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Crossing Classical Lines

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- How-to photos with instructive captions.
- Tips to help you complete the project and become a better woodworker.

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Published in Woodworker's Journal "Practical Woodworking: Proven Projects, Tips and Tricks from Fellow Woodworkers"

$7.95

WJ142

Crossing Classical Lines

Getting a look of sophistication can sometimes be simpler than you ever imagined. The distinctive lines of this bed frame were achieved using basic joinery and one primary tool, the router. We've combined styles here as well as two wood species to add even more flair to this project.

Furniture projects generally fall into stylistic categories. There's Shaker, Scandinavian, Country and many other specific styles common to our woodworking repertoire. However, the design of this bed frame is quite unique; it's a hybrid that captures elements from two different styles. First, the overall design reflects strong influences from the Arts & Crafts period, particularly the designs of Frank Lloyd Wright. On the other hand, the bedposts are reminiscent of shapes frequently found on post-modern pieces. Of course the bed can be made from any number of different woods, but the contrast of honey-colored maple with the deep blood red of padauk creates a striking combination.

It's a treat to build such an elegant piece of furniture, especially once you discover how uncomplicated the construction is. The primary joint in this bed frame is a basic mortise and tenon made almost entirely with a router. With the addition of a table saw and a few hand tools, you can readily make this bed.

The construction took about 40 hours and the materials cost about $400. You'll need sixteen lineal feet of 3" x 3" maple for the posts, 30 board feet of 6/4 maple for the rails (milled to 1¼" thick), eight board feet of 1/2"-thick padauk and a small amount of 1/8"-thick padauk for the stripes in the posts and ball caps. There are a few other odds and ends in the *Material List* that you'll also need (see page 64). Bed rail fasteners and the 3"-diameter wood balls are available from Rockler Woodworking and Hardware.

We advise that you have your stock milled at a lumberyard. Our project builder planed his own material, and hefting around that thick maple got to be tiresome after three hour's work.

Cutting the Stock

When you get your planed material back from the lumberyard you can begin ripping the major bed components to width. Rip the side rails (pieces 1) and lower rails (pieces 2) to a width of 7" and cut the upper rails (pieces 3)

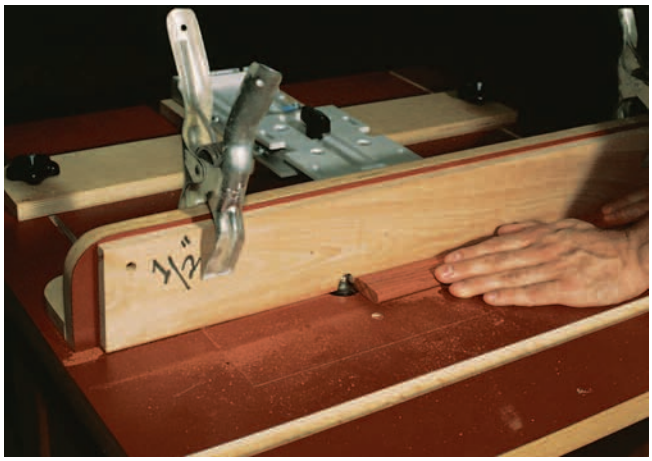


Figure 1: *Round over the edges on the padauk slats by raising the 1/4" bit so the outside tip of its curve is even with the table surface. Align the face of the fence with the outside edge of the bit's bearing.*

3" wide. Rip the 1/2"-thick padauk into 1½"-wide slats (pieces 4 and 5) and cut a 24"-long piece of 3/4"-thick padauk to a width of 5⅜" for the platforms (pieces 6) that sit on top of the four posts.

Before moving on, it's important to remember that all woods are toxic to varying degrees, and this is especially true of exotics. Always be sure to use a dust mask, wear a long sleeve shirt and possibly gloves, all depending on how sensitive you are to inhaling or contacting the fine dust you create while working with these woods. Padauk, for instance, can be a skin irritant. If you have a dramatic reaction to working with a certain wood, and this is possible with any species, contact your doctor immediately.

Once you've ripped these pieces to width, crosscut them to the lengths shown in the *Material List*. The lower and upper rail lengths include enough material for 1¼"-long tenons at both ends. Cut your bedposts (pieces 7 and 8) to length at this time too. Make sure your crosscuts are square as this will greatly affect upcoming steps.

