Stout & Stylish Garden Arbor

Elegant design and rock-solid router-cut joinery combine to make this outdoor structure the envy of the neighborhood.

By Alan Turner

Project Design by
Alan Turner and Mario Rodriguez

When spring blooms, many woodworkers turn their attention from the shop to the garden. This arbor—plus its matching gate on page 30—takes dead aim at both passions. Handsome but without excess adornment, this Arts and Crafts-inspired project provides an inviting entrance to a thoughtfully landscaped backyard or patio area. And with any of three complementary fence ideas on page 35. you can enclose a garden or contain Fido's urge to romp and roam.

As a woodworking project, the arbor will teach you how to use your router with a few simple jigs to cut precise mortises and perfectly-shaped curves. Another surprising detail about this project is the shop-friendly subassemblies. Despite its impressive size, this arbor is designed so that you can build the parts when there's still snow on the ground and quickly install it outside as soon as the weather allows.

Note: Both the arbor and gate were made from grade "D and better" western red cedar. Cedar is a natural choice for large outdoor structures because it's lightweight, easy to work, and resistant to decay. To find suitable material, you may need to go to a specialty lumberyard. Pressure-treated pine, although less expensive and easier to find, isn't recommended for this project. Treated wood can be brutal on bits and blades. If you go with straight "select and knotty" cedar from your local home center, you can build the arbor for under $300.

Start with the arbor sides

Note: Begin this project by making the mortising templates explained in "Shop-Made Mortising Jigs" on page 24. Then follow the steps below.

1 CROSSCUT THE POSTS (A) AND STRETCHERS (D) TO LENGTH PLUS 4". (Add the below-frost length if sinking the posts to provide better support for the gate. See the **Cut List** for dimensions and the sidebar below.) Now, thickness-plane these parts to square off the rounded corners. Working in 1/16"-deep increments, plane one post face, rotate the post 90°, and plane the adjacent edge. Plane all four post and two stretcher faces before lowering the cutting head. After removing the roundovers, the finished dimension should be 3¼" square.

TIP ALERT

Look for stock that's free of any pith (center of the tree), especially when picking corner posts. Pithy posts will twist over time.

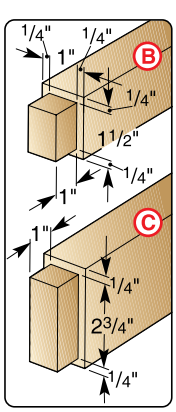
MATCH THE POST LENGTH TO YOUR NEEDS

The length of the post (A) given in the **Cut List** assumes that you're using a metal post base or post stake (refer to **Figure 8** on page 29) for post-footing options. If attaching the gate, setting the posts in concrete offers the most stable and permanent option. If you choose this method, buy posts that are long enough to be positioned below the frost line.

2 CROSSCUT THE FRESHLY-SQUARED POSTS (A) TO 83½". Include the frost-depth if appropriate.

3 STARTING AT 83½" DOWN FROM THE TOP END OF POSTS (A), MARK THE MORTISE LOCATIONS SHOWN ON FIGURE 1. Next, clamp all four posts side-by-side, as shown in **Photo A**. Make sure that the ends are flush before transferring the mortise locations onto the remaining three posts.

Marking out all the mortises at once is faster than using a tape and eliminates the errors that can sneak in when making repetitive measurements.



4 MORTISE THE POSTS (A) USING THE "LOWER RUNG" AND "UPPER RUNG" TEMPLATES in **Figure 2**. Begin by aligning the appropriate template with your mortise marks and clamping it in place. Chuck a ⅞" spade bit into a drill and remove the bulk of the waste as shown in **Photo B**.

Use a spade bit to hog out the waste material. Mark the mortise depth on the bit's shank to avoid drilling too deeply.

TIP ALERT

Make your mortises ⅛" deeper than the length of your tenons. The extra space gives excess glue a place to go—instead of oozing out the sides—when you insert the tenons

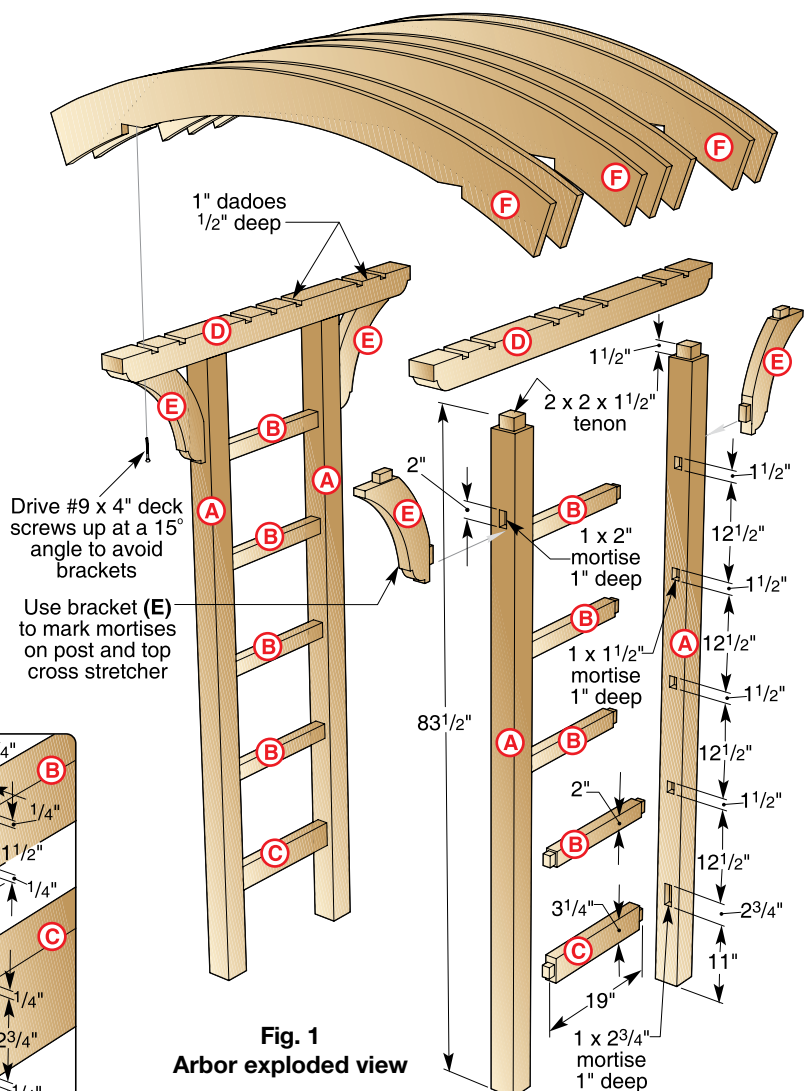


Fig. 1
Arbor exploded view

PHOTOS: MARIO RODRIGUEZ

The jig keeps the router from cutting outside the lines. Vacuum out the cavity and inspect your work before unclamping the jig.

5 NEXT, CHUCK AN UPCUT SPIRAL BIT (SEE THE CONVENIENCE-PLUS BUYING GUIDE) INTO YOUR HAND-HELD ROUTER. Position the tool on the jig, turn it on, and plunge the mortising bit to full depth at the corners of the mortise; then raise the bit and rout from side to side in ¼"-deep increments to clean up the mortise walls and bottom, as shown in **Photo C**.

After routing the four mortises for the lower rungs, use the upper rung template to rout the remaining 16 mortises.

TIP ALERT

Filing a small notch in the top and bottom of the jigs' mortise openings will make the layout lines visible without affecting the accuracy of your jigs.

6 REFERRING TO THE CUTTING DIAGRAM on page 29, rip enough 2x6 stock to make eight 19" long upper rungs (B) and two lower rungs (C). Saw off the rounded corners before ripping the rungs to final **Cut List** width. (Cut an extra upper and lower rung to fine-tune the tenon-cutting setups.)

7 CROSSCUT RUNGS (B AND C) TO FINAL LENGTH by clamping a stopblock to your mitersaw and making a test cut. Adjust as needed and make your cuts.

8 CUT THE UPPER (B) AND LOWER RUNG (C) TENON SHOULDERS ON THE TABLE SAW BY FIRST DRAWING A LINE 1" IN FROM THE END OF A TEST RUNG. Next, raise the blade height to ¼" and adjust the rip fence so that your pencil line remains after you cut. Then, using your miter gauge, test-cut a tenon and check your work. The shoulder-to-end dimension should be exactly 1". Now, cut the shoulders on all of the upper rungs (B) and lower rungs (C) as shown in **Photo D**.

