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#160, JUNE/JULY 2012

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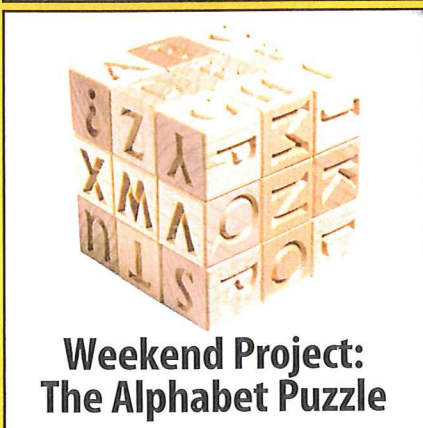
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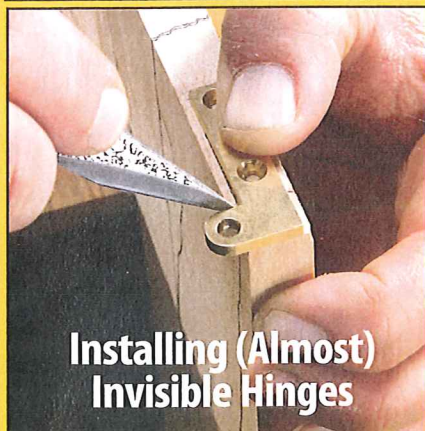
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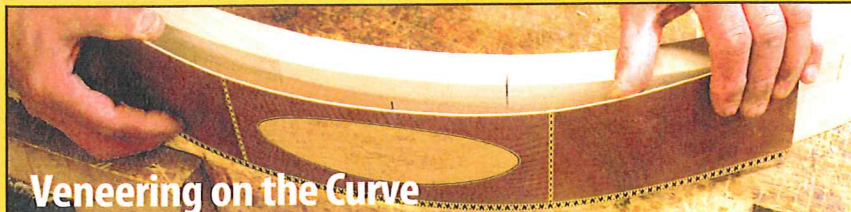
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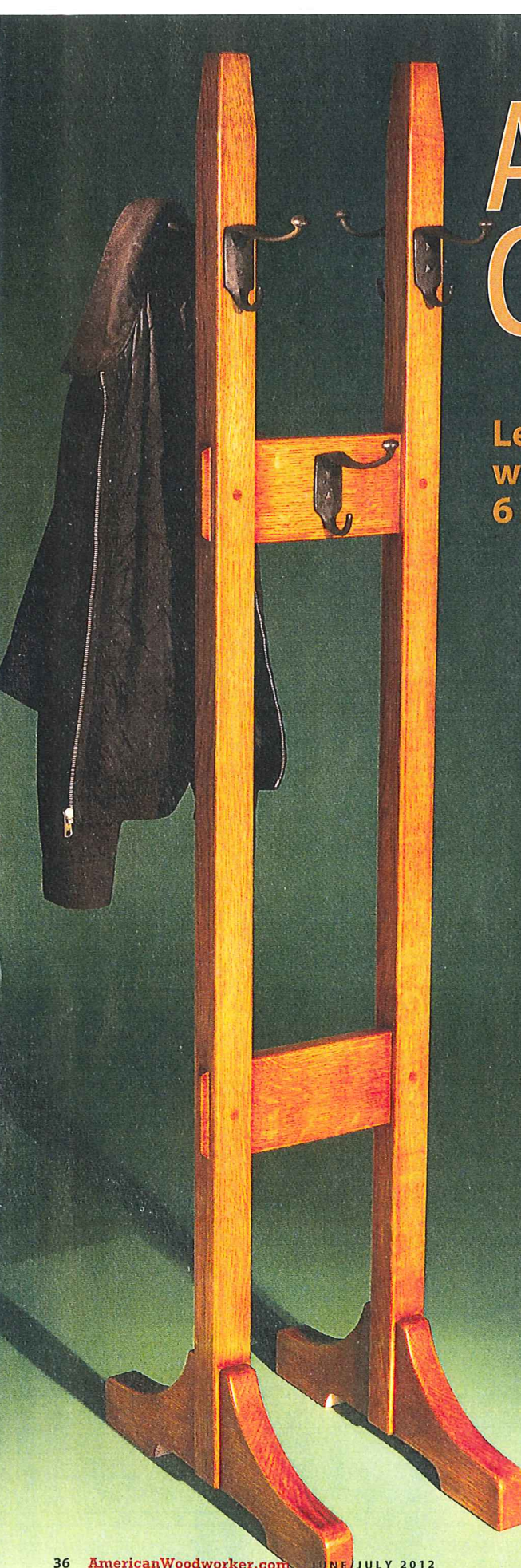
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Arts & Crafts Coat Rack