Working at the Router Table

The edges of the padauk slats (pieces 4 and 5) are routed with a 1/4" roundover bit, which creates a total roundover of 1/2" on the slat edges. The advantage of this technique is the slats will fit perfectly in mortises routed with a 1/2"-diameter straight bit. Set up your router table with the 1/4" roundover bit and rout all the slat edges (see *Figure 1*). A small ridge will likely remain after routing the edges, so lightly sand the pieces to smooth the roundovers.

Replace the bit in the router table with a 3/8" roundover and rout the edges on the platforms (pieces 6) in a similar fashion, again sanding lightly to remove any ridges.

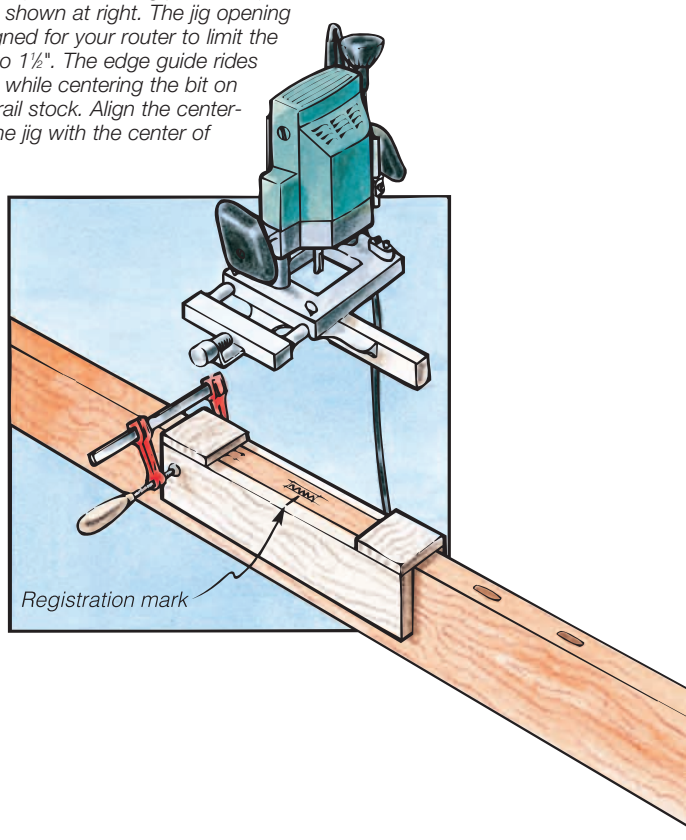
Now switch to a 1/8"-diameter straight bit in your router and set the fence 1½" from the bit's center. Raise the bit to a height of 3/32" and rout a groove centered in the front and back of the four bedposts (pieces 7 and 8). Proceed slowly since a 1/8" bit is somewhat fragile.

Before routing the mortises in the bedposts, rip the padauk inlay strips (pieces 9) to go into the grooves you just routed. Set your table saw blade to a height of 1/4" and rip eight strips 1/8" wide. Normally it isn't advisable to trap a narrow strip between the blade and the fence, but this material is so light and flexible that it's unlikely to shoot out of the saw as long as you maintain control of the stock. Rip the padauk to within a foot of its end, cutting the strips to fit the groove snugly, then reach around and pull the last few inches through the blade. Run a small bead of glue in each of the post grooves and press the inlay strips in place.

