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photo by Steve Emma

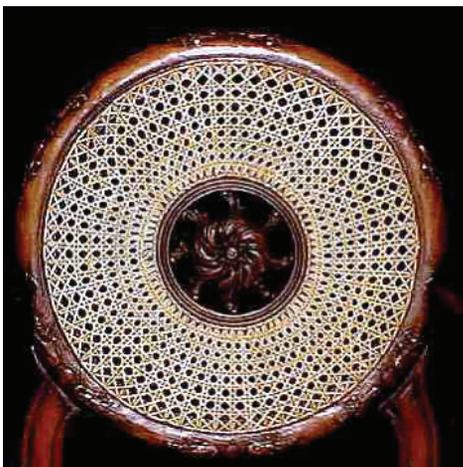


Figure 1: Example of Sun Ray pattern caning—restoration of an antique chair by Steve Emma (www.steveemma.com)

The Belmont Bed

My clients, Terry and John David, and I were huddled over a computer looking at images of caned furniture when our jaws dropped in unison—we had come across caning done in a circle. Rather than a rectilinear grid with the warp (vertical strands) and weft (horizontal strands) at 90° to each other, the warp radiated from a central medallion like spokes of a wheel and the weft was woven in concentric circles. The diagonal strands made gently curving arcs and the overall look was stunning. We discovered that this caning pattern is called *radial* or *sun ray* and can be done in full circles, partial arcs, or ovals—Figure 1.

We knew immediately that we wanted to use this style of caning in the bed I would be making for them. JD and Terry live in a beautifully restored Victorian home in Manchester, NH. Terry had an idea for the overall shape of the headboard based on a sofa from her mother's home. I decided that caning in a partial arc would work best with her sketch. After making a number of drawings, discussing these with the clients, consulting with friend and fellow furniture designer and maker Libby Schrum, and building scale models, we had a final plan. There would be a gently curved top rail and straight bottom rail, both joined to the bed posts, a straight stile at each side, an arch, and two spokes dividing the arch into three main caned panes. There would also be a small triangular caned pane at each corner—Figure 2.

Headboard Construction

The joinery for this piece was complicated by short-grain issues in the arches. I consulted my former teacher at the Center for Furniture Craftsmanship, Aled Lewis, who devised a two-step plan for joining the spokes to the arches.

I started with the top and bottom rails. Although I usually cut mortises before tenons, I did not want to mill and mortise the bed posts and then fit the headboard to the posts for several reasons: (1) the long posts would make working on the headboard awkward; (2) I knew there would be a lot of fitting before the headboard was done and did not want to mar the posts in the process; and (3) I anticipated (correctly) that the headboard joinery might involve so much tweaking that the location of the mortises for joining the rails to the posts might not end up exactly to plan.

In order to stabilize the headboard as I built it, I made two short, temporary posts of poplar and cut mortises in them to accept the tenons on the end of each rail. Then I made the stiles. Each had an integral tenon on the bottom with corresponding mortise in the bottom rail, and a mortise at the top for a floating tenon. I shaped the top rail on the bandsaw and cleaned it up with a template and flush trim bit on the router table. The bottom edge of the top rail is curved, but in order to simplify the joinery I created flat spots where the stiles and arches met it.



The Belmont Bed

photo by Chris Pinchbeck

Next came the arches. I created a template for the shape and cut and trimmed the boards leaving both ends long. I dry fit the rails and stiles to the temporary posts, set this on top of the over-length arches and marked each arch end with a knife. I cut the arches to final size, then mortised them and the corresponding spots on the top rail and stiles for floating tenons.

I knew that I needed a floating tenon to join the spokes to the arches, but given the narrow wedge shape of the top of each arch and resulting short grain, if I tried to cut a mortise in the arch it would probably destroy the board.

This is where Aled's brilliant two-step plan came in. I glued up the following—stiles to top rail, and arches to stiles and top rail with the temporary posts and bottom rail dry fit to keep everything in place. After the glue cured, I marked out the spokes and removed the posts and bottom rail. I cut the spokes to length and mortised them for floating tenons. I also had to mortise the inside of the arch for the floating tenon. This was challenging because the arch was glued to the rail and stiles so the whole assembly was large and unwieldy. I needed to create a platform to support a router. In our shop we have several long, narrow torsion boxes used as flexible work platforms. I sandwiched the headboard, upside down, between two of these and clamped them tightly—

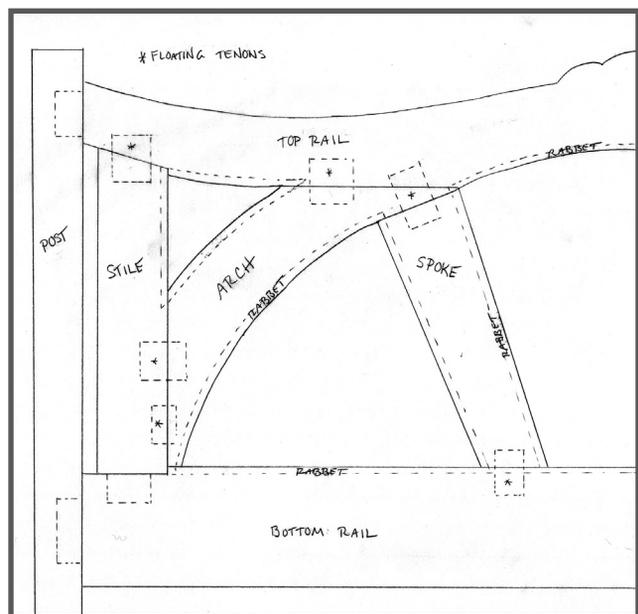


Figure 2: Drawing of headboard shape and joinery

Figure 3. I clamped fences to either side and created stops and, after a lot of fine adjustments, was able to rout the mortise, which went through the arch into the top rail—Figure 4. Once this was done, I assembled and glued up the spokes and bottom rail to the rest of the headboard.