SHOP-MADE MORTISING JIGS

To make the jigs, we used four 10 x 11" pieces of ¼"-thick hardboard, a combination square, glue and finishing nails or ¾"-long screws. When in use, the scrapwood cleats guide the router while the fence and clamps hold the jig in place on your work. The arbor requires four router mortising jigs: "Lower Rung," "Upper Rung," "Post," and "Corner Bracket." Build as shown and label each template to avoid confusion. Determine your router's offset and mark that distance outside of your mortise lines. (The offset is the distance between the outside edge of your router's base and the outside edge of your installed upcut spiral bit.) To do this, position the router so that the bit touches each inside corner of your mortise opening and draw a box around the penciled arcs to reveal the offset distance.

Next, attach the cleats to the base along the outside edges of the penciled box with glue and screws or finish nails. (As shown in **Figure 2**, open corners enable chips to fall free instead of clogging the jig.)

Finally, lay out a mock mortise on a piece of test scrap that matches the workpiece. Clamp the jig to the scrap and check that the mortise aligns with your layout lines. Make a test cut, following the instructions in step 4 on page 23 and step 5 above.

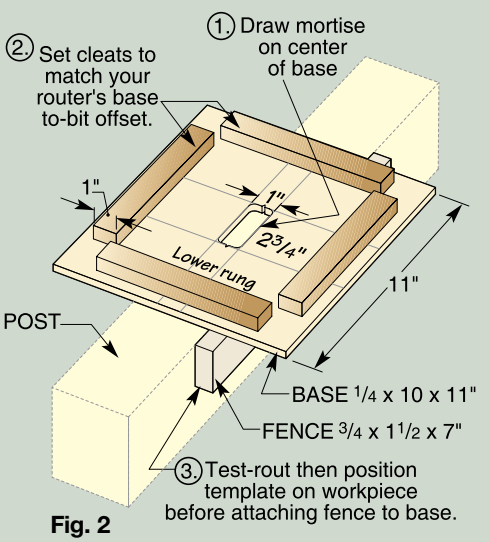
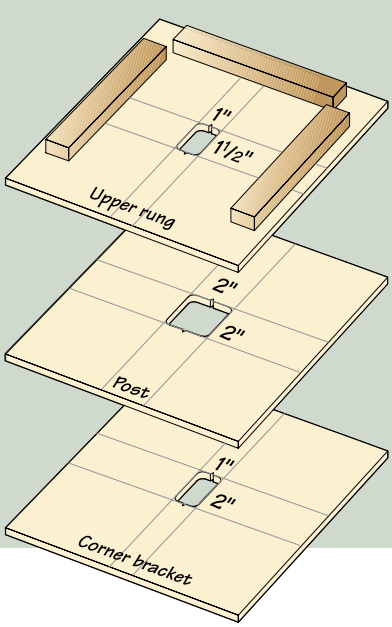


Fig. 2



Butt the ends to each rung against the fence to ensure even tenon shoulders. Use a miter gauge to guide the rungs over the saw blade.

Bandsaw the cheeks so the waste falls away from the fence. Use a stopblock to control the length of cut.

9 CUT THE RUNG CHEEKS ON THE BANDSAW BY STARTING WITH YOUR TEST RUNG. Adjust the bandsaw's fence and attach a stopblock on it, as shown in **Photo E**, so that the blade cuts the cheek and the waste falls to the outside. Finally, round the edges of the tenons with a file (see the **Buying Guide**) so that they'll slide into the mortises.

Insert a spacer between the fence and your workpiece to cut the even tenon shoulders. Use a stopblock to set the tenon length.

10 CUT THE TENONS ON THE ENDS OF POSTS (A). The length of the posts makes them too awkward to maneuver on the table saw, so instead, clamp all four posts together side-by-side, with the ends flush. Mark your tenon locations, and use a circ saw and straightedge to make the ⅝" deep cut as shown in **Photo F**. Turn the posts 90° and repeat the cut. Do all four post sides the same way.

11 CROSSCUT THE TOP CROSS STRETCHERS (D) TO 51". Refer to the dimensions given in **Figure 3** to make a pattern for the stretcher ends from ¼"-thick hardboard. Trace the end pattern on both sides of each end. Next, cut out the curve using either a bandsaw or a jigsaw with a 6"-long blade. Finally, clean up your cut with rasps, files, and sandpaper. Work from the outside edges toward the center to avoid chipping on the back edges.

12 MARK (DON'T MEASURE) THE POST MORTISES. The locations of the post mortises in the top cross stretcher (D) depend on the side assemblies. For the best fit, dry-assemble each side assembly and pull it tightly together with clamps. Center a top cross stretcher (D) between the two posts (A) and transfer the locations of the posts tenons onto the bottom face of the top cross stretcher (D). Repeat the assembly and marking process with the opposite side. Label each stretcher/side pairs so that they will be matched together later.

TIP ALERT Use the post mortising jigs to check the fit of the rungs before sticking them into the posts.

13 ROUT THE MORTISES IN THE TOP CROSS STRETCHER USING THE POST MORTISING JIGS.

Make the corner brackets

1 MAKE AN ENLARGED COPY OF THE CORNER BRACKET PATTERN ON PAGE 76. Adhere the pattern onto a 5¼"-wide piece of ¼"-thick hardboard and bandsaw and sand it to shape.

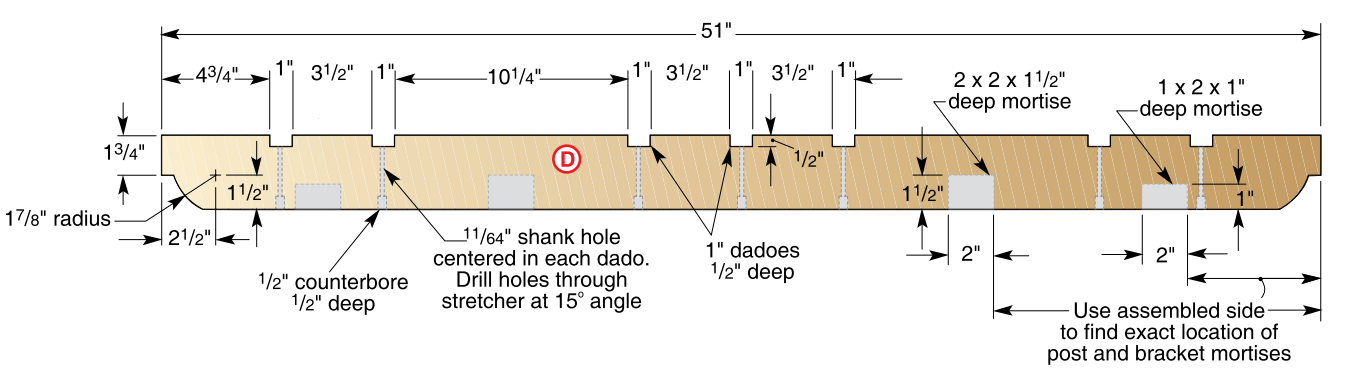
2 FROM 2X6 STOCK CUT TWO CORNER BRACKET BLANKS FOR PARTS (E) TO 18" LONG. Joint one edge of each piece to remove the round-overs and, using your mitersaw, cut one end of each blank at 35°.

TIP ALERT When making curved parts, cut the joinery before cutting the curves. A straight edge provides a reliable reference for both marking and cutting.

3 NEXT, PLACE THE CORNER BRACKET PATTERN ON THE BRACKET BLANKS for parts (E), aligning the top tenon with the 35° line. Trace the bracket pattern onto both faces of each blank.

4 MAKE A STOP for cutting the bottom tenon angle on the bracket blanks on a mitersaw. Add a toggle clamp hold-down for securing the bracket blank during the cutting operation. Position the workpiece, clamp the brace to the mitersaw fence, lower the hold-down, and make the cut as shown in **Photo G**.

Fig. 3
Stretcher part view

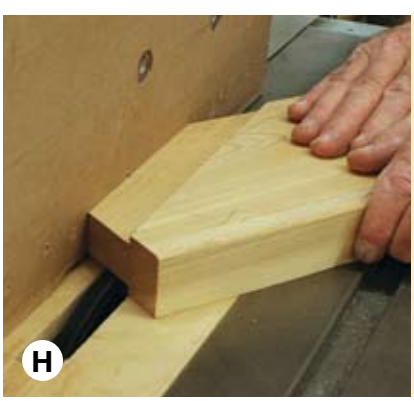


With the mitersaw set for a 35° cut, clamp a brace to the fence, secure the workpiece to it, and angle-cut the end of the bottom tenon on the bracket blank at 55°

5 TO CUT THE CORNER BRACKET (E) TENON CHEEKS, install a ¼" dado cutter set into your table saw and a sacrificial fence on your saw's fence. Set the cutter height to ¼", and set the sacrificial fence 1" from the outside edge of the dado set. Now cut both ends of each corner bracket (E) to establish the tenon shoulders, as shown in **Photo H**.