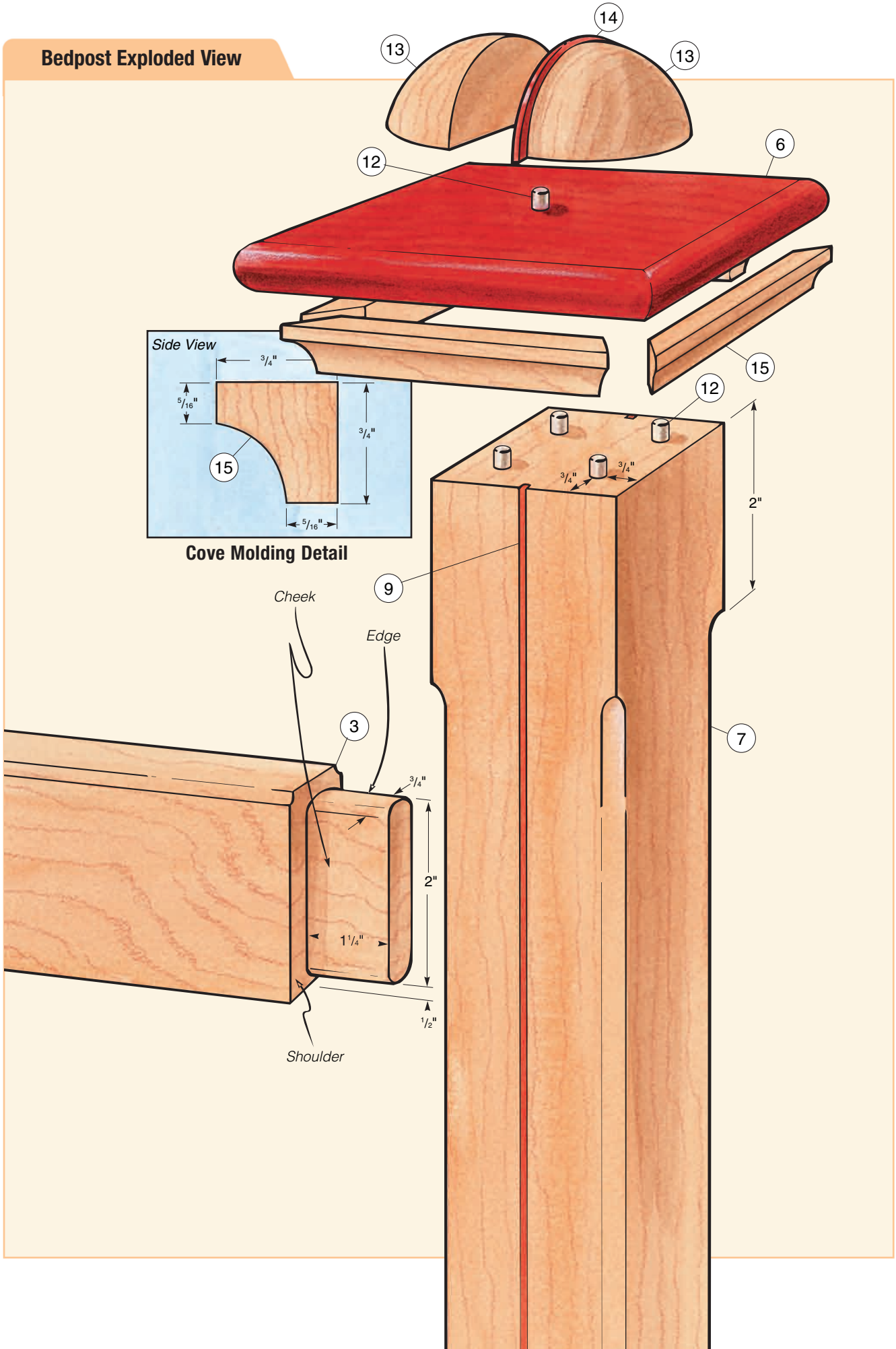
Routing Mortises

Routing the mortises in the upper and lower rails is tiring work. There are lots of cuts to make here for all the slats, and it takes concentration to remove the material in the right

Figure 2: *Simplify the mortising process by making the jig shown at right. The jig opening must be designed for your router to limit the length of cut to 1½". The edge guide rides against the jig while centering the bit on the 1¼"-thick rail stock. Align the centering mark on the jig with the center of each mortise.*



Bedpost Exploded View



Cove Molding Detail

places. The first thing you need to do is make a jig (see *Figure 2*) that limits the length of cut to 1½". The jig we made from scrap plywood is simple and easy to set up; just be sure to alter the spacing between the stop blocks to accommodate the size of your router's base.

Lay out the slat mortises on the rails (see page 64) and equip your router with a 1/2" straight bit. Adjust the router's edge guide to center the bit on the rail's edge. Line up the registration mark on the jig with the mortise location mark and clamp the jig to the rail. Set the router on the edge of the rail between the jig stops and plunge the bit into the stock to take a 1/4" deep pass, followed by a 1/2" deep pass to complete the mortise. Continue this process until all the slat mortises are cut in the upper and lower rails.

Sand the padauk inlay strips flush with the bedposts, then follow the drawing on page 64 to lay out the mortise locations in the posts. Precision really pays off here, so take your time and mark everything carefully.

Now chuck a 3/4"-diameter straight bit in your plunge router and adjust the edge guide to center the bit on the 3"-wide post. Set the depth of cut to 1⅝".

Select the best side of each post to face you when you stand at the footboard, which is the most frequent view of a bed from within the room. When routing identical pieces like the posts, make it a habit to rout them all with the guide riding against the same point of reference. For instance, always bear the edge guide against the outside face of the posts. This way any slight variation will be the same from post to post. Now take a number of increasingly deeper passes to rout two mortises in each post for the upper and lower rail tenons. You'll find the router is easy to control with the edge guide attached and that stops aren't necessary to control the length of your cut.