The clients wished the surface of the headboard to be as smooth as possible and therefore wanted the caning to not be proud of the wood—Figure 5. To this end, I routed a 1/16" deep, 1/2" wide rabbet around the perimeter of each pane using a rabbeting bit. I cleaned up the corners of the rabbets with a chisel. Note that I actually cut the rabbet and drilled the holes for the cane on each element before gluing up the headboard.

Caning Pattern

Developing the caning pattern and locations of the holes was the greatest challenge for this piece. Just finding a caner who would even do the job was difficult, since the pattern was so

complex and unusual. The nearest person I could find to take it on was Steve Emma in Providence, RI (www.steveemma.com). I had expected that a caner would be able to tell me where to drill the holes, but he was not. Most caners exclusively re-cane old chairs which already have the holes drilled. Even though Steve had done radial caning, he had never designed the hole layout. So, I was on my own.

Unfortunately, the pattern was not as simple as other radial caning I had seen because the arch of the headboard was not a constant radius. In addition, it was divided into five separate panels, each to be caned separately. After several agonizing hours trying out different hole patterns on paper, I realized how to go about it. Rather than plotting out the holes and then drawing the warp and weft, start by drawing the desired cane pattern. In other words, draw the warp and the weft in a pleasing pattern with fair curves and use this to determine where the holes should be. I made a full-sized outline of the headboard on a piece of melamine,



Figure 3: Headboard clamped for routing spoke mortise

photo by Chris Pinchbeck



Figure 4: Close-up of headboard clamped for routing spoke mortise



Figure 5: Close-up of rabbet for caning



Figure 6: Final full-scale drawing of the caning pattern



Figure 7: Bed bolt



Figure 8: Ledger board and slats



then used a wet-erase marker to draw the warp and weft. This allowed me to draw, erase, and re-draw the pattern easily until I got it right—Figure 6.

Once I got the pattern I wanted, I used an excel spreadsheet to calculate the exact hole locations. The wet-erase marker marks were too crude to be used directly, but they guided the calculations. For example, I could see whether the holes on each side needed to be evenly spaced or gradually increasing in distance apart. Where a pane gets wider from bottom to top with the warp fanning out (such as the middle section) it is important to have the warp strands get gradually farther apart or else the weave will take on a rectangular rather than square look.

Finally, I transferred my calculations to the headboard elements and drilled the holes on the drill press. As mentioned, this was done before gluing up the headboard because I would not have been able to fit the assembled headboard on the drill press.

Once the headboard was all glued up, I delivered it to the caner along with a detailed drawing of the caning pattern so he would know how to do the weave. A week later I picked it up and was very pleased with the result.

Bed Rails and Slats

While the headboard was at the caner, I worked on the posts and bed rails. I wanted the bed bolts to be invisible and used a technique from *Fine Woodworking Magazine* (FWW #175, Jan/Feb 2005, *Anatomy of a Bed* by Jeff Miller). It involves using captured nuts in the headboard and footboard rails (which are glued to the posts) to accept a hex socket-head bolt, which attaches the side rails to the posts—Figure 7.

I made the ledger boards out of poplar and sunk them into grooves in the side rails. The clients did not intend to use a box spring and wanted the frame to be able to accommodate a 12" or a 15" mattress, so I made two grooves—one for each. The ledger board is screwed into the groove. I placed a short dowel every 6

inches in the ledger board and made corresponding grooves in the end of each slat in order to keep the slats in place—Figure 8.

I finished the piece with Dark Walnut Danish Oil in order to bring out the color of the walnut and reduce the contrast between sapwood and heartwood—it was impossible to avoid sapwood in the 2¾" square posts. After allowing it to cure for 72 hours, I top coated it with General Finishes water-based polyurethane. This finish has better UV protection than solvent-based clear finishes, which was important for preserving the color of the walnut.

Terry and John David allowed me to take the bed to Craftboston in April, where it was very well received. Many people who visited my booth remarked on how unusual and beautiful the caning was. Finally, I delivered the piece and assembled it in the clients' home. The headboard is in front of a window and the caning allows the morning light and the summer breeze to filter through. ■

Headboard Joinery

Step 1: Cut joinery—stiles to top rail (floating tenon) and bottom rail (integral tenon), headboard rails to posts, tenons only (integral tenons)

Step 2: Cut joinery—arches to stiles and top rail (floating tenons)

Step 3: Assemble stiles, rails and arches—glue stiles to top rail, glue stiles to arches, glue arches to top rail, dry-fit stiles to bottom rail

Step 4: Cut joinery—spokes to arches and bottom rails (floating tenons)

Step 5: Assemble and glue up stile/top rail/arch assembly (previously glued up) to spokes and bottom rail

Step 6: Cut mortises in posts for headboard rails