Reset the fence, burying the blade in a sacrificial fence, to complete the ends of the tenon cheeks.

6 LOCATE, MARK, AND CUT THE BRACKET TENONS



Press the ends of the corner brackets against the fence to cut the angled tenons. The resulting tenon should be 1" thick.

TO 2" WIDE as shown in **Photo I**. Now make the shoulder cuts, cutting to the line. Clean up the cuts with a chisel.

7 BANDSAW OR JIGSAW THE CURVES ON THE CORNER BRACKETS (E). Cut as close to the line as possible, and smooth with rasps and files or a spindle sander.

Mark the width of the bracket tenons; then cut them to finished dimensions with a bandsaw or dovetail saw.

8 ASSEMBLE BOTH SIDE ASSEMBLIES TO LOCATE THE CORNER BRACKET MORTISES. Using the corner brackets, transfer the bracket mortise locations to the posts (A) and top cross stretchers (D). Disassemble the side assemblies and rout the mortises using the "Corner Bracket" mortising jig. After you've cut all eight mortises, resassemble the sides and test-fit the corner brackets. Label each bracket for later assembly.

Make the bonnet ribs

Note: There are seven identical bonnet ribs (F). If drawn inside a rectangle, each would be approximately 14¾" wide by 71" long. Here you'll see how to create a wider board from a 2x12 by reattaching cutoffs onto the bottom of your stock.

1 MAKE THE TEMPLATE FOR THE FLARED BONNET RIBS (F) by attaching a 16 x 72" piece of ¼"-thick hardboard to your floor with double-faced tape. Then follow the 3-step layout sequence as shown in **Figure 4**. (A pair of trammel points will help, but in a pinch, you can get by with a 2"-wide strip of plywood, pencil, and finish nails.) After laying out the top and bottom curves, measure and mark the ends of the bonnet rib pattern and the notches (**Figure 5**). Cut out the template on your bandsaw, then carefully sand up to your layout lines to create a smooth, or fair, curve.

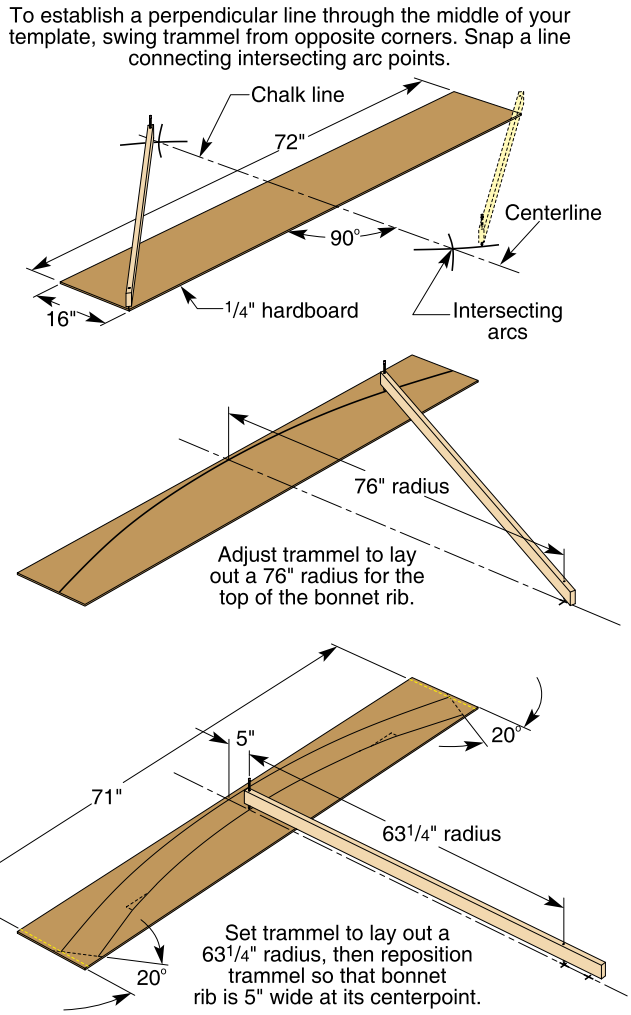
TIP ALERT To shape the gently curved rib pattern, glue 60-grit paper to a 2" wide by 11" long piece of ⅛" plywood using a quick-release contact cement, to make a flexible "file".

2 JOINT ONE EDGE OF YOUR 1X12 BONNET RIB (F) STOCK TO REMOVE THE ROUNDED LUMBERYARD EDGE. Position the bonnet rib template on top of your rib stock as shown in **Figure 6**, so that the jointed edge runs along the bottom of the rib. (At this point, the template is still wider than your stock.) Using a bandsaw or jigsaw, cut the bottom curve about ⅛" to the waste side of your line.

3 MAKE TWO RECTANGLES FROM THE JOINTED BOTTOM CUTOFFS AND GLUE THEM USING EPOXY (see the **Buying Guide**) to the bottom edge of all seven rib blanks as shown in **Figure 6.**

4 TRANSFER THE BONNET PATTERN ONTO THE RIB BLANKS. Give the ribs about 24 hours to fully cure; then remove the clamps and trace the rib pattern on your board. Cut the ends to finished length using a mitersaw set at 20°. Cut the top arc and the remaining portions of the bottom arc about ⅛" outside of your pencil lines.

Fig. 4
Making the rib template



5 ROUT HALF OF THE BONNET RIBS (F). To avoid tear-out, always rout "downhill" to the grain. To succeed, you'll need two bearing-guided router bits: a pattern routing bit with a top bearing and a flush-trim bit with a bottom-mounted bearing (see the **Buying Guide**). Begin the process by sticking the pattern on top of the rib blank and orienting the blank so that the bottom ends are pointing toward you. Now with your router and a pattern-routing bit, guide the bearing against the left-hand half of the arch bottom; then reposition the router and shape the right-hand half of the top. (Try to start and stop your cuts at the rib's centerpoint so that the bit's rotation doesn't lift or tear out opposing grain.)

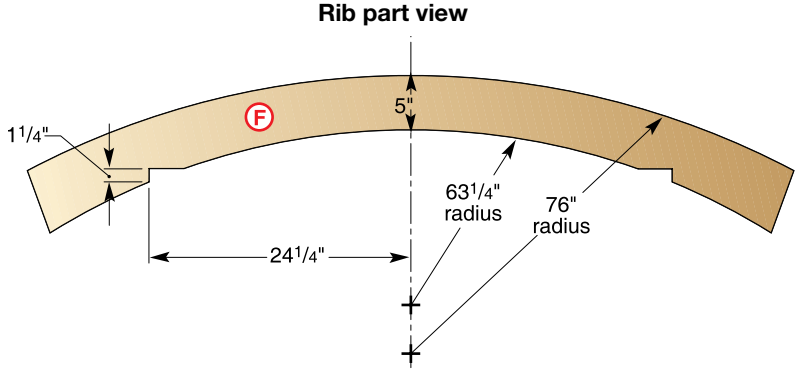
TIP ALERT
Fresh epoxy squeeze-out can be cleaned up with acetone or lacquer thinner. If you miss a spot, watch and wait for it to get to the green stage. This partially-cured point is the perfect time to remove excess with a block plane because it's not sticky but softer than when fully cured.

6 FINISH ROUTING THE REST OF THE RIB WITH A FLUSH TRIM BIT. Flip the rib (F) so that that pattern sits under your stock. Chuck a bottom-bearing flush trim bit into your router and trim the remaining two edges.