Once the post mortises are cut, install a 5/8" straight bit in the router and leave the edge guide set for routing the center of the posts. Adjust the cutting depth to equal the thickness of the back plate of the bed rail fasteners (pieces 10) and rout these shallow mortises in the posts (see *Exploded View* on page 62). Finish this step by squaring the corners of the mortises with a chisel to fit the slotted piece of each pair of fasteners.

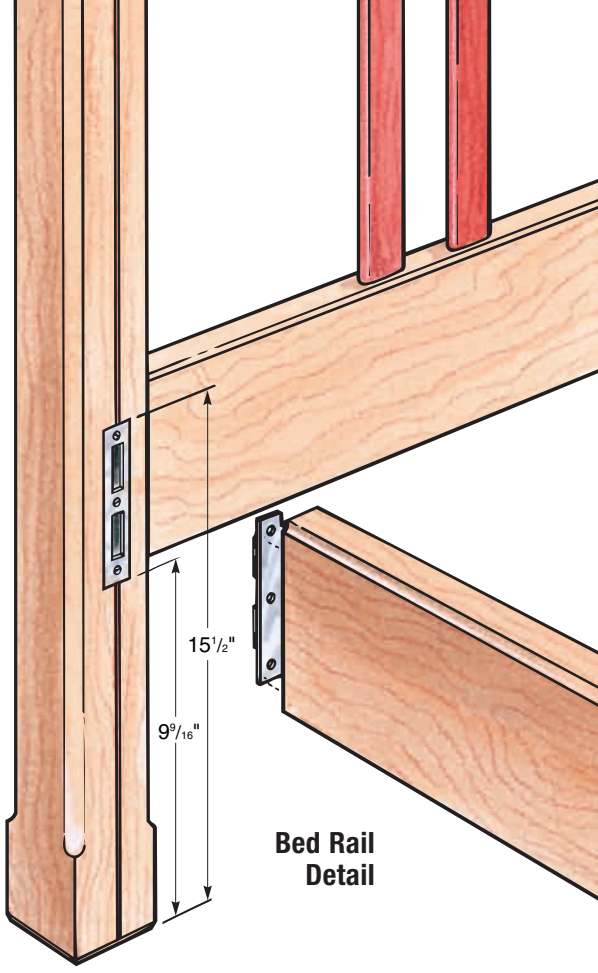
With a pencil, outline the slots that will engage the hooks on the other fastener piece and exchange the 5/8" bit in your router for a 1/4" straight bit. Now rout 1/4"-deep channels at these two locations within each mortise to accommodate the hooks on the mating fastener pieces.

Routing the Tenons

The rails are really too long and heavy to handle on a table saw while cutting their tenons, so use a router to remove the cheek material followed by a fine-cutting Japanese saw and chisel to cut the shoulders (see *Exploded View* on page 61).

Use a 3/4" straight bit in your router and set the edge guide to limit the cut to 1¼" from the end of the rail to the outside edge of the bit. Lower the bit 1/4" and pass the router over both sides of a piece of scrap to make sure the tenon fits the mortise. When you rout this way, don't define the shoulder with the first pass, but rather, work toward it and make the shoulder cut the last pass. Once you're satisfied that everything is correct, rout the cheeks for the eight rail tenons.

With a Japanese saw or other small, fine-toothed handsaw, cut the edge shoulders on every tenon, then



Bed Rail Detail

QuickTip

Tool Battery Disposal

Ni-Cad (nickel-cadmium) batteries contain mercury, which poses a serious threat to our groundwater. They're not welcome at the landfill, so don't be tempted to toss those dead tool batteries in the trash. Most cities have a system in place for dealing with them: call your courthouse or landfill office for proper disposal. Or call 800-8-BATTERY and get the name of a local retailer who will take them off your hands free of charge.

pare the shoulders square with a sharp chisel. The last step in forming the tenons is rounding over the edges with a file so they fit into the router-cut mortises. Use a medium-toothed cabinetmaker's file to round the edge corners, and you'll need to use a chisel to cut the small hump of wood that always remains at the inside corners of the shoulders after filing. Chamfer the leading edges of the tenons with the file so they slip into the mortises more easily.

