

# Making a Frame-and-panel Bed

*Subtle details enhance a basic bedstead*

by John McAlevey

Recently I was asked to design a headboard that could be attached to a standard, adjustable steel bed frame. These bed frames are practical and fairly attractive when fitted with a nice headboard, but to me, they just don't compare with a wooden bedstead, complete with headboard and footboard. As the clients and I conferred on possible designs, I urged them to go with an all-wood bedstead, and they eventually agreed and decided to use solid cherry.

I began making sketches, exploring ways to take advantage of this beautifully figured wood in the large headboard and footboard, which had to be at least 60 in. wide to accommodate a queen-size mattress. I had recently designed and made a couch with frame-and-panel ends, which the clients had seen and liked when they visited my shop. As I sketched my ideas, I decided to develop a similar frame-and-panel system, as shown in the top photo on the facing page. Basically, the bed posts serve as stiles for the panels in the headboard and footboard, and the crossmembers, which set the width of the bed, complete the frames that hold the panels. The bed rails that run the length of the mattress can be joined to the posts with standard knock-down bed hardware (see the bottom, left photo on the facing page) or with T-nuts, bolts and decorative caps.

Having decided on the type of construction, I continued sketching and experimenting with the shape of the top crossmembers on the headboard and footboard. A straight horizontal line across the top of the headboard lacked interest. So I drew concave and convex lines,

and eventually decided that a convex curve on the headboard and a concave curve on the footboard would provide a linear contrast that would give the piece the look I was after. I also decided to chamfer the posts heavily to make them more interesting and appealing.

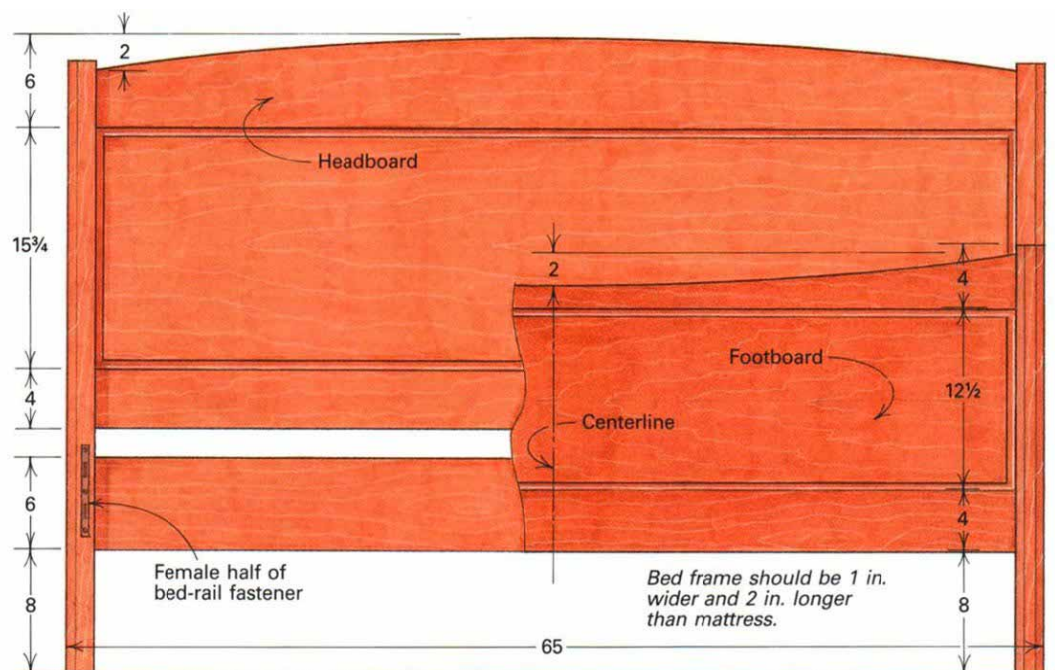
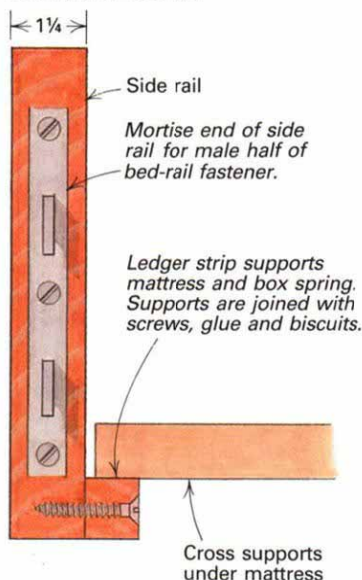
As is my usual practice, I rendered a final drawing that incorporated all of the design details and submitted it to the clients for approval. At this time, if the clients have any suggestions or changes to propose, we discuss them and make adjustments accordingly. In this case, the design was approved and I gave the clients an estimated delivery date. I also usually tell my customers when I intend to begin work on their project because sometimes they like to see the work in progress. I encourage this, although not to the point of them hovering over my shoulder during the whole job.

