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Hoopback Garden Bench

In this plan you will be getting:

- Step by Step construction instruction.
- A complete bill of materials.
- Exploded view and elevation drawings.
- How-to photos with instructive captions.
- Tips to help you complete the project and become a better woodworker.

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

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WJ088

Hoopback Garden Bench

Graceful curves make the style of this bench timeless, while reclaimed cypress lumber will stand up to the worst weather, season after season. As far as outdoor projects go, this bench requires a fairly ambitious effort and several weekends of time to complete, but its rugged construction will be worth all your efforts.

If your patio seating amounts to a couple of plastic chairs or straddling a picnic bench, maybe it's time to add one of these garden benches to your list of options. At more than five feet long, it will easily seat three adults. The backrest's gentle angle and close spacing of the seat slats means it's also quite comfortable.

We could have simplified the project's design by incorporating fewer curves, but a curvy bench seems to harmonize well with the irregular shapes of outdoor spaces and flowerbeds. The armrests and crest rail, in particular, make the bench feel more organic, informal and inviting.

A weather-resistant wood species is a must for this project. Our author used reclaimed sinker cypress (see *tint box*, page 98), and it was a pleasure to build with. If you've never tried it, cypress cuts, routs and sands similar to cedar or redwood. It's not oily, has a pleasant odor and glues up without issue. Take the usual precautions when cutting or routing to minimize end grain tearout and splintering.

The author fixed a leg template to each leg blank and left it there for the entire machining process. Drill the mortise for the seat rail before you cut the back leg out of its blank.

Templates and More Templates

Laying out and assembling this bench will go much easier if you start with some full-size patterns and templates. Make a full-size gridded pattern of the bench's end view—it'll be a real help for positioning the armrests and setting up the rail angles. You should also fabricate hardboard templates for the crest rail, back leg, armrest (both side and top views), seat rail and front rail. The templates will be handy for locating mortises and for template-routing the rough parts to final shape. Use the *elevation drawings* printed throughout this article to make these shop aids. It's worth the fuss.

Making the End Frames

Get rolling on this project by building the end frames, which consist of the front and back legs and the seat and lower rails (pieces 1 through 4).

Start with the back legs. Use your back leg template to draw the leg shapes on some 8½"-wide stock. Orient the leg shapes so the longest flat edges of the legs line up with a stock edge. At this time, we suggest that you stick the template to each leg blank with hot-melt glue or carpet tape. Mark and cut the seat rail mortises using whatever machining method you prefer (see *photo*, above). We drilled them out with a Forstner bit. Cut out the leg shapes, and refine them with a piloted, flush-trim bit in the router table. It will save

LOWDOWN ON SINKER CYPRESS

During the late 1800s and early 1900s, loggers used rivers for transporting logs to lumber mills. In Southern states much of this timber was virgin cypress, ranging in age from 300 to 1,200 years old. Some logs sank while in transit, where they've remained largely preserved under layers of mud and silt. Krantz Recovered Woods, our lumber supplier for this bench, harvests these "sinker" logs from Louisiana lakes and rivers. The logs are sawn into boards and beams, then thoroughly air-dried before they're sold.

Recovered "sinker" cypress logs remained largely preserved under layers of oxygen-poor mud and silt for over a century.

Virgin cypress trees matured slowly in dense, ancient forests. Recovered logs exhibit a whopping 30 to 50 annual growth rings per inch! The trees in today's second-growth forests average only five to 10 rings per inch. Higher ring counts make antique cypress exceptionally stable, fine-grained, largely free of knots and naturally insect- and rot-resistant.

Krantz offers sinker cypress in 4/4, 8/4 and beam thicknesses in widths up to 12" and in lengths up to 30'. Prices range from $4 to $8 per BF, plus shipping. To learn more or receive a price quote on lumber, call Krantz Recovered Woods at 888-242-1050, or visit them on the web at: www.KrantzRecoveredWoods.com.

To rout the angled shoulders on the back legs' top tenons, make a jig that registers the angles and clamp it to both legs. This way, you can mill them in one setup. A rub collar on your router can follow the angled jig shapes to cut the shoulders. Flip the legs over in the jig to make the second set of angled shoulders.

you loads of sanding time. Cut the lower rail mortises with a router, 3/4" straight bit and edge guide. Both rail mortises are offset on the legs to create 1/4" shadow lines between these parts.