Post and Side Rail Details

Before assembling the footboard and headboard, take care of a few minor details on the bedposts while they're still easy to maneuver. The first thing to do is lay out four dowel holes on the top of each post (see *Exploded View* on page 61) for securing the padauk platforms (pieces 6). Mark the locations and drill 1/4" holes 5/8" deep using a portable drill. Now insert 1/4" dowel centers into the holes and center the platforms on each post. When the platforms are positioned, press down on them to dent the wood with the dowel centers. Now drill 1/4" by 1/2" deep holes at these locations. Don't glue the platforms to the posts until after assembling the headboard and footboard.

The four corners of the posts and the top edges of all the rails are routed with a cove bit. On the rails this detail extends the entire length, but on the posts the routing is stopped short of the ends. Lay out the stopping points on the posts (3" from the top and 2" from the bottom) and chuck a 1/2"-radius cove bit in your router. Set the bit to cut 1/4" deep and rout the edges of the posts, stopping when you reach the end-point lines. Make your first pass a shallow one and stop slightly short of the lines. On the second pass cut full depth and rout right to the line. Try to avoid lingering at the line or you'll burn the wood—if this happens, fashion a round-tipped scraper to remove the burned wood. After the posts are done, rout the top edges of the rails from end to end.

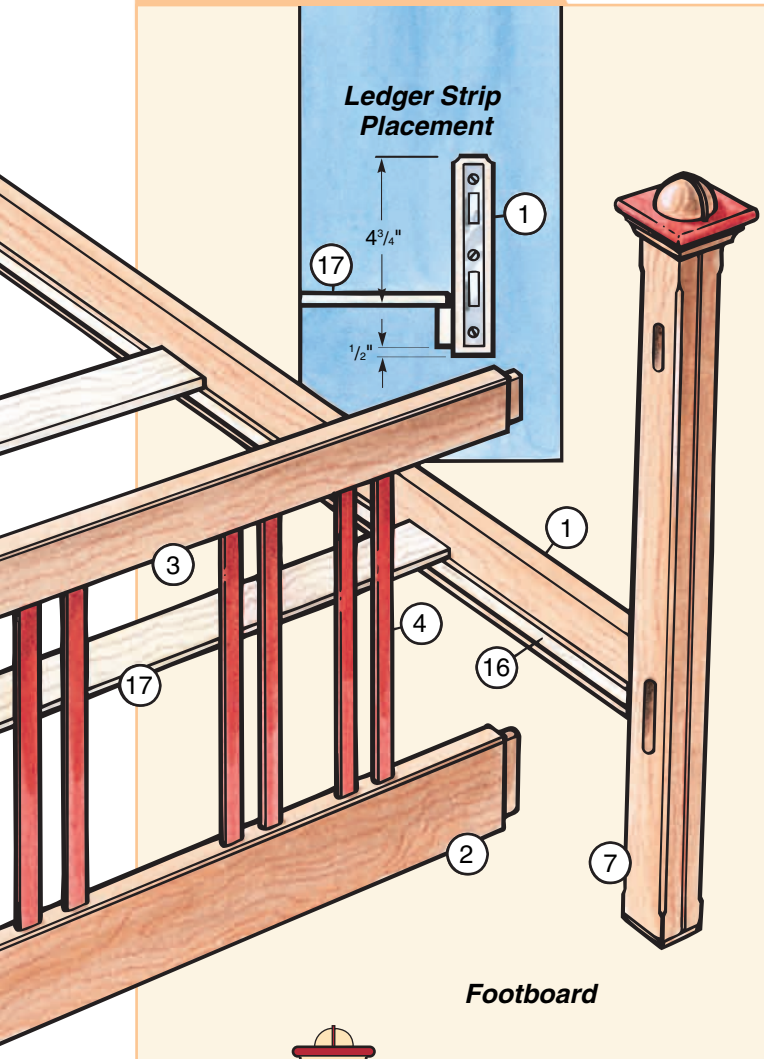
Figure 3: *Hold the side rail in a bench vise while routing the bed rail fastener mortises. Clamping a scrap board flush with the rail's end stabilizes your router during this cut. Remember, you also need to cut two deeper channels within the mortise with a 1/4" bit so the fasteners lay flat.*

Take care of one other small item by turning the posts upside-down and routing a 3/16" chamfer on their bottom edges. This makes the post appear to be set off the floor a bit and prevents catching the wood and chipping the corners when the bed is moved.