**Bed joinery and hardware**—I selected  $\frac{3}{4}$  stock for the bedposts and  $\frac{1}{2}$  stock for the rails and crossmembers, and then milled them to the dimensions given in the drawing. A queen-size mattress generally measures 60 in. by 80 in., but bed sizes can vary from manufacturer to manufacturer. So make sure you measure the length, width and thickness of your mattress and box spring before cutting out stock; you may have to adjust the dimensions.

As an economy move, whenever I cut stock to length, I crosscut the longer pieces first, hoping to get my shorter pieces from the cut-offs. From the  $\frac{3}{4}$  stock, I ripped 3-in.-wide pieces for the bedposts.

## Frame-and-panel bed

### End view of side rail



Two 40-in.-long posts were needed for the headboard and two 28 in. long posts were used for the footboard. For the bed rails, I ripped two 8-in.-wide strips from my 1½-in.-thick stock and then cut each piece to a length of 80½ in. All of the crossmembers for the headboard and footboard are 61 in. long. The headboard required two 6-in.-wide crossmembers and one 4-in.-wide crossmember, and the footboard needed two 4-in.-wide crossmembers (see the drawing). While I'm rough cutting stock, I also mill and glue up enough stock for panels. To make sure everything fits together, though, I don't cut the panels to size until after the frames are completed.

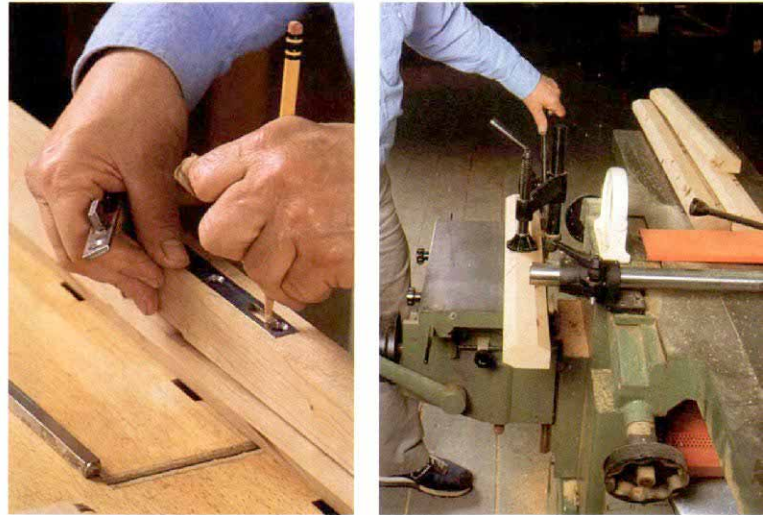
After all the pieces were cut to width and length, I laid out the joints. The headboard and footboard components are held with loose mortises and tenons. I have found that this loose-tenon system has several advantages over more conventional mortises and tenons. First, I can measure directly from my drawing and don't have to worry about forgetting to add the lengths of the tenons to pieces that need them. Second, I can plane my tenon stock to the exact thickness needed, in this case ½ in., and so my tenons are more accurately sized than those I cut with various tablesaw or shaper jigs. The bed rails are joined to the headboard and footboard with wrought-steel 6-in. bed-rail fasteners, which I ordered from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374-9514. These bed-rail fasteners are very strong, and they also make it easy to take the bed apart for shipping and moving.

I am fortunate to have a Steton combination machine (see the bottom, right photo), which provides me with a jointer and a thickness planer, as well as a horizontal mortising machine. This is a definite plus for making loose mortise-and-tenon joints. The stops on the mortiser can be adjusted to control the width and depth of the mortises, and so the required layout is not very extensive. Since loose tenons are fitted into mortises in the ends of the crossmembers, I don't have to worry about any tenon layout.