Turn to the top leg tenons next. Notice in the *drawings* and in the *inset photo* (below), that the front and back shoulders are angled to accommodate the curved crest rail. The bent leg shape won't allow for cutting these angled shoulders on a saw, but you can rout them with a simple jig, rub collar and straight bit (see *photo*, left). The other pair of square shoulders and cheeks on these tenons can be trimmed to shape with a band saw.

Both the seat rail and lower rails have angled tenons where they attach to the back legs. Cut the rails to size now (but don't cut the seat rail arches yet), and make the angled shoulders of these tenons on the table saw with a wide dado and the miter gauge set to 75°. Cut the short cheeks and shoulders on the band saw. Make the straight front tenons on these parts in the usual way, then cut the seat rail arches. Flush-trim the arches at the router table using the seat rail template as the bearing guide.

The front legs have tenons on top with angled shoulders similar to the back legs. Since these legs are straight, cut the angled shoulders at the table saw with the miter gauge set to 75°. Trim the front and back shoulders and cheeks to shape at the band saw.

Wrap up the front leg joinery by cutting mortises for the seat rail, front rail and lower rail. Keep the orientation of the front legs clear as you mill these

mortises—the legs are mirror images and not identical.

Dry-fit the end frames, then give the parts a good sanding. After that, ease the edges and glue up the frames.

Making the Seat

Follow the *Material List* on the next page to cut the front and back rails and the seat supports (pieces 5 through 7) to size. Mill tenons on the ends of the front rail. Attach the front rail template temporarily, trim the broad arch about 1/16" proud of the template edge, then refine the shape with a flush-trimming bit and your router.

The back slats fit into a series of individual mortises in the back rail. Use the *Elevation Drawings* on page 105 to lay these mortises out, and mill them. Some bench designs will substitute a long, continuous mortise here and separate the slats with spacer blocks, but our author wanted to minimize exposed horizontal glue lines wherever possible. The fewer joints where water can soak in and cause trouble, the better.

The back ends of the seat supports are angled to hold

The back slats fit into individual mortises in the back rail. A hollow chisel mortiser is the perfect tool for this repetitive chopping task. Or, you could cut them with a plunge router fitted with an edge guide.