The ends of the side rails are also mortised to accept the hooked bed rail fasteners. Once again, this is easily done with a router, an edge guide and a 5/8" straight bit. Adjust the guide to center the bit on the edge of the 1¼"-thick rails and set the depth of cut to equal the thickness of the back plate on the fasteners. Now lay out the start and stop points on the ends of the rails (see *Figure 3*). Clamp on a wide auxiliary board so it's flush with the end of the rail, then plunge the bit into the stock and rout the mortise. Do this to both ends of each rail, then square the rounded ends of the mortises with a chisel. Now set the fasteners in place and give them a sharp blow with a hammer. When you remove the fasteners you'll notice two separate indentations caused by the stamped hook retainers on back of the fasteners. Rout 1/4" channels at these locations so the fasteners will sit all the way into the mortises as shown in the *inset* above.

Set the fasteners into the mortises

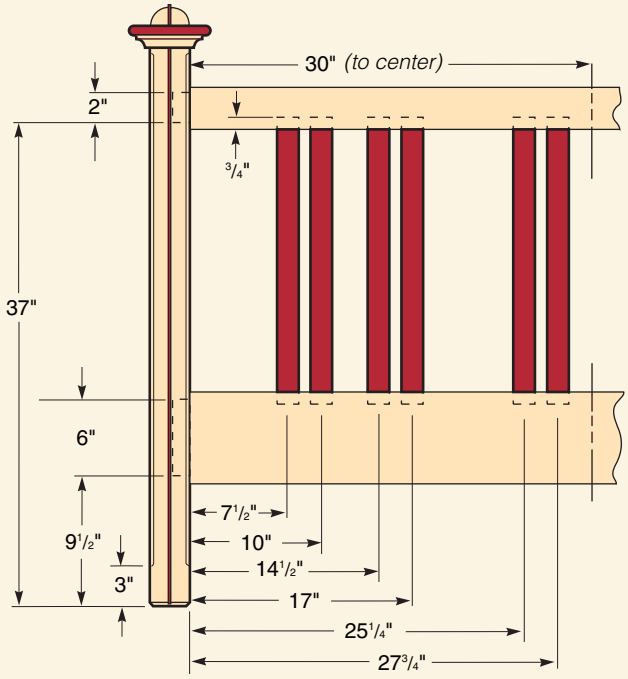
Bed Frame Exploded View



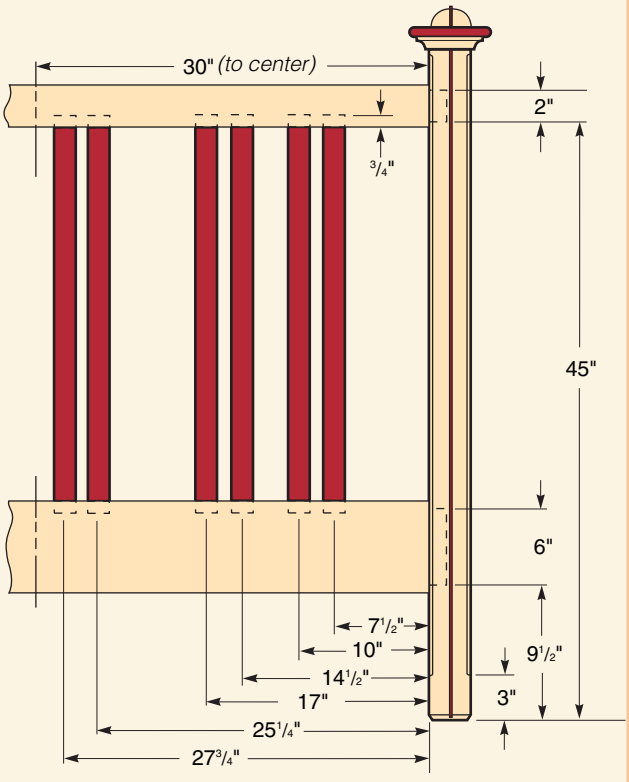
MATERIAL LIST – *Bed Frame*

		T x W x L
1	Side Rails (2)	1¼" x 7" x 80"
2	Lower Rails (2)	1¼" x 7" x 62½"
3	Upper Rails (2)	1¼" x 3" x 62½"
4	Footboard Slats (12: Padauk)	1/2" x 1½" x 22"
5	Headboard Slats (12: Padauk)	1/2" x 1½" x 30"
6	Platforms (4: Padauk)	3/4" x 5⅜" x 5⅜"
7	Footboard Posts (2)	3" x 3" x 43¼"
8	Headboard Posts (2)	3" x 3" x 51¾"
9	Post Inlay Strips (8: Padauk)	1/8" x 1/8" x 53"
10	Bed Rail Fasteners (1 Set)	6"
11	Bed Rail Screws (24)	#10 - 2"
12	Spiral Dowels (20)	1/4" x 1"
13	Maple Balls (2)	3" Dia.
14	Ball Dividers (4: Padauk)	1/8" x 1⅝" x 1⅝"
15	Cove Molding (16)	3/4" x 3/4" x 6"
16	Ledger Strips (2)	3/4" x 1¾" x 80"
17	Stretchers (4)	3/4" x 3½" x 61½"