7 USING THE PATTERN, MARK AND THEN BANDSAW OR JIGSAW THE NOTCH IN THE RIBS.

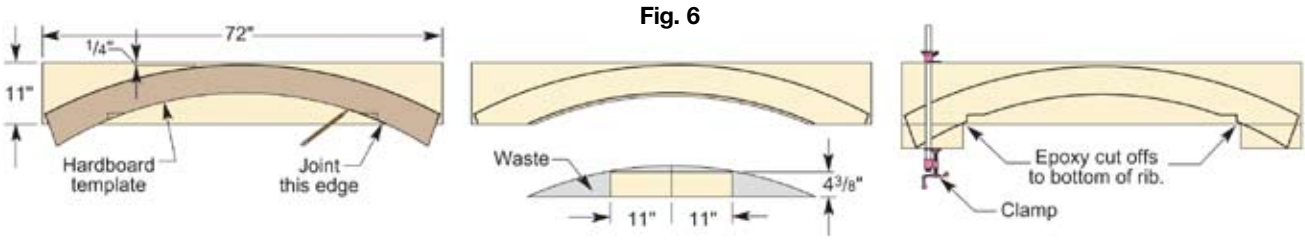
8 DADO THE TOP CROSS STRETCHER (D) TO FIT THE BONNET RIBS (F) by first placing two stretchers side-by-side.Referring to **Figure 3**, mark the location of the dadoes for both bonnet ribs at the same time with a square and pencil. Use a bonnet rib (F) to check that the dadoes are wide enough. Then use your table saw and dado cutter set, or router and straightedge guide, to cut the ½"-deep dadoes.

Fig. 5
Rib part view



TIP ALERT
Ball-bearing guided spiral bits are expensive, but the shearing cut can prevent tear-out, even when cutting against the grain.

Fig. 6



Assemble the arbor sides

The glue-up proceeds in two stages. The first creates the "ladder" assembly; the second adds the corner brackets (E) and top cross stretcher (D). Choose an epoxy with a long open time so you can make adjustments and arrange your clamps where needed.

1 CLEAN UP YOUR PARTS BEFORE GLUE-UP. To lift dents, place a damp cloth over spot, then lightly run a hot iron over it. Lightly sand to 120 grit.

2 NEXT, GLUE THE UPPER AND LOWER RUNGS TO THE POSTS, placing the top cross stretcher (D) on the post tenons without glue to help maintain the squareness of the assembly. Center clamps across each rung and let the epoxy cure overnight.

TIP ALERT

A thin coat of epoxy on the end grain of a joint will seal the wood and prevent or reduce wicking, preserving the joint for a long period of time. Similarly coating the bottom of the posts is also recommended.

3 INSERT THE CORNER BRACKETS (E) IN THE POSTS (A), then clamp the top cross stretcher (D) in position as shown in **Photo J**. Repeat the process for the remaining side.

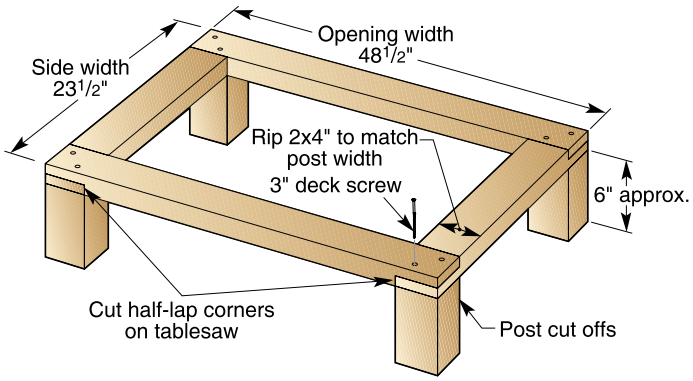
4 ASSEMBLE THE ARBOR IN YOUR SHOP. Stand the two sides on the floor. To keep the sides from tipping, clamp a pair of 42"-long 2x4 spacers between the sides. Insert the bonnet ribs into the dados.

5 SCREW THE TOP CROSS STRETCHER (D) TO THE BONNET RIBS (F). To do this, refer to **Figure 1**, and then drill a 13/64" hole at a 15° angle up through the bottom of each stretcher (D). Aim for the center of each rib (F) about 3/4" in from the inside edge. After drilling the pilot hole, use a 3/8" twist drill to create a 1/2"-deep counterbore in the stretcher (D). This allows the screw to be countersunk well out of sight. Drill a 1/8" pilot hole about 2" into the bottom of each bonnet rib (F). Mark the ribs before disassembly so that they can be matched to their dadoes.

Position the clamps perpendicular to the top cross to prevent bending the ends or warping the assembly.

6 FINISH YOUR ARBOR. Stain or paint the arbor after final assembly and drilling, but before installation. A good defense is an-oil based exterior primer, gray (see the **Buying Guide**), followed by an acrylic deck paint.

Fig. 7
Footing placement frame



Set in the footings and install the arbor

If you want your arbor to last, make sure you set it on solid footing. If you're not planning to build the gate, metal post stakes, as shown in **Figure 8**, are a quick and easy way to set the posts. A concrete footing would offer more support to the arbor frame, and is recommended if you intend to include a gate and/or fence.

Note: Digging even a small misplaced hole can disrupt service to an entire neighborhood, or kill you. An easy—and free—way to avoid such risks is by calling 811. This call will connect you with a professional utility locator who will mark out nearby utility lines so that you know where it's safe to locate your arbor.

1 REFERRING TO THE FOOTING PLACEMENT FRAME IN FIGURE 7, screw together a jig from scrap lumber and left over post stock, matching the dimensions of your arbor. Use the frame to level the tops, as shown in **Photo K**.

2 SET THE ARBOR SIDES IN THE POST STAKES, as shown in **Photo L**. You'll need to insert shims into the post stakes or standoffs to account for the wood you removed when squaring the posts (A).

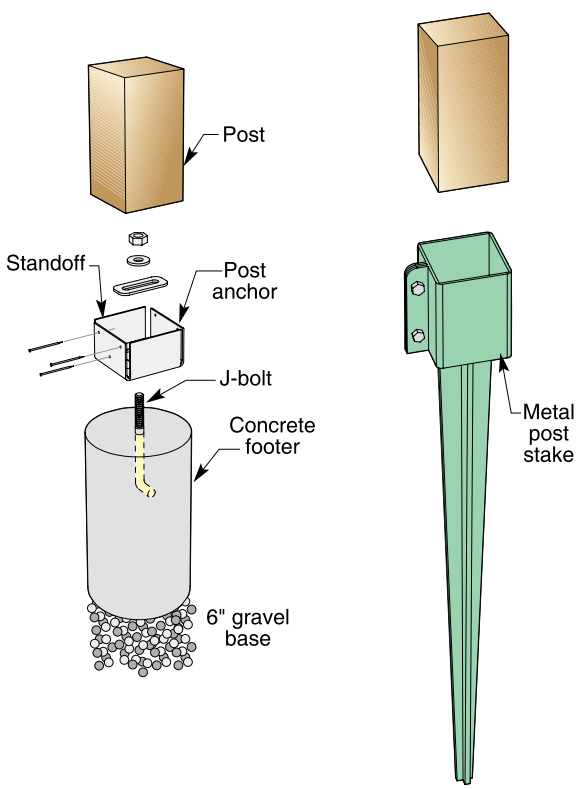
3 SET THE BONNET RIBS (F) INTO THE TOP CROSS STRETCHERS (D), as shown in **Photo M.** To avoid chuck damage to the top cross stretcher, use 12" long drill bits, (see the **Buying Guide**). Drive a 4"-long #9-size deck screw through the stretcher and into the bonnet ribs to pull the arbor together.

Use a scrapwood positioning jig to mark the exact locations for the bolt-down standoffs or to adjust the height of the post stakes.

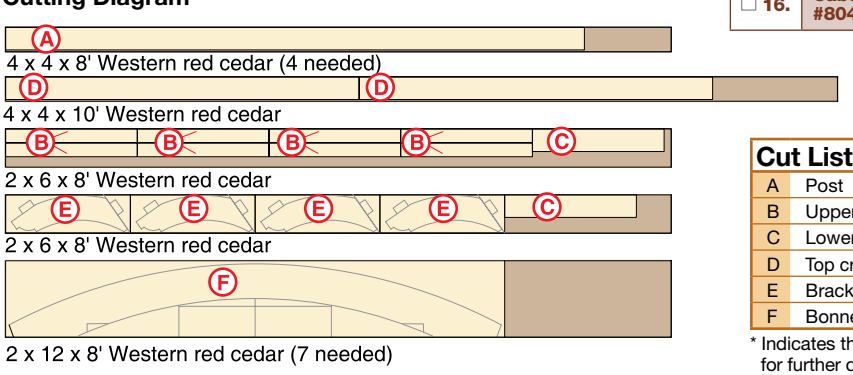
Tip the arbor sides in place. Use a helper or attach a scrapwood brace before attaching the bonnet ribs.

Set the bonnet ribs in the dadoes carefully to keep touch-up painting to a minimum. Screw them in place.