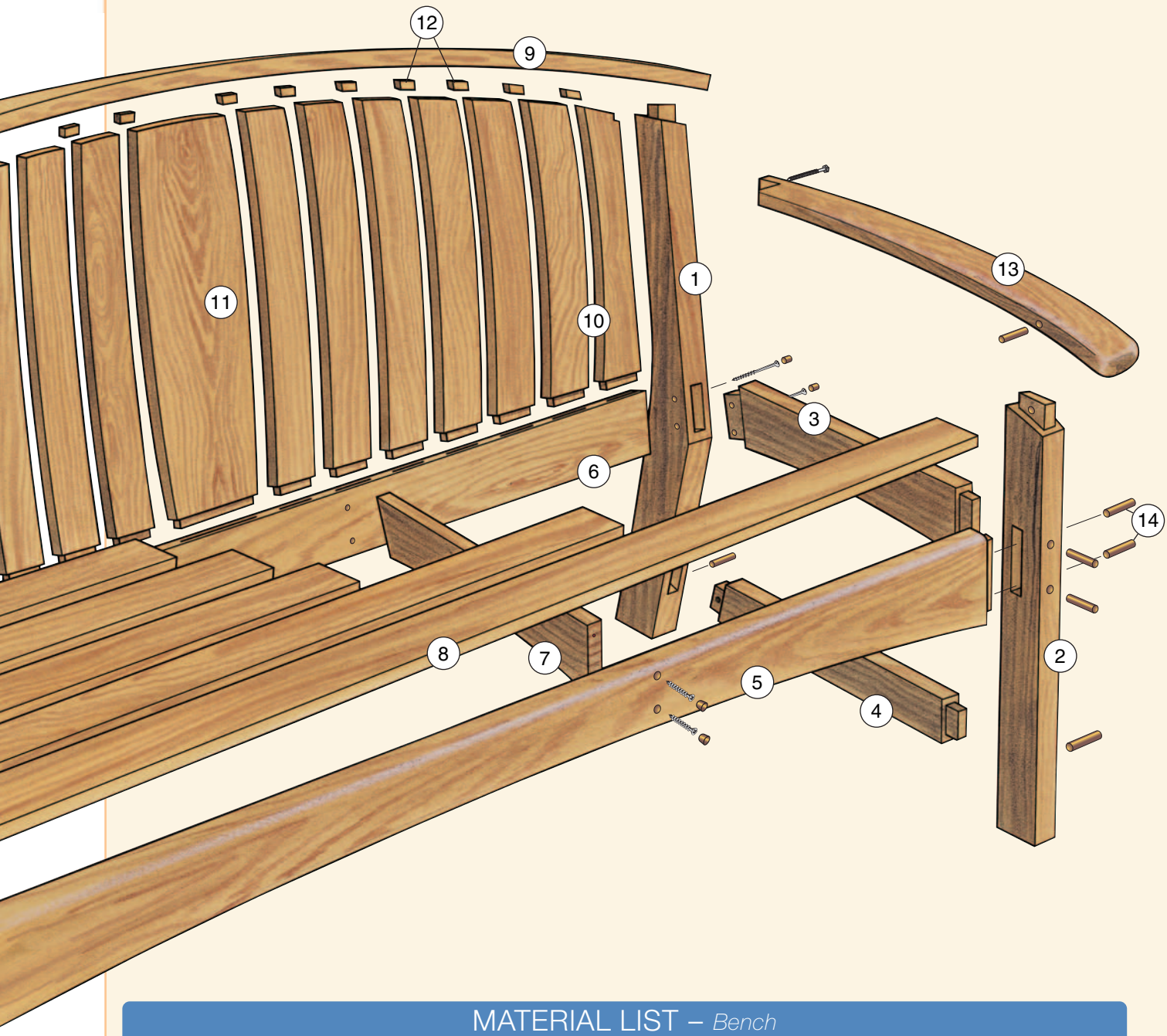
QuickTip

Storyboards Keep Part Ordering Clear

Large assemblies with numerous parts can quickly get out of hand, so the pros know the value of a storyboard to keep everything organized. This can be as simple as a large sheet of paper or hardboard laid on the workbench, with a full-size template drawn on it. The template shows how the parts will be oriented to each other after assembly, and a good template can even be used to take measurements while you cut parts to size. Hot glue small guide blocks to the template, to help line up the larger parts.

Rout the shallow step of the crest rail's continuous slat mortise first. Plow it from one back leg mortise to the other. Then mill the 3/4"-deep stopped portion of the slat mortise with the same bit and edge guide setup.

Bench Exploded View

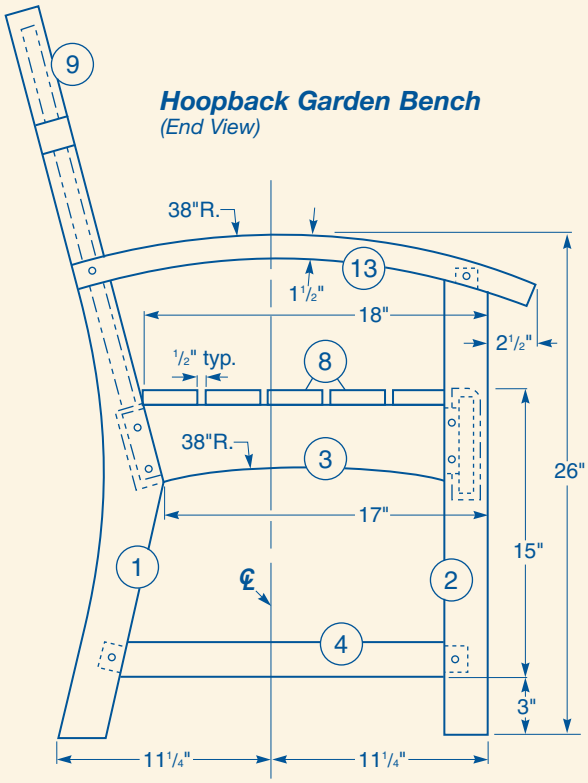


MATERIAL LIST – *Bench*

		T x W x L
1	Back Legs* (2)	1¾" x 8½" x 33"
2	Front Legs (2)	1¾" x 2¼" x 24¼"
3	Seat Rails (2)	1½" x 4" x 17¾"
4	Lower Rails (2)	1½" x 2" x 19½"
5	Front Rail (1)	1½" x 5¾" x 65"
6	Back Rail (1)	1½" x 4" x 62½"
7	Seat Supports (2)	1½" x 2¾" x 16¼"
8	Seat Slats (5)	3/4" x 2¾" x 66"

		T x W x L
9	Crest Rail* (1)	1¾" x 8¼" x 71¼"
10	Narrow Back Slats* (14)	3/4" x 4" x Varies
11	Wide Back Slat (1)	3/4" x 7" x 21"
12	Back Slat Spacers (14)	3/4" x 3/4" x 1"
13	Armrests (2)	4"* x 4½" x 25"
14	Dowel Pins (30)	3/8" Dia.