Footboard



Headboard



and mark their screw hole locations. You might as well do this for the posts now too. Drill 2"-deep pilot holes with a 5/32" bit, which should be just right for #10-2" flathead wood screws (pieces 11). However, don't install the fasteners until after the bed is finished.

Assembling the Head and Foot Boards

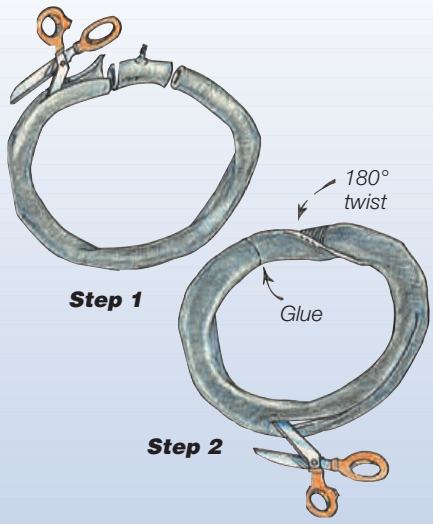
Prior to joining all the pieces in the headboard and footboard, sand everything to 150 grit. Be sure to ease all the edges on the maple, but don't lose the definition on the coved edges.

Organize all the parts for the footboard first, and be diligent about it. Once you've started putting glue in the mortises, you won't have time to go looking for a slat.

Padauk, due its oily composition, sometimes fails to bond well with conventional glues. To overcome this problem

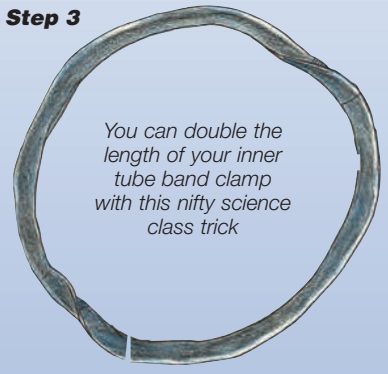
Figure 4: *Use a V-jig for cutting the maple balls in half, making sure the ball fits very tightly. Cut slowly and stop the saw when the blade exits the ball, then reach in and remove the two halves.*

QuickTip



Giant Band Clamps

Although bicycle inner tubes make great band clamps, sometimes even they are not big enough. Here's a science class trick that will double their size. Cut out a couple of inches to remove the valve, then split the remainder lengthways. Now bring the ends together, and twist one a half turn (180°). Apply 2" of tire patching cement to join them and, after it dries, make another cut and slice all the way around the circumference. When the cut returns to the starting point, you'll have one big rubber band, not two small ones, thanks to the twist you put in earlier.



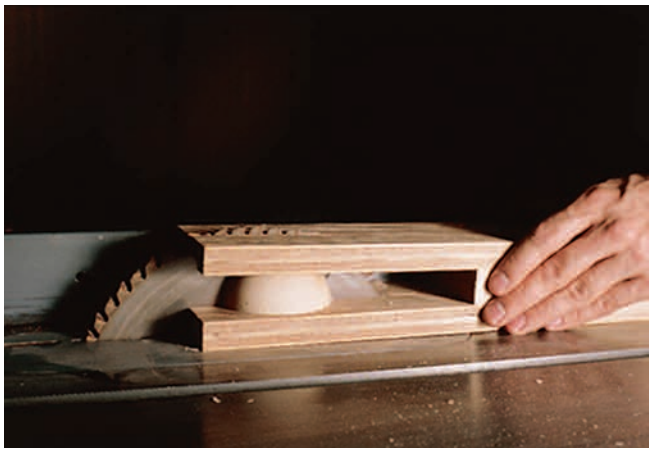


Figure 5: *A V-jig with only the top piece grooved is used for quartering the ball on a table saw. Once the ball is completely within the blade body, stop the saw so you can remove the quartered pieces.*