Learn how to make large joints
while building a project with only
6 pieces.

by Stewart Crick

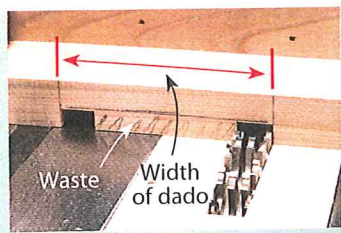
BOLD JOINERY is one of the hallmarks of Arts and Crafts furniture, which I love to make. This coat rack, originally built by Gustav Stickley between 1900 and 1910 and catalogued as a “No. 53 Costumer,” has two kinds of large-scale joints. Huge through mortise and tenon joints connect the rails to the posts. The feet are connected to the posts by equally large bridle joints.

If you’ve been waiting for an opportunity to advance your joinery skills, here’s an ideal project. You’ll only be making three different parts, in pairs, so it certainly isn’t too complicated. Fitting these large joints may seem daunting, but I’ve devised a number of tricks to make the process very machine-friendly.

EDITOR: TOM CASPAR | PHOTOGRAPHY: JASON ZENTNER, EXCEPT AS NOTED | ILLUSTRATION: FRANK ROHRBACH



1 Begin by making the posts. Each post will be glued up from two pieces, or "half-posts." Clamp all four half-posts together in order to trim them to the exact same length.



2 Cut dados in each of the half-posts. When the halves are glued together, the dados become through mortises. Use a stop block and a spacer to ensure that all the dados are the same width.



3 Make a set of keys that fit tightly into the dados. Wrap the keys with packing tape to prevent glue from sticking to them, then place the keys in the dados.



4 Glue the posts together. The keys will align the opposing dados. Glue the post on a stiff plank or on a platform, such as this torsion beam, to make sure the post comes out straight.

Make the posts

Stickley used quartersawn oak to make his Costumer, and so did I. Plainsawn oak would work fine, though, and is easier to find in the thick sizes you'll need.

I laminated the posts from two pieces of wood (A) rather than make them from one extra-thick piece. This approach makes mortising much easier. You won't have to chop huge holes; you'll cut dados, instead, in opposing pieces that I call "half-posts." The dados must line up just right for this method to work, though. Here's how you'll pull that off.

First, mill each half-post at least 1/8" oversize in thickness and width. Trim them 1" extra long (see Cutting List, page 38). Assemble the pieces in pairs, as if they were the completed posts. Mark the ends of each pair with a cabinetmaker's triangle, so you can keep track of how the half-posts should be oriented. Set the pieces aside for a few days. If the wood wants to bend or twist, this will give it time to settle down.

Next, joint the faces that will be glued together. It's best not to run these surfaces through the planer at this time; if you did, and your planer snipes the ends of the boards, you'd get unsightly gaps between the laminations at both ends of the posts.

Plane the opposite sides until the pieces are the correct thickness. Joint the sides of each piece and rip them to final width. Mark the mating sides with triangles, then trim all four

half-posts to length (Photo 1). Re-assemble the half-posts and lay out the dados on both sides of each piece (Fig. B). Shade in the waste, so you don't accidentally cut in the wrong place.