Fig. 8
Post footing options



Cutting Diagram



Convenience-PLUS BUYING GUIDE

		WOODCRAFT #	PRICE
☐ 1.	Whiteside Carbide Spiral Upcut Bit ½" D, 1½" CL (½" SH)	03K35	$52.99
☐ 2.	Whiteside Pattern Cutting Bit ½" D, 1" CL (¼" SH)	24A61	$24.99
☐ 3.	Whiteside Pattern Cutting Bit 1⅛" D, 1½" CL (½" SH)	24A63	$42.50
☐ 4.	Whiteside Spiral Upcut Flush Trim Bit ¼" D, 1" CL (¼" SH)	127465	$39.99
☐ 5.	Nicholson #50 rasp	06B02	$59.99
☐ 6.	10" Half Round File	06B06	$24.50
☐ 7.	System Three Epoxy Resin, qt	124520	$26.99
☐ 8.	System Three Hardener, pt	124526	$21.50
☐ 9.	System Three Plunger Pump Set	124533	$17.99
☐ 10.	Nitrile Gloves (12)	145280	$5.99
☐ 11.	Disposable glue brushes ½" width, pack of 48	04Z51	$10.50
Above items available at Woodcraft stores, *woodcraft.com* or by calling (800) 225-1153.			
☐ 12.	6" long ⅛" dia. drill bit	71000087	$2.90
☐ 13.	6" long 11/64" dia. drill bit	71000111	$3.83
Above items available at MSC Industrial Supply Co. Phone (800) 645-7270 or visit *Mscdirect.com.*			
☐ 14.	4" stainless steel screws, pkg/100	1240-SD6	$52.42
Above items available at McFeely's. Phone (800) 443-7937 or visit *mcfeelys.com.*			
☐ 15.	Cabot Solid Color Acrylic Decking Stain, Medium Base #1808 (Color: Napa Vine)	Contact Cabot at (800) 877-8246 or visit cabotstain.com/cabot/info/dealer_locator.jsp to locate a dealer near you.	
☐ 16.	Cabot Problem-Solver Oil Primer, #8044 (Gray)		

Cut List		Thickness	Width	Length	Qty.	Mat'l
A	Post	3¼"	3¼"	83½"	4	WRC
B	Upper rungs	1½"	2"	19"	8	WRC
C	Lower rungs	1½"	3¼"	19"	2	WRC
D	Top cross stretcher	3¼"	3¼"	51"	2	WRC
E	Brackets	1½	5¼"*	16⅞"*	4	WRC
F	Bonnet ribs	1"	14⅝"	71"*	7	WRC

* Indicates that piece is initially cut larger; please see the instructions for further details.

WRC= Western red cedar (See the Cutting Diagram.)

A Graceful Arbor Gate

By Alan Turner

Project Design by
Alan Turner and Mario Rodriguez

This curved-top gate is the perfect complement to your new arbor. As you can see, the top rail, the ends of the stiles, even the custom-made iron hinges (see the Convenience-Plus Buying Guide) were arched to match the arbor's ribbed bonnet. Like the arbor, the gate is built to last. The rails attach to the stiles using solid mortise-and-tenon joinery. Matching the curve of the top rail to the top of the center stile might appear daunting, but here you'll learn how to make a template and use your router for a seamless fit.

Begin with the gate frame

1 REFERRING TO THE CUT LIST, CROSSCUT THE STILES (A), BOTTOM RAIL (B) AND CENTER STILE (D) to length plus a few inches, from 2x6 stock. Make the top rail (C) from 2x10 stock. Surface-plane all five pieces to 1⅜" thick. Using your table saw, rip a square edge on all pieces, then rip the stiles (A), bottom rail (B) and center stile (D) to 4¼" wide. (The top rail (C) will be sawn to width later.)

2 CUT THE FRAME TO FIT THE ARBOR. Referring to the **Cut List**, crosscut the stiles (A) and center stile (D) to final length. The center stile (D) is left long. It will be trimmed to fit later during assembly. See the note below before cutting the bottom rail (B) and top rail (C) to final length.

Note: Measure the width of your arbor opening before cutting the rails to final length. This gate is designed with ⅞" of clearance on the hinge side and an equal ⅞" gap on the latch side, for a post-to-post distance of 42". You may need to adjust the length of the rails to fit your arbor.

3 MAKE A TEMPLATE FOR THE TOP RAIL (C) BY FIRST CHUCKING A ½"-DIAMETER STRAIGHT BIT INTO YOUR HANDHELD ROUTER. Then attach the router's base to a 54"-long strip of plywood. Plunge the bit through the plywood base. Measure 46¾" from the **inside** edge of the bit and drill a ⅛"-diameter pilot hole through the plywood. Cut an 8 x 36" piece of ¼"-thick MDF or ¼" hardboard and place it under your router. Now drive a screw through the pilot hole so that it serves as a pivot point. Proceed to rout the top arch as shown in **Photo A**. Drill a ⅛"-diameter hole 42¼" away from the **outside** edge of your bit on the plywood base. Reposition your jig so that you're using the new hole as your pivot point and rout the bottom arch.

Mounting a router to your trammel is an easy way to cleanly cut the curves for the top rail template.

4 MORTISE THE STILES (A) FOR THE TENONS ON THE BOTTOM RAIL (B) AND TOP RAIL (C) where shown in **Figure 3** using a hollow-chisel mortiser. If you don't own a mortiser, use your drill press and a ½"-diameter Forstner bit to remove most of the waste. Pare the opening with a chisel, establishing clean, square corners.