**Width dimensions are prior to shaping*



CYPRESS DOWELS

Where can you find cypress dowels? In your scrap bin. Make your dowel pegs at the router table with a 3/8"-diameter bullnose bit. Clamp a scrap tunnel against the fence to keep the dowels from chattering during milling. Run strips of square stock through the tunnel twice to round half of the curvature with each pass.

the back rail in the same plane as the crest rail. This way, the back slats will fit into straight, rather than angled, mortises. Attach the seat supports to both long rails with pairs of countersunk 4" deck screws at each joint. The top edges of the seat supports should be flush with the back rail's mortised edge, but be careful that the supports attach 3/4" down from the top edge of the front rail. This way, the seat slats will align with the top edge of the front rail.

Now join the front and back rails to the end frames to erect the bench seat. The back legs attach to the back rail with pairs of countersunk 4" screws. Glue the front rail tenons into their mortises. Line up this center bench subassembly so the back rail and seat rails align properly, as shown in the *drawings*.

Cut the five seat slats (pieces 8) to size, and round over the edges and ends. Instead of attaching these slats by driving screws down into the rails and seat supports, use dabs of water-resistant glue to tack them in place, then drive weather-resistant 1½" pocket screws up from underneath (see *photo*, page 104). It's a good way to avoid rows of unsightly wood plugs on the seat slats.

Moving on to the Back

The curved crest rail (piece 9) is easier to machine while it's still part of a wider, flat-edged blank. Stick the template to your stock so the bottom curve faces up and the pointed tips are flush with the stock edge. Cut the crest rail's inner curve and trim it flush with a router. The back slats fit into a continuous groove in this curve. Refer to the *Elevation Drawings* on page 105 to see how it steps from a depth of 5/16" to 3/4" for most of the length. The shallower part of the mortise helps keep the back leg mortises strong while still hiding the top ends of the endmost back slats. Set up your router and edge guide to cut the 5/16" mortise depth first, and mark the back leg mortise locations. Rout the shallow portion of the step from one leg mortise to the other (see *photo*, page 99), then continue to hog out the deeper slat mortises to a depth of 3/4", stopping 1¾" from each of the back leg mortises.

With the continuous mortise completed, bore the back leg mortises on the drill press with a 1¼"-diameter Forstner bit, and chisel the corners

Drawing parallel curves on the back slats is easy if you group the slats together in a jig. Make a template with a curve based on a 9-foot radius, and trace the curves onto the slats using the template. Shape the slat jig so the top edge matches the crest rail mortise curve. This way, you can scribe the slat top curves as well.

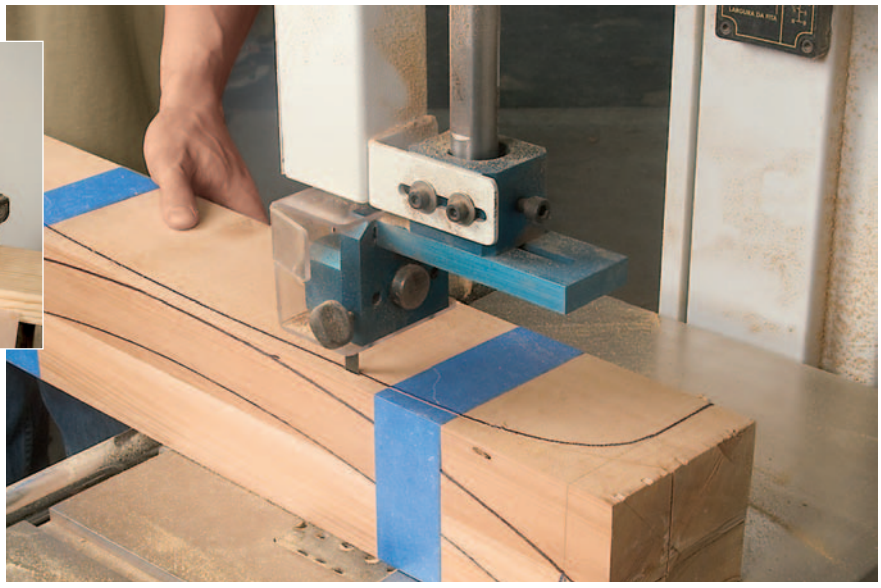
PROTOTYPING

Initially, our author wasn't sure which armrest style would look best on his bench, so he made several prototype armrests from scrap (above). This is a great way, especially on a chair or bench project, to help you settle form, function and ergonomic issues.

square. The flat bottom edge of the crest rail blank will ensure that these two mortises are square to the back legs. Once the leg mortises are done, finish cutting out the crest rail, rout it flush to the template and ease the edges with a ¼" roundover bit.