Figure 6: *A wooden handscrew clamp works well to assemble the ball caps. Tape a folded piece of sandpaper to the ends of both jaws to get a better grip and to protect the maple ball sections.*

use epoxy. Begin spreading glue into all the slat mortises in the lower and upper rails and inserting the slats into the lower rail. Now pull the upper rail onto the other end of the slats, then spread glue in the post mortises and on the rail tenons. Pull the posts onto the rails and check for squareness by measuring the diagonals. Use long bar clamps to hold everything together until the glue sets. At this time glue the platforms onto the the footboard posts using 1/4" x 1" long dowels (pieces 12). Set the footboard assembly aside and follow the same procedure for the headboard.

Making the Ball Caps

To safely cut the 3"-diameter maple balls (pieces 13) you must make a couple of simple V-jigs; one for cutting the balls in half on the band saw (see *Figure 4*), and another for quartering them on the table saw (see *Figure 5*). Size each jig spacer so the balls are squeezed tightly.

Clamp a fence to your band saw table so the blade is centered on the V-jig and push a ball into the jig with its end grain pointing right and left. Slowly engage the blade and cut through the ball. Turn off the machine as soon as the blade exits the ball, then reach in and remove the two halves. Don't try pulling the jig back through the blade as the tension on the ball will have closed the kerf and you'll just untrack the blade.

Now cut each ball half into quarters using the table saw jig. Adjust the saw's fence to center the blade on the jig, then proceed with the cut until the ball is just past the teeth and resting against the body of the blade. Stop the machine and remove the ball quarters from the jig. Again, don't try to back out of the cut or continue through the other side of the blade because the teeth, which are wider than the blade body, will shave more material off the ball.

Next, cut out the dividers (pieces 14) that go between the quartered maple balls. Lay out two 3¼"-diameter circles on 1/8"-thick padauk and draw a center line through them. Now cut out the circles and split them in half on a band saw.

Put glue on one face of each quartered ball and align each pair with a divider (see *Figure 6*). We used a wooden handscrew clamp with sandpaper folded and taped on the ends of the jaws to press the cap assemblies together. The sandpaper helps keep the clamp from slipping. A band clamp could also work. Once they're assembled, refine the edge of the divider on a drum sander, then sand the cap. Use a belt sander to smooth the bottom of the caps.

Use a center finder to position a dowel hole on the bottom of the four caps. You should also find the center of each post platform. Drill a 1/4" by 1/2"-deep hole at each of these locations and glue the caps to the platforms with a dowel (pieces 12).

Adding the Final Details

The next construction step is making the small cove moldings (pieces 15) that fit under the platforms. Use two pieces of 3/4"-thick maple that are at least 3" wide and 24" long and rout a 1/2"-radius cove on their long edges. Now, with the table saw fence set 3/4" from the blade, rip the edges off the boards. Miter the strips to surround the top of the posts and glue them in place, holding them to the platforms with spring clamps. You can use small brads if you're having trouble holding the

molding with clamps.

The last detail on the bed frame is adding the ledger strips (pieces 16) along the inside of the side rails. Glue the 1¾"-wide strips 1/2" from the bottom of the rails. Once the glue dries, cut the ends of the strips flush with the ends of the rails and use a chisel to chamfer their sharp edges. Make four stretchers (pieces 17) to reach from rail to rail for supporting the box spring. Just use pine 1" x 4" material for these pieces, cutting them to fit between the rails while resting on the ledger strips.

Finishing Up

Sand everything through 220 grit before applying a finish. We applied Nordic Oil, which is a tung oil mixture that builds to a nice luster in three or four coats. Apply the first two coats with a brush, wiping off the excess each time about fifteen minutes later. After the first two coats, sand the entire frame with 400-grit silicon carbide paper to remove any fine particles caught in the finish and apply another thin coat with a cotton rag. Add a fourth coat if you want more gloss.

You could use any other clear finish for this project, if you prefer. Varnish, lacquer or blonde shellac would also highlight the grain and contrast.

Screw the bed rail hardware into their mortises and mount the rails to the posts. Now set the four stretchers so they span between the ledger strips, and drop in your box spring and mattress.

A good router is, without a doubt, the key tool required for constructing this bed frame. With the addition of a table saw you can complete almost every step of the process, and the result, as you can see, is an elegant, sophisticated piece of furniture.

A winning combination of geometric shapes and color contrast make this bed appealing to see and to touch. Rugged maple construction ensures that it will stand the test of time, too.