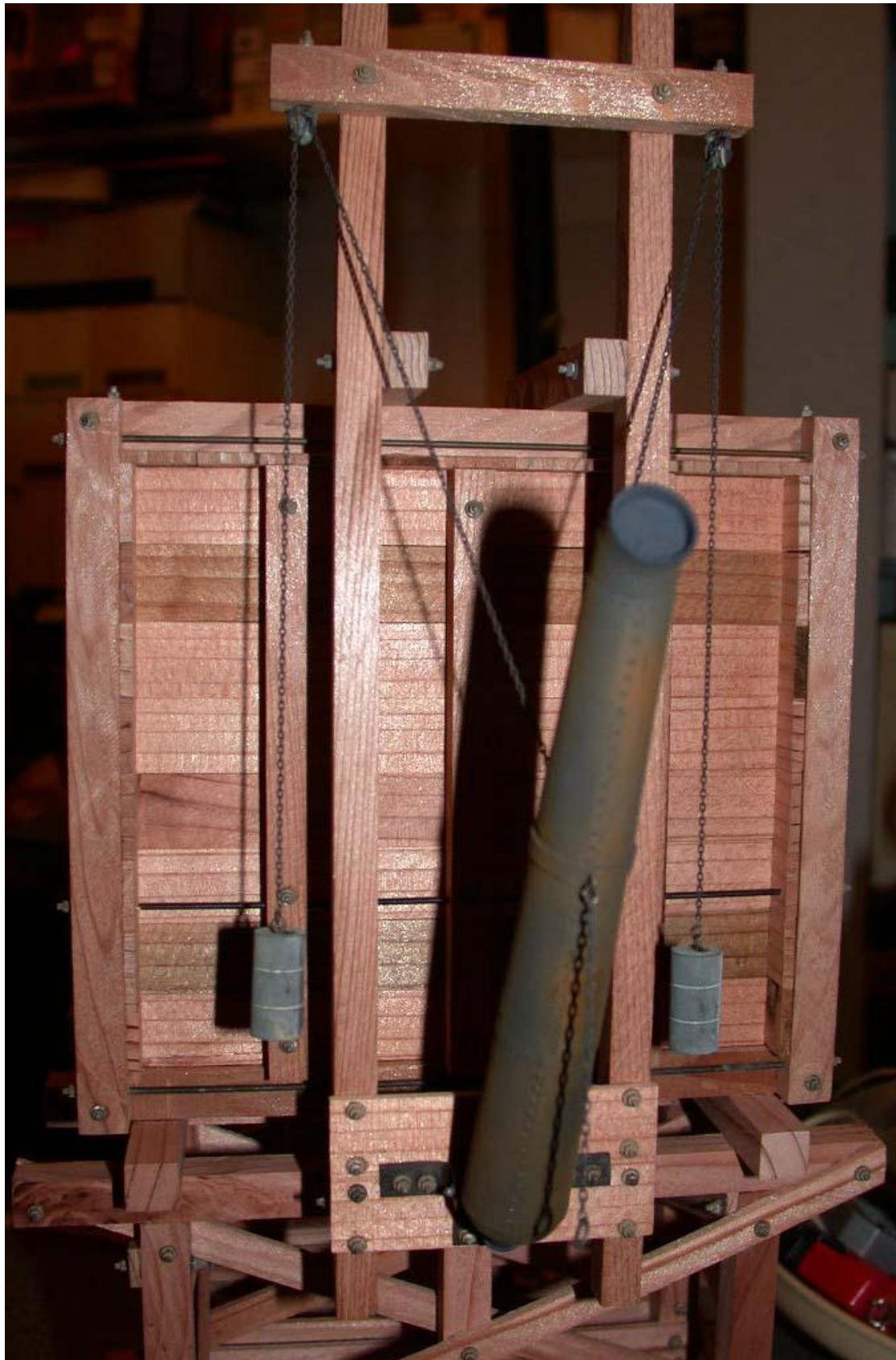
Scribe a light line on the **Supports** at the measured distance. Glue the **Brackets** to the **Supports** along the measured line. Again, I used 5-Minute epoxy for this, not only for its water resistance, but also for strength. After the epoxy sets up, drill through the **Brackets** and **Supports** and install NBW's front and back.



Now is the time to paint the water spout. Though the photo below shows a solid core, I later removed the spout and hogged out the end with a Dremel tool and a small router bit. It looks a lot better when the end is hollow. Do this before painting. I painted the spout with Floquil Grimy Black, followed by a light overspray of rust.

Blacken the counterweights, pulleys, and chain. The counterweights need to be drilled for the eyelets, and the eyelets glued in place. Make a small ring from brass wire to connect the chains to the spout. Drill the spout for the ring, slip on the ends of the chain, and install the ring on the top of the spout.

Cut a piece of brass wire to fit within the **Spout Hanging Brackets** and hang the water spout. Glue the NBW's in place on each end of the spout hanging wire to prevent it from sliding out. Glue the pulleys in place, and the NBW's above them. Thread a chain through each pulley and put the spout in its *fully lowered position*. Cut each chain about 1/2" below each pulley. Raise the spout, pulling the chains through, and hang a counterweight on the end of each chain. Lastly, make another short chain that the crew can use to pull down the spout. I put a larger ring on the end of mine. Hang this from the front end of the spout.



That completes **Part V**. In **Part VI**, we'll finish things up by making the **Ladder**, the **Water Valve**, the **Water Gauge** and it's **Rollers**, and a **Top Hatch**. Until next time.