The back slats start out as 4" or 7" straight-edged blanks but end up curved along both long edges. We tackled the task of marking these curves by butting the narrow and wide back slats (pieces 10 and 11) next to one another inside a jig (see *Back Slat Jig*, page 107). First cut the bottom tenons on the slats, then set them in the jig whose top curve matches the shape and position of the crest rail mortise at full depth. Then mark the curved top line (which determines the slat length as well) using the jig. When you're done, flip the slats over and

Cut out a portion of your full-sized bench end view pattern to make an alignment jig for drilling the armrest mortises. The goal here is to cut these mortises so the legs meet the armrests squarely, despite the curve.



Sawing the armrests to shape is a two-stage technique. Cut the side profile first, tape the off-cuts back in place, then cut the top profile (shown here). Once they're shaped, clamp the armrests in a drilling jig (see inset photo, left) to drill out the front leg mortises.

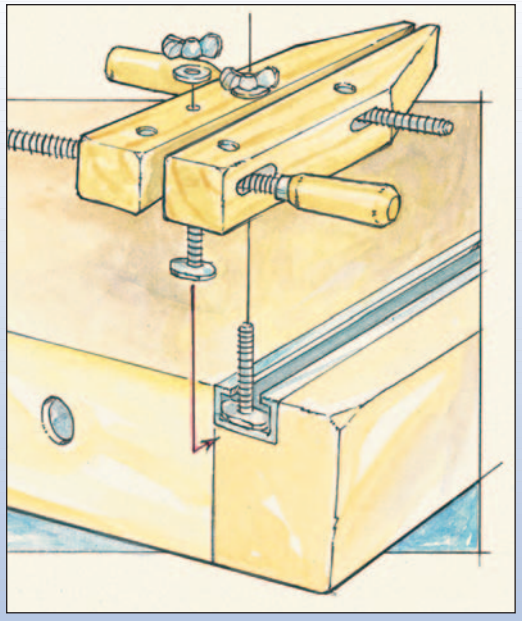
rearrange them in the jig so the curved cutoff line shows on top. Use a short template in the jig to draw the curved edges on the slats, one after the next. All these curves match those on the center slat (see top *photo*, previous page). Index the curves on the slats so that each finished slat will be 1" apart. Make the center slat 6" wide and the other slats 3" wide. Leave the endmost slats flat on their outer edges where they'll meet the back legs.

Gang-cut the narrow slats in stacks of three or four on the band saw, then cut them to length individually. Smooth the slat edges. Note in their *elevations* on page 105 that the endmost slats need to be notched at the top corners to fit into the stepped crest rail mortise where it changes depth.

QuickTip

Instant Workbench Vise

Most workbenches have two vises that allow you to work at either one side or an end. If your bench only has one vise at the end, here's a way to add a side vise wherever you need it. Rout a slot along your bench and embed a length of metal T-track to hold a couple of 10" handscrew clamps. Then drill a hole in each clamp and insert a T-bolt that fits in the track. A wingnut makes adjusting easy. Sliding one clamp in from each end gives you an instant vise.



Test-fit the slats and crest rail on the bench. When it all assembles without force, slip the slats into the back rail and crest rail mortises dry, but glue the crest rail onto the back leg tenons. Cut slats spacers (pieces 12) to size, and use dabs of glue and galvanized finished nails to pin them into place in the long mortise.

Adding the Armrests

Make blanks for the armrests (pieces 13) by building up two thicknesses of 8/4 stock. Notice that the final armrest shape is curved both lengthwise and widthwise. Here's how to sculpt the shape: Use your Armrest Side View Template to draw this portion of the curvature, then band-saw the shape. Save the offcuts and tape them back in place to reform the blanks. Now, use your Top View Armrest Template to mark this dimension of the curvature onto the blank. Saw the armrest to shape here, and remove all the offcuts (see top *photo*, page 103).

If you made a full-size end view pattern of the bench, locating and making the armrest mortises for the front leg tenons will be a snap. Remove a portion of your pattern directly above the armrest and use it as the reference for making a drilling jig that holds the armrest square, relative to the front leg (see inset *photo*, page 103). Mount this section of your pattern to some thick scrap, cut the scrap to match your pattern curvature, and attach it to a scrap base. Then, boring the armrest mortises on the drill press will be a simple matter of clamping them against the jig, marking the mortise dimensions off the pattern and drilling the stopped mortise holes. Square up the mortises with a sharp chisel, and refine the armrest with a good dose of belt-sanding. Ease the edges with a 1/4" or 3/8"-diameter roundover bit .