5 MORTISE THE BOTTOM RAIL (B) FOR THE CENTER STILE (D) referring to the dimensions given in **Figure 2**.

PHOTOS: MARIO RODRIGUEZ

Fig. 1
Exploded view

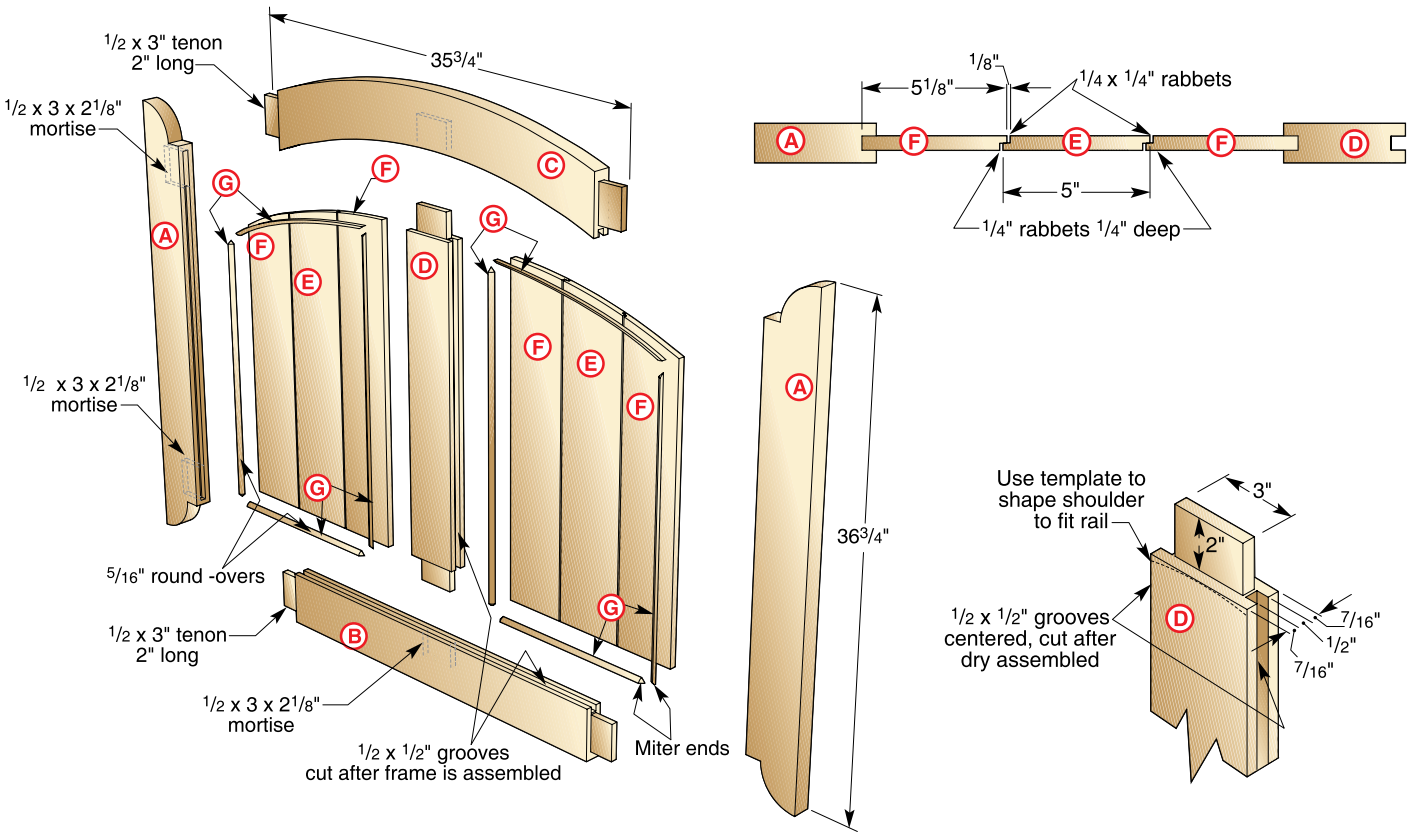
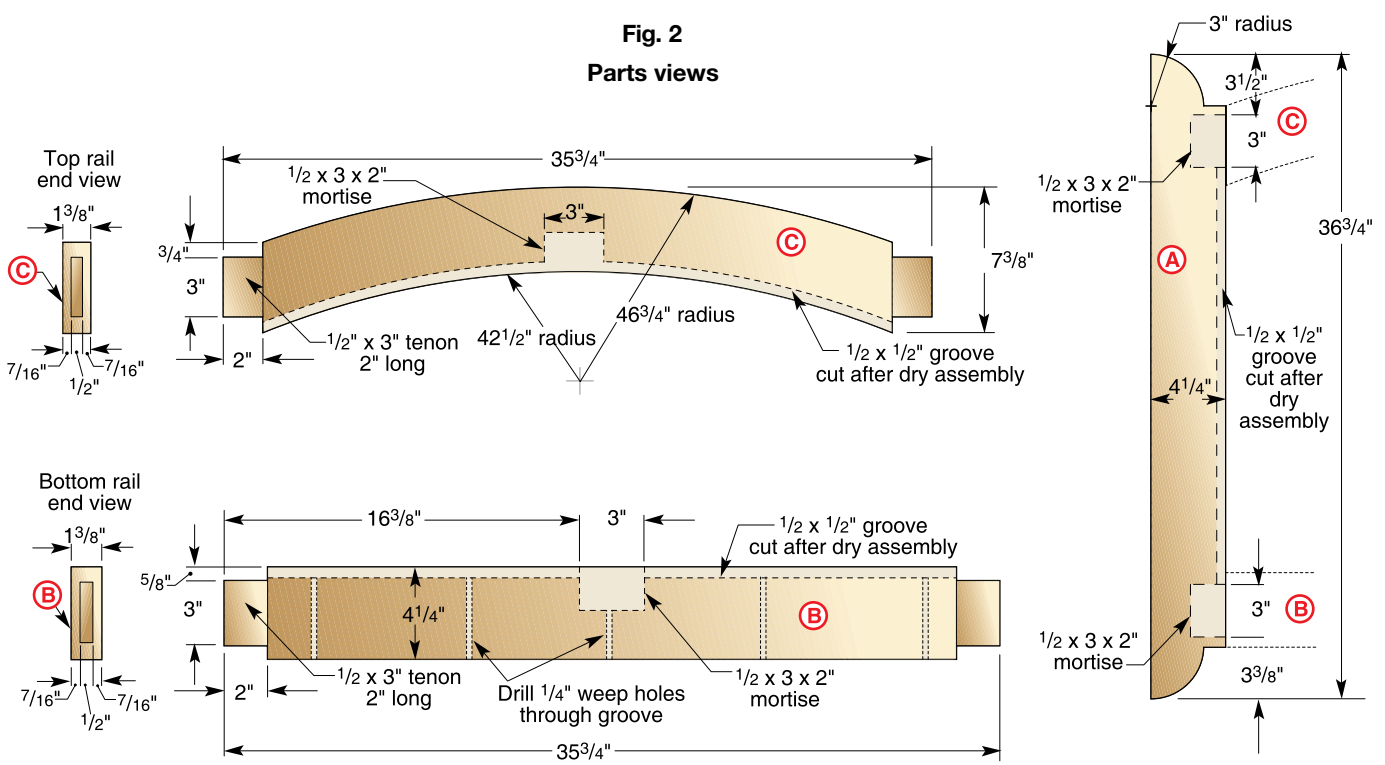
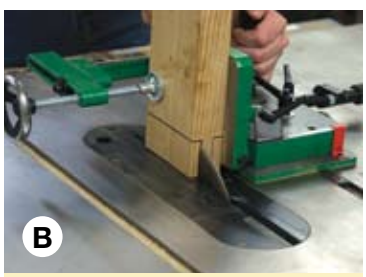


Fig. 2
Parts views



6 SPRAY-ADHERE A COPY OF THE PATTERN FOR THE STILES (A) FOUND ON PAGE 76 ONTO ¼"-THICK HARDBOARD AND CUT IT OUT. Now trace the pattern onto both faces of each stile end. Use your table saw to cut the horizontal notches, then bandsaw or jigsaw the curves. Use a rasp and file to erase saw marks and work up to your line. When filing, work from the outer edges to the center to prevent chip-out.

7 SAW THE TENONS ON BOTTOM RAIL (B), TOP RAIL (C), AND CENTER STILE (D) by first cutting the shoulders on the faces of the three pieces with a table saw. Raise the blade to 7/16", adjust the fence to 2" from the outside blade teeth, and cut the shoulders, using your miter gauge. Raise the blade to ⅝" and make the connecting shoulder cuts through the edges of the bottom rail (B), stile (D), and in the bottom edge of rail (C). As shown in **Photo B**, raise the saw blade to 2", and, using a tenoning jig (see the **Buying Guide**), make the cheek cuts on all three pieces. Finish cutting the edge shoulders with a bandsaw or handsaw.



Use a table saw and tenoning jig to easily cut the wide tenon cheeks on the rails (B, C) and stile (D).

8 USE THE TOP RAIL TEMPLATE TO MARK THE CURVES ON THE TOP RAIL (C). Cut the bottom curve about ¼" away from your pencil line. Before sawing the top curve, make the mortise for the center stile (D). Measuring against the pencil line, set your mortiser for a 2"-deep cut where shown in **Figure 2** and cut the ½" x 3" mortise.

9 ROUGH-CUT THE CURVED TOP EDGE OF THE TOP RAIL (C) using a bandsaw or jigsaw; then attach the rail pattern to the bottom face of the stock with double-faced tape. With a handheld router and flush-trim bit, pattern-rout the "downhill" grain parts of the curve. Then, chuck a pattern-routing bit (see **Buying Guide** on page 29) into your router, flip the work over so the pattern is on the top, and finish the curve.

Make the center rail and panels to fit the frame

1 MAKE A CURVED SHOULDER TEMPLATE FOR THE CENTER STILE (D). Assemble the gate without the center stile (D). Center a 4¼"-wide strip of ½"-thick MDF under the top rail (C) and then trace the bottom curve onto the MDF. Cut to the line, smooth the curve and then test the template to make sure that it fits tightly against the bottom of the top rail (C).

2 SHAPE THE CENTER STILE (D) TO FIT THE TOP RAIL (C). To do this, use a combination square and make a pencil line across both faces of the center stile (D), ¼" below the square-cut tenon shoulder. Clamp the template to the rail so that its top edge touches the line. Using your router and a pattern bit, adjust the bit height so that the cutter grazes the tenon's cheek and routs the curved shoulder as shown in **Photo C**. Remount the pattern on the opposite side and rout the other shoulder. After routing, trim the top tenon so that it's 2" long from the centerpoint of the curved shoulder to the end.

Use a shallow-cutting pattern bit to shape the top shoulder of the center stile to fit the top rail.

3 TRIM THE BOTTOM OF THE CENTER STILE (D) TO FIT THE GATE. Begin by dry-assembling the gate, without the center stile (D) and mark the new shoulder location on the bottom of the center stile with a knife. Recut the bottom rail shoulders on the table saw to the marked length and clean up the cheeks with a chisel. Trim the tenon to fit.

4 GROOVE THE GATE FRAME FOR THE PANELS. First, dry-assemble and clamp the gate with the center stile. Using your handheld router, install a ¼" slot cutter (see the **Buying Guide**) then adjust the bit so that when routing from both sides of the gate you produce a ½"-wide centered groove. After routing the framed openings from both sides, disassemble the gate and use a chisel to square off the rounded corners that the bit couldn't reach. Finally, drill a series of ¼"-diameter weep holes through the slot on the bottom rail (B) where shown in **Figure 2** for water drainage.