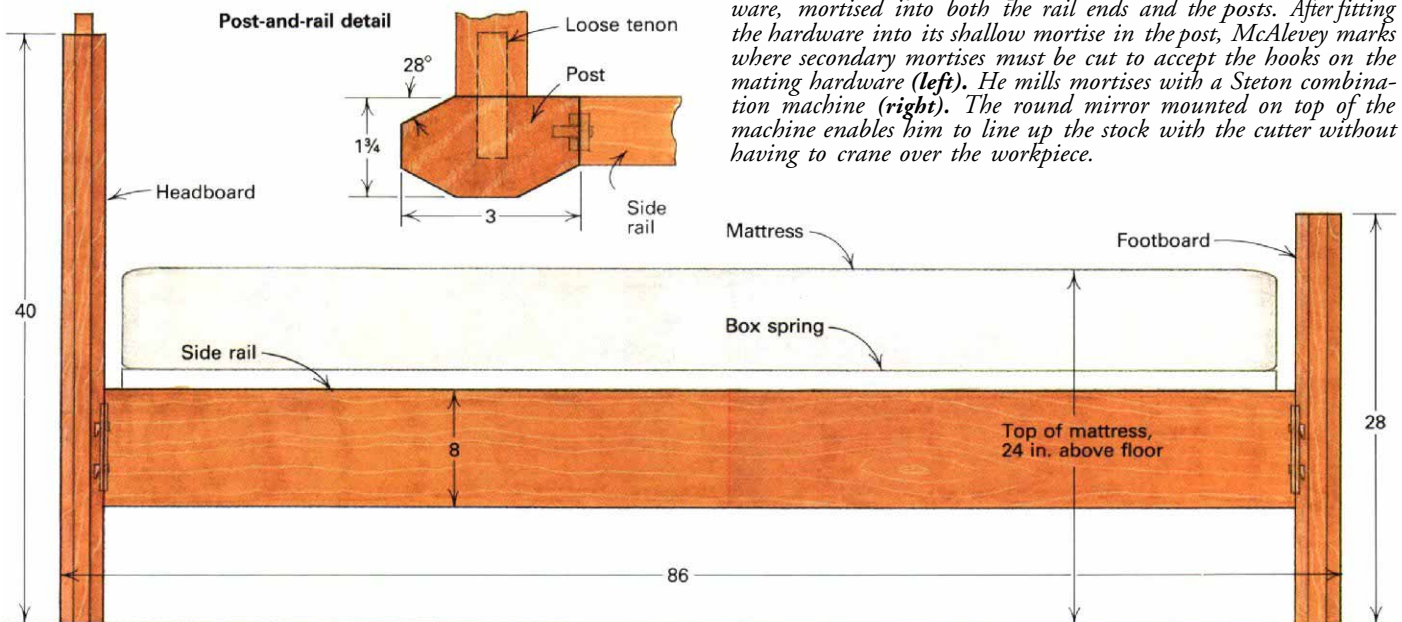
The joints were cut in two steps. First I cut mortises on the ends of the crossmembers and then used them to mark out the mortise locations on the four bedposts. Once the mortising machine is set up, the only reference I need is a centerline for each mortise. But in this case, I also marked the pieces to remind me which face of the wood will be up on the mortising table. By working off the same face all the time, it doesn't matter if my mortises end up being slightly off center. If you don't have a horizontal mortiser, you can, of course, cut



*Convex and concave lines dress up the wide headboard and footboard of McAlevey's frame-and-panel bed.*



*Bed rails can be joined to posts with standard metal bed hardware, mortised into both the rail ends and the posts. After fitting the hardware into its shallow mortise in the post, McAlevey marks where secondary mortises must be cut to accept the hooks on the mating hardware (left). He mills mortises with a Steton combination machine (right). The round mirror mounted on top of the machine enables him to line up the stock with the cutter without having to crane over the workpiece.*



the mortises with more traditional methods: on a drill press with a mortising attachment or with a plunge router and jig, like the one Tage Frid used in "Routing Mortises," *FWW* #30.

Once all the crossmember mortises were cut, I milled enough stock for the loose tenons. After crosscutting the tenons to length, I glued them into the mortises in the crossmember ends. I lightly clamped across die sides of the crossmembers when gluing the loose tenons in place, and usually got a light glue squeeze-out. I don't know if clamping is really necessary, but it is easy enough to do, ensures a good glue bond and doesn't take much time.

Next, I laid up the headboard and footboard on my benchtop and transferred the mortise (now tenons) centerline marks to the posts at the appropriate heights and locations. After mortising the posts (as shown in the bottom, right photo on the previous page), I routed the grooves for the panels. But before I cut the panels to their final dimensions, I dry-assembled the headboard and footboard and measured for the length and width of the panels. I always consider the time of year and the humidity in the shop and allow for expansion or contraction across the grain of the wood. Then I cut the panels to size and profiled the perimeter of the panels with a custom-made shaper knife that I ordered from the Freeborn Tool Co., 3355 E. Trent Ave., Spokane, Wash. 99202.