Set the armrests against the front and back legs to determine where to notch the armrests so they fit around the back legs. Cut these notches out with a hand saw. Install the armrests with glue in the mortise and tenon joint and with a 1/4" x 2" countersunk galvanized lag bolt and washer to the back legs.

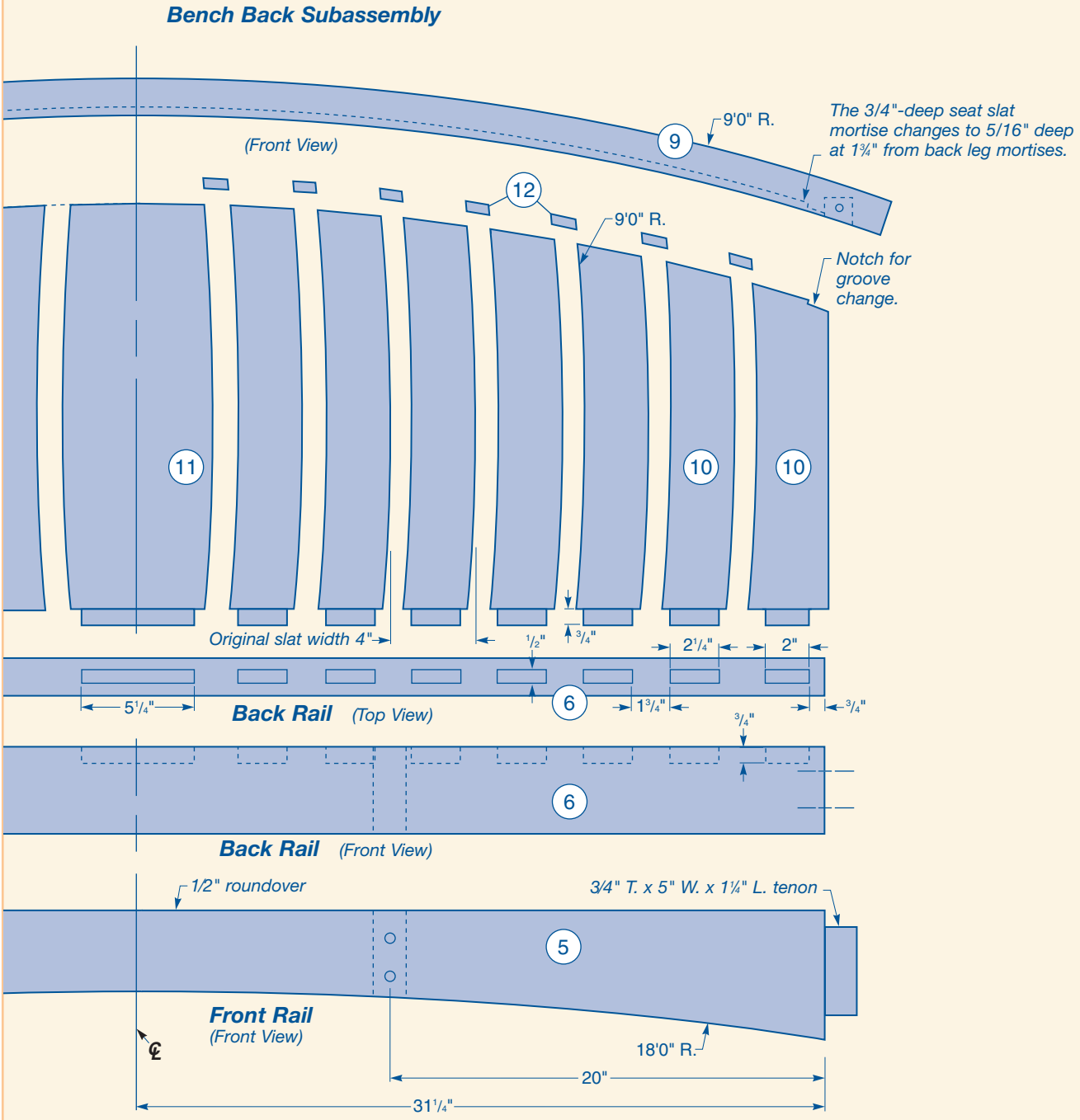
To hide the seat slat fasteners, drive them in from underneath. The author used a pocket-hole jig and weather-resistant pocket screws. Tack the slats in place first with glue.