Set up your tablesaw for cutting the dados (Photo 2). I use two miter gauges joined by a long fence to prevent the half-posts from wobbling while I make these cuts. You could also use a single aftermarket miter gauge that's been adjusted to fit tight in one miter slot or a sled with two runners.

All of the dados must be the same width. Use a stop block and a spacer—the spacer determines the width of the dado. If your dado set is 3/4" wide, the spacer should be 3-3/4" long. Make the two outside cuts first, with and without the spacer, then remove the spacer and make overlapping cuts to remove the rest of the waste.

Make a set of wooden keys from 3/4" thick stock for aligning the dados (Photo 3). The keys must fit tightly into the dados—but not too tight, or assembly will be difficult. The best approach is to make them from a board that's at least 12" long. Rip the board about 1/64" narrower than a typical dado, rout all of its long edges with a 1/8" roundover bit and cut the



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Fig. A Exploded View

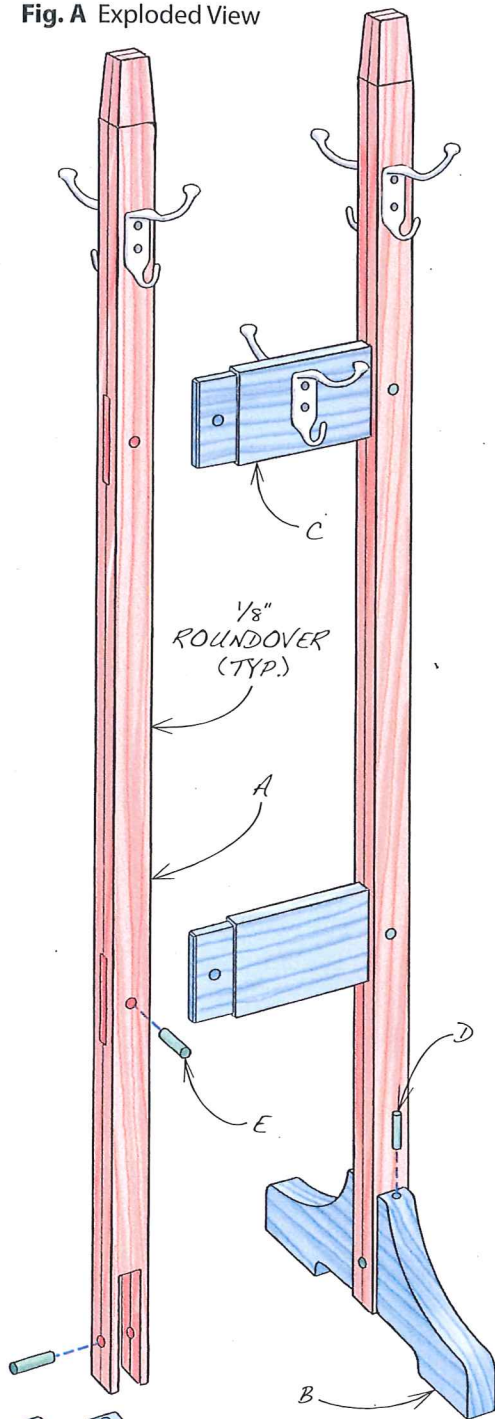


Fig. B Half-Post Layout

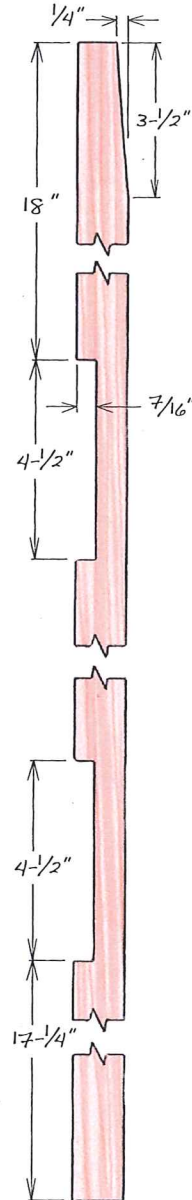


Fig. C
Mortise and
Tenon Joint

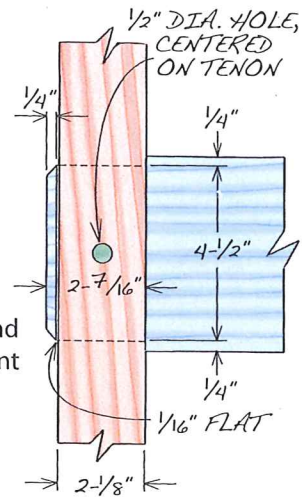
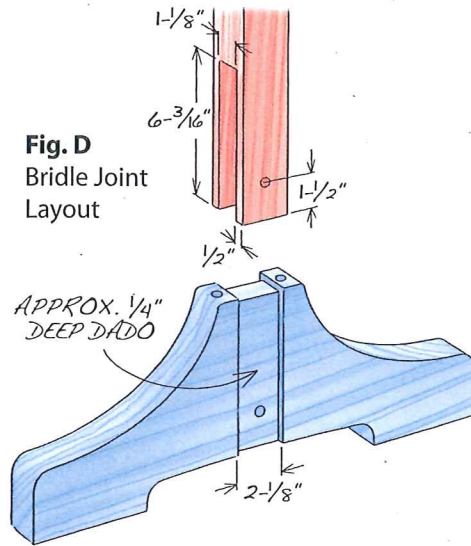


Fig. D
Bridle Joint
Layout



Cutting List

Overall Dimensions:
71-3/8" H x 12-3/4" W x 22" D

Part	Name	Qty.	Th x W x L
A	Half-post	4	1-1/16" x 2-1/4" x 70-1/4" (a)
B	Foot	2	1-5/8" x 7-5/8" x 22"
C	Rail	2	1-1/8" x 5" x 13-3/8" (b)
D	Dowel	4	1/2" Dia. x 2"
E	Peg	6	1/2" Dia. x 2-1/8"

Notes:

- After gluing the half-posts together, mill to final dimension: 2-1/8" x 2-1/8" x 70-1/4".
- Distance between shoulders is 8-1/2".

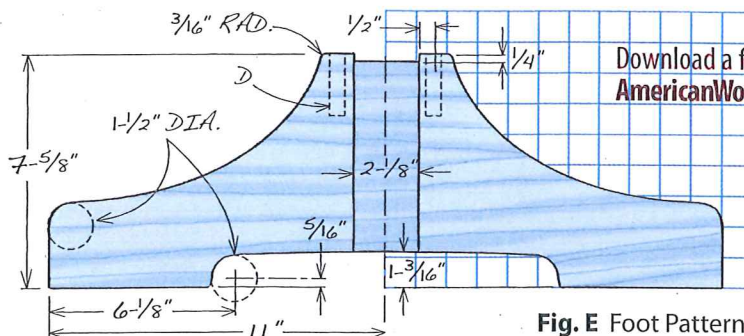
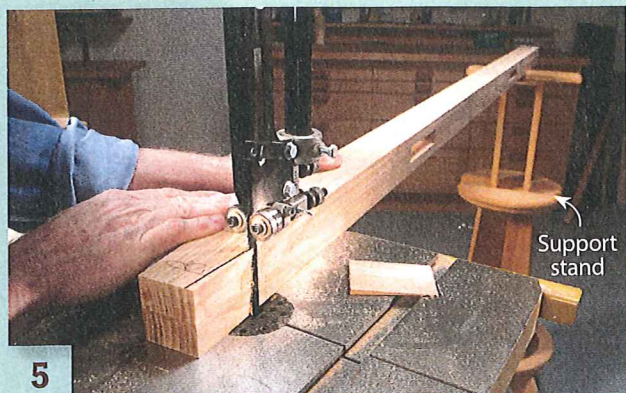