Once I was sure the panels fit properly in the headboard and footboard, I bandsawed the convex and concave curves on the two upper crossmembers. I laid out my curves by anchoring the ends of a thin strip of oak with a spline weight at each end of the rail, bending the strip until I got a pleasing curve and then tracing along the curve with a pencil, as described in *FWW* #71, pp. 42-45. After bandsawing the curves, I cleaned up the edges with a compass plane, a block plane and scrapers.

The 1 $\frac{3}{4}$ -in.-thick by 3-in.-wide bedposts are heavily chamfered on three of the four vertical corners to add visual interest to their otherwise rectangular shape. I set the angle of my chamfers on the tablesaw using a bevel gauge. Because the angle of the chamfer is greater than 45° (it's about 62°), I had to run the posts on edge through the tablesaw with the blade tilted 28°. Always use push

sticks to keep your hands out of harm's way during this operation. To remind myself that I am chamfering only three of the four corners, I determined the orientation of all four posts and marked the corners to be chamfered ahead of time.

After chamfering the posts, I made the mortises for the bed-rail fasteners with a  $\frac{5}{8}$ -in.-dia. bit on my horizontal mortiser. The mortises on the rails and posts are shallow, about  $\frac{1}{8}$  in. deep, to match the thickness of the fasteners. The next step is to square the corners of all eight mortises with a chisel. Don't panic if you discover that the male half of the hardware doesn't sit just right in the bed-rail mortises—you haven't made a mistake. If you recheck the fasteners, you'll see that the hooks that engage the two halves of the hardware protrude through the back side of the metal plate. I chucked a  $\frac{1}{4}$ -in. bit in the mortiser and made a narrow vertical groove, about  $\frac{3}{8}$  in. deep, in the center of the post mortises to allow clearance for the hooks on the rails. You could also drill or gouge out the bottom of the mortises to accommodate those bumps.

With this design, the box spring and mattress are supported by ledger strips attached to the side rails with plate-joinery biscuits, screws and glue. I used all three joinery methods because I didn't want the ledger strips to tear away from the rails. Gluing and screwing alone is probably adequate, but I used biscuit splines to locate the strips and to add some extra strength.

**Preparing for finishing touches**—Recently I have avoided using a belt sander for finish work. I've discovered that a properly sharpened and burnished Stanley #80 cabinet scraper will do the job more accurately and without the dust and noise of a belt sander. I scraped all the parts with the Stanley #80 (see the photo below), and used a flat cabinet scraper to prepare the surfaces for final hand-sanding with 120-grit and 220-grit aluminum-oxide open-coat sandpaper. Before I glued up all the parts that make up the headboard and footboard, I gave them a light coat of Watco Danish oil (available from most hardware stores), taking care to keep it off the tenons. Doing this ensures that the panel is oiled right up to its edges and makes it much easier to clean up glue squeeze-out after assembly.

After unclamping the glued up headboard and footboard, I checked them for any dings I might have inadvertently inflicted on the wood during assembly. As usual, I found a few and so I steamed them out using a damp cloth and a household iron. I then scraped and resanded the area prior to applying a second coat of oil. Once the bed was oiled and gone over two or three more times with 0000 steel wool, it was ready for delivery.

With the bed assembled, I laid 1-in.-thick poplar boards across the frame and on top of the ledger strips to support the box spring. The poplar boards are usually random widths—four or five boards, 4 in. or 5 in. wide by the required length—and evenly spaced along the bed's length. Many customers find a mattress or a Japanese-style futon to be quite comfortable and adequate without the bulky box spring. In such a case, you will want to adjust the mattress and rail height accordingly. When a box spring is not used, I lay more of the random-width poplar boards across the width, leaving a space of an inch or so between the boards. Then, if you turn your mattress over every so often, you can also flip the boards at the same time, to compensate for any bow they might develop.

And, by the way, if you don't think it's worth the trouble to make an all-wood bed frame, you can build the headboard alone and attach it to the various types of steel frames sold by department stores. You may, however, have to adjust the height of the bottom crossmember in the headboard to fit a particular frame. As with the mattress, check the sizes of the frame before beginning construction. □

*John McAlevey builds furniture in Warner, N.H.*



*A well-tuned Stanley #80 scraper quickly cleans up bed parts and even makes quick work of cleaning up sawmarks on the chamfers of the cherry bedposts.*