Pinning the Joints

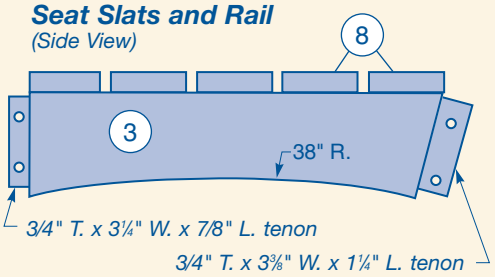
Glue alone will certainly hold these mortise and tenon joints for a long while, but eventually the glue might fail. As added insurance, it's a good idea to peg all the interlocking joints and plug the screw holes with 3/8"-diameter cypress dowel pins (pieces 14). You can't buy cypress dowels, but they're easy to make on the router table with a bullnose bit. Two passes through a scrap tunnel jig turns square strips into perfect doweling (see the *sidebar* on page 101 for details).

Trim the dowel pins and sand them flush, then give the bench a coat of penetrating wood finish to help preserve its color. All that's left now is to move your new bench outside, rustle up the tiki torches and start planning your next patio party.

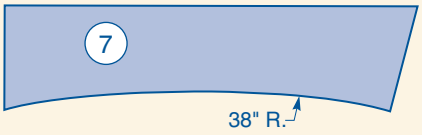
Technical Drawings



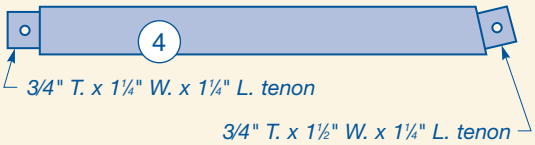
Seat Slats and Rail
(Side View)



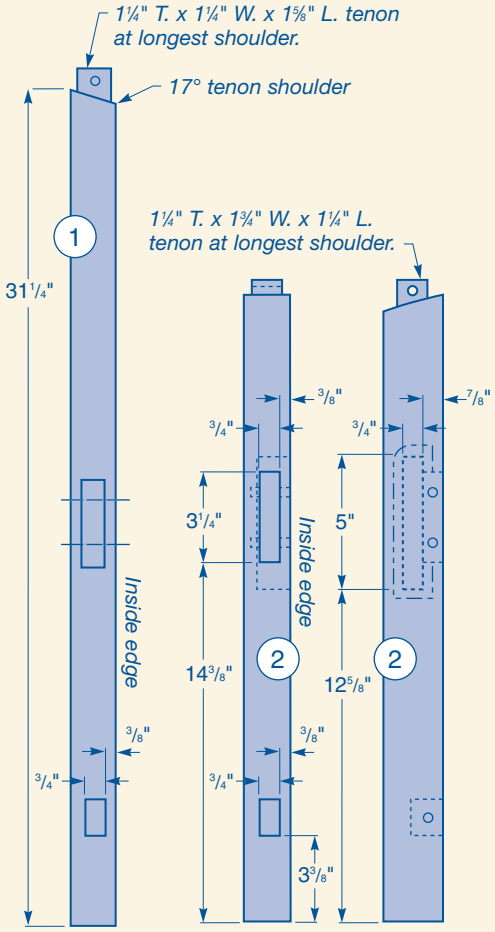
Seat Support (Side View)



Lower Rail (Side View)



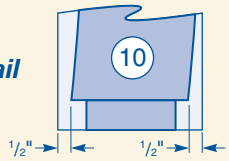
NOTE: Given the shape of the back legs, you'll need to cut the upper mortises without the aid of a table saw. Use a router, rub collar and jig to make these "template" style (see page 98). The angled mortises on the front legs can be cut conventionally, since the legs are flat.



Back Leg (Front View)

Front Leg (Front and Side Views)