5 SURFACE-PLANE ENOUGH 1X6 STOCK TO ½" THICK TO MAKE THE INNER (E) AND OUTER (F) PANELS. (See the **Cutting Diagram**.) Rip the panels to the widths indicated in the **Cut List**. Using your table saw and dado cutter (or router table and straight bit) cut the ¼ x ¼" rabbets where shown in **Figure 1**.

6 CUT THE PANELS TO MATCH THE CURVED TOP BY ASSEMBLING THE GATE FRAME, MINUS THE TOP RAIL (C). Insert the panels (E) and (F) into the grooves as shown in **Figure 1**. Next, position the top rail (C) as shown in **Figure 3**. Make a light pencil line along the bottom edge of the top rail. Mark ⅜" up from that previous line and, aligning the top with these marks, scribe a second line parallel to the first. Now remove the rail

TIP ALERT Save the leftover (mixed) epoxy. Once cured, you'll know that it's safe to remove your clamps.

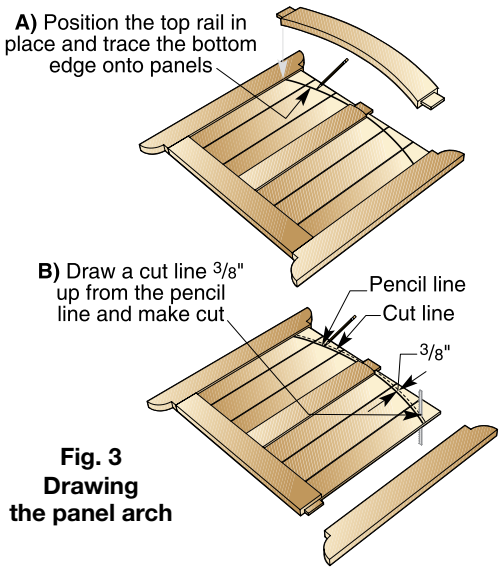


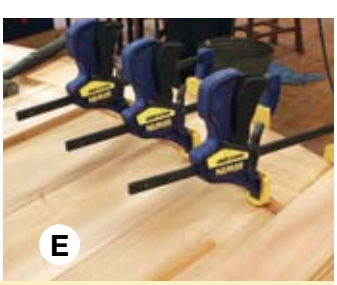
Fig. 3 Drawing the panel arch

template and bandsaw or jigsaw along this outside line, allowing the panels to fit the frame. See the **TIP ALERT** on page 32 before applying epoxy.

7 CLAMP THE BOTTOM RAIL (B) TO THE BENCH. Then insert the center stile (C) and panel pieces as shown in **Photo D**. (Some 7/16"-thick strips of scrap can help support the free ends of the panel.) Slide the top rail (C) onto the inner panels (E), outer panels (F), and center stile (D).

8 MILL THE PANEL BEADING (G) BY MAKING THE RADIUSED EDGE FIRST. For safety, the beading pieces are routed, then ripped, from leftover two-by stock. To do this, install a ¼" radius round-over bit (see the **Buying Guide**) into your router table and rout each corner. Next, take the board to your table saw. Set the blade height to 5/16", the fence to 5/16" and free each corner in two cuts using a sacrificial push pad. Joint the edge and repeat the routing and sawing process to make additional beading. Miter the bottom corners and cope the top corners to fit the beading to the frame. Attach the beading to the rail and stile edges using pin nails and waterproof glue (see the **Buying Guide**). Clamp the beading in place, as shown in **Photo E**, to ensure that it doesn't pull away from the nails.

Assemble the gate from the bottom up. Using spacer blocks to support the free ends of the panel.



Flex the bead along the top curve to fit it in place. Use clamps and nails to hold it to the top rail until the glue dries.

9 SAND THE GATE TO 180 GRIT IN PREPARATION FOR PAINTING. See step 6 in the arbor instructions on page 28 for advice on finishing. See also "Wood vs. Wild" on page 36 for finishing alternatives.

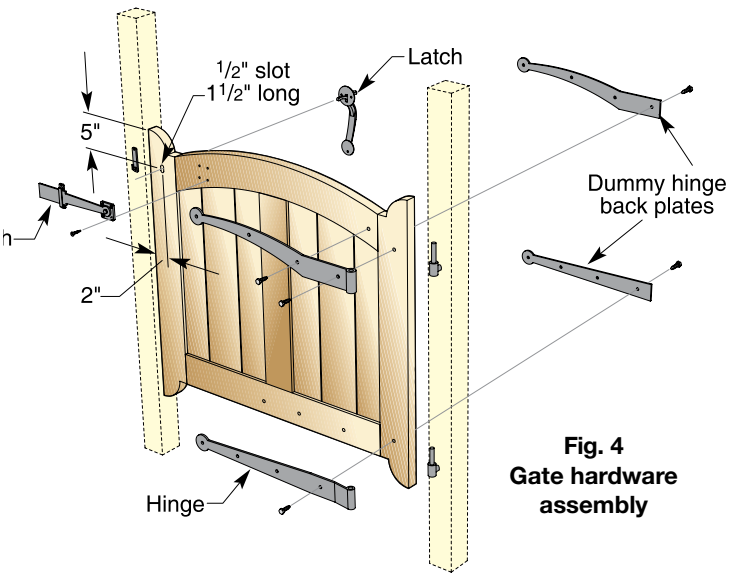


Fig. 4 Gate hardware assembly

Install the hinges and hang the gate

1 TO INSTALL THE STRAP HINGES ON THE BOTTOM RAIL (B) AND TOP RAIL (C), strike a centerline for the bolt holes (the hinge does not have parallel sides), then drill and mount where shown in **Figure 4**. A dummy hinge plate on the gate's back face gives a similar appearance from both sides and works like a giant washer enabling you to tighten the hinge bolts to the gate.

2 INSTALL THE THUMB LATCH (see the **Buying Guide**) by measuring 1¾" in from the edge of the door (opposite the hinges) with a combination square and striking a 1" line from 4½" to 5½" down from the top outside end of center stile (D). Strike a parallel line 2¼" in from the edge. With 2" in as your center, mortise through the door with a ½"

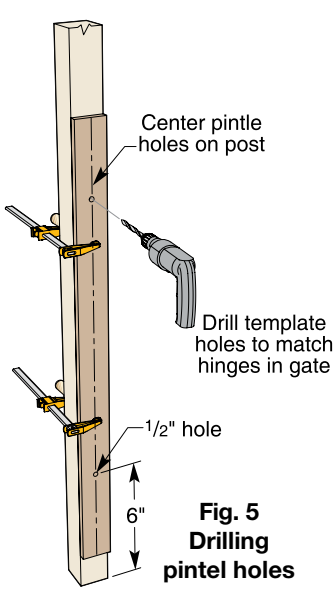


Fig. 5 Drilling pintel holes

Make a boring jig, drill the holes in the arbor post, and install the threaded pintles by screwing them in place.

drill bit, creating a 1"-long slot for the latch lift. Clean the mortise with a chisel and install the latch door hardware.

3 TO INSTALL THE PINTLES, measure the distance from the bottom of the top hinge to the bottom of the bottom hinge and then make a post boring template shown in **Figure 5** from scrap. Drill two ½" holes at this exact distance. On site, after the arbor installation, clamp the guide block to the arbor as shown in **Photo F**, drill, and turn them in. Hang the gate on the pintles.

4 HANG THE GATE AND ATTACH THE KEEPER. The keeper is the last step in the assembly process. Instead of measuring, close the installed gate and transfer the location of the catch onto the post to accurately position the keeper when the gate is shut. Now, fasten the keeper to the post.

About the Author and the Designer

Alan Turner and Mario Rodriguez operate the Philadelphia Furniture Workshop, a full-service woodworking school in Philadelphia, Pennsylvania. They combine over 60 years of furnituremaking and teaching experience and offer courses ranging from power- and hand-tool basics to project building. See PFW on the Web at *philadelphiafurnitureworkshop.com.*

Note: In addition to the items listed in the Buying Guide on page 29, you may also need the following products to build the garden arbor gate.