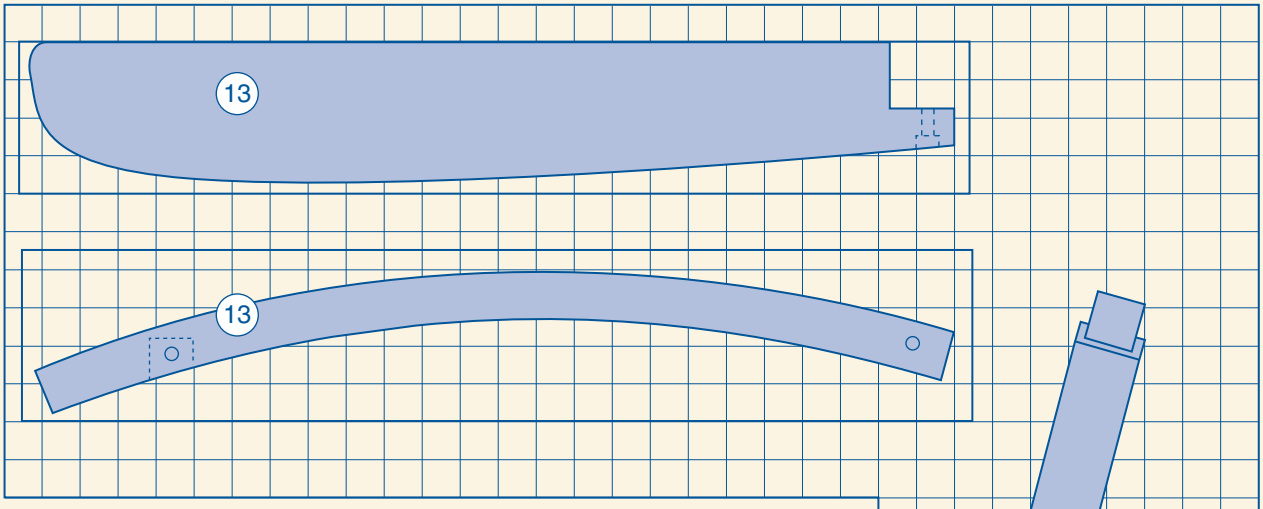
Back Slat Layout Detail

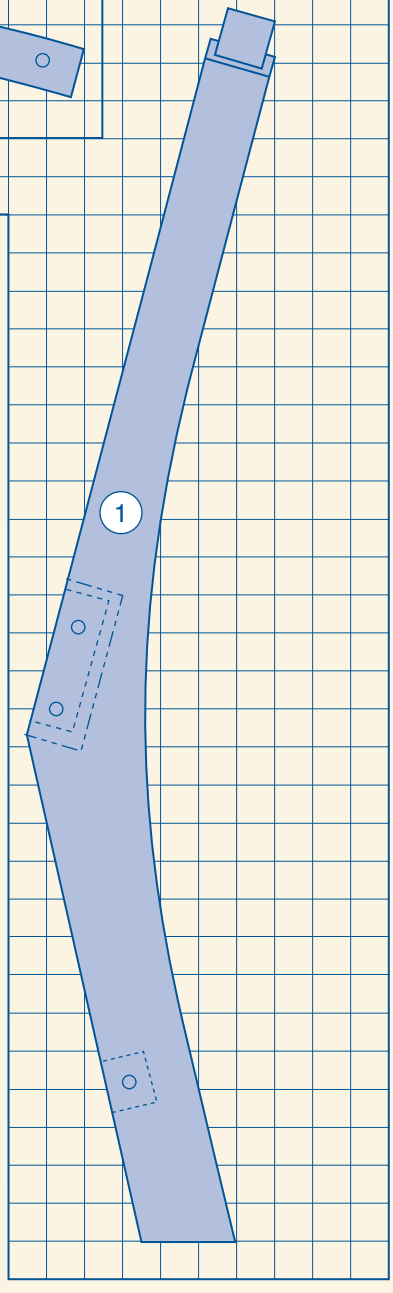


Although the back slats have curved edges, keep the bottom tenons straight. This way, they'll fit into straight mortises milled in the back rail.

Armrest *(Top and Side Views)*

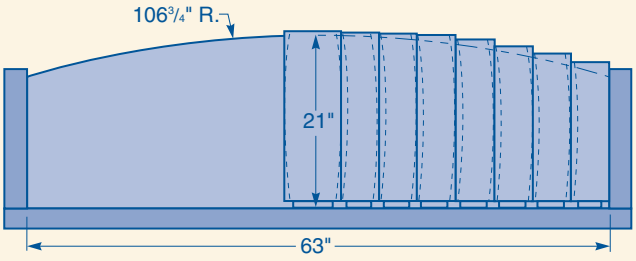
Each square equals 1"





Back Leg *(Side View)*

Back Slat Jig



The key to accurately forming the back slats is to create the jig shown above. The jig's curved edge is shaped to match the crest rail mortise groove. Lay the slats in the jig and mark their curved top ends, using the curved edge of the jig. Next flip the slats over and move them end-for-end on the jig so the curved line you drew is showing. Now use a template (see the photo on the top of page 102) to lay out the curved edges of the slats, represented by the dotted lines above. There needs to be a 1" space between the curved parallel lines.