Convenience-PLUS

BUYING GUIDE

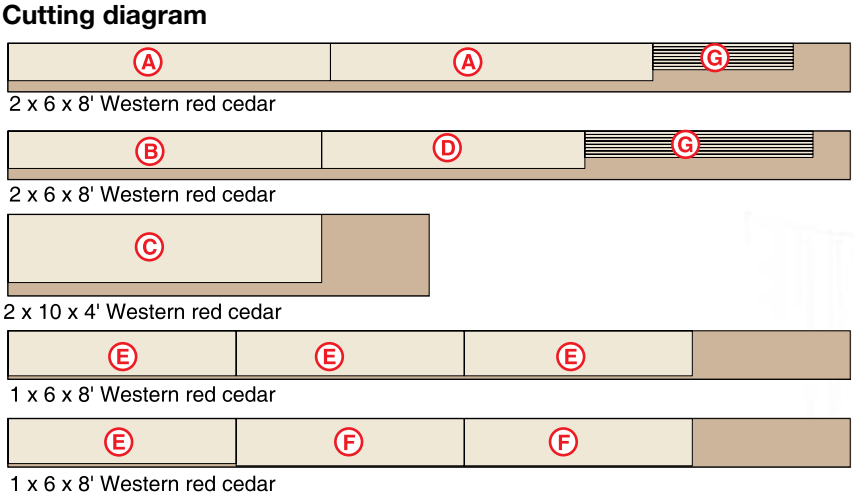
		WOODCRAFT #	PRICE
☐ 1.	**Tenoning Jig**	144755	$79.99
☐ 2.	**Whiteside Flush Trim Bit, ½" D, 1½" CL (½" SH)**	24A73	$20.99
☐ 3.	**Whiteside 3-Wing Slotting Cutter ¼" (requires arbor listed below to operate)**	24D67	$19.99
☐ 4.	**½" SH x 4" Arbor**	405748	$16.99
☐ 5.	**Woodcraft Round Over, ¼" R, ½" CL (¼" SH)**	129659	$21.99
☐ 6.	**Waterproof Titebond III, 8 oz**	145561	$4.99
Above items available at Woodcraft stores, *woodcraft.com* or by calling (800) 225-1153.			
GATE HARDWARE			
☐ 7.	**Arch-top Pintle Hinges**	8024	$162.50
☐ 8.	**Dummy Hinge Back Plate (pair)**	8524-D	$45.50
☐ 9.	**Regular (Thumb) Latch, #9100, $139.70**	9100	$139.70
Order the gate hardware from James Peters & Sons Hardware by calling (215) 739-9500 or visiting jamespetersandson.com.			

Cut List		Thickness	Width	Length	Qty.	Mat'l
A	*Stiles	1⅜"	4¼"	36¾"	2	WRC
B	*Bottom Rail	1⅜"	4¼"	35¾"	1	WRC
C	Top Rail	1⅜"	7⅜""	35¾"	1	WRC
D	*Center Stile	1⅜"	4¼"	30"*	1	WRC
E	Panels (inner)	½"	5"	26"*	2	WRC
F	Panels (outer)	½"	5⅛"	26"*	4	WRC
G	Beading	5/16"	5/16"	16"* (top & bottom) 26"* (side) (Cut pieces to fit)	8	WRC

* Indicates that piece is initially cut larger; please see the instructions for further details.

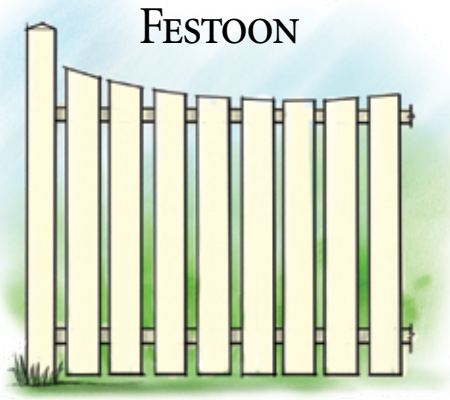
WRC= Western red cedar

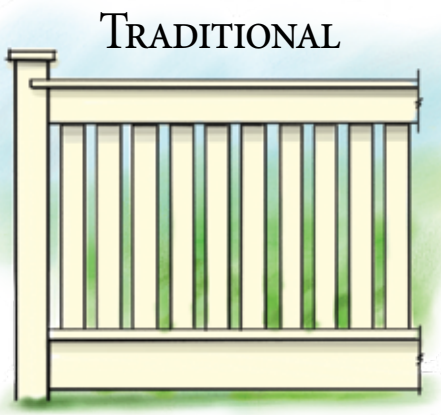
Cutting diagram



A Trio of Fence Ideas

While the arbor and gate make a grand entrance into an attractively landscaped yard, you might want to enclose the area with a complementary fence. Here are three fence ideas to help you do just that. Consider making the 8' long fence sections, attaching picket assemblies to 4 x 4' posts and maintaining a height equal to or just above the gate's height. Sink the posts to below frost line for maximum durability.





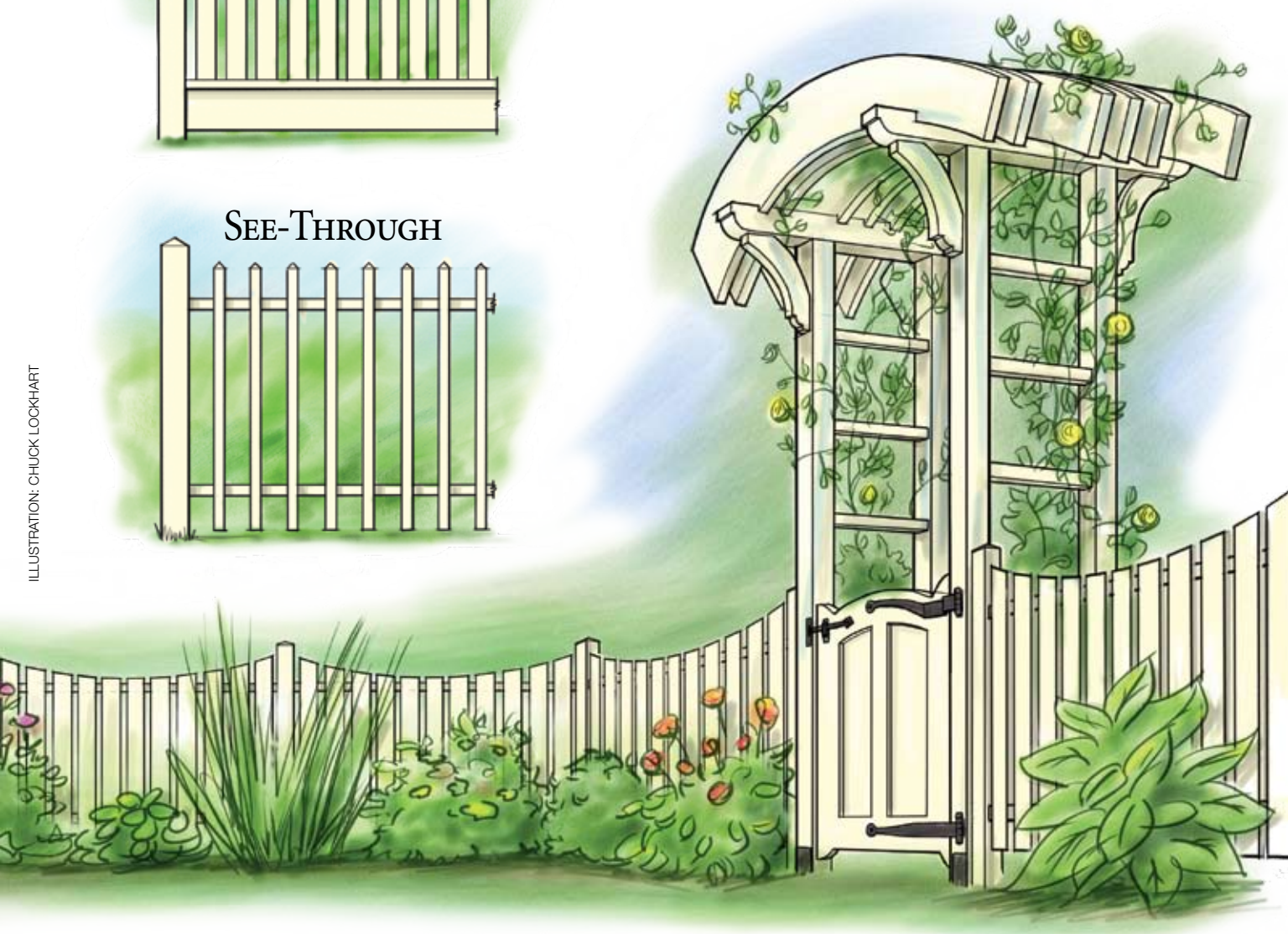


ILLUSTRATION: CHUCK LOCKHART