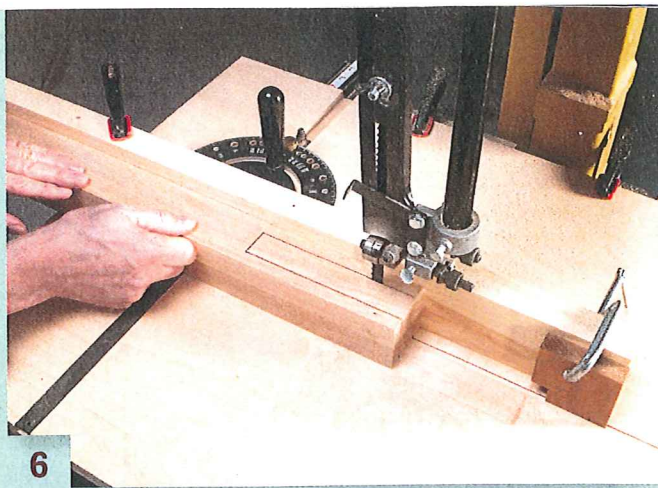
Fig. E Foot Pattern

Download a full-size pattern of this foot
AmericanWoodworker.com/WebExtras

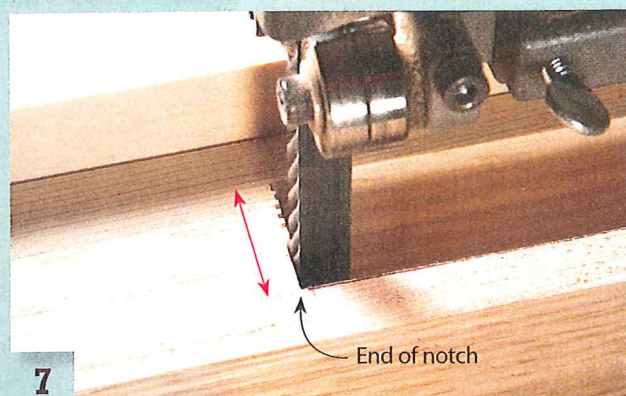




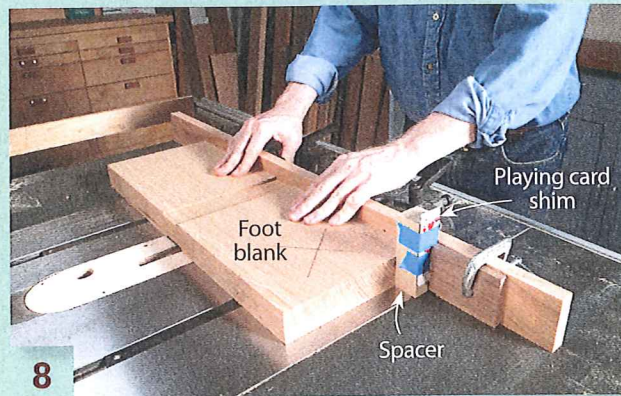
5 **Taper the tops** of the posts. The posts are almost 6 ft. long, so you'll need to support them with a stand that can be raised as high as your bandsaw's table.



6 **Saw the sides** of a long notch in the bottom ends of the posts. You'll need a fence for this operation—I made this one using a piece of plywood and my tablesaw's miter gauge.



7 **Remove most of the waste** between the two side cuts, then nibble away the end of the notch. In this setup, sliding the miter gauge back and forth produces an end that's absolutely straight and square.



8 **Cut dados** on the feet to fit into the notches. The width of the dados must exactly match the thickness of the posts. Add playing cards, one at a time, to a spacer in order to gradually increase the dado's width.

piece into four 3" lengths. Wrap each key with packing tape to prevent glue from sticking to it (masking tape isn't a good substitute, because it can tear). Keep adding layers of tape, if necessary, until the key fits the dado just right, without any wiggle.

Glue together each pair of half-posts (**Photo 4**). Use cauls to spread out the clamping pressure. Let the posts sit in the clamps overnight, then joint one side until the two halves are flush. Plane down the other side to the post's final width.

The tops of the posts are tapered on all four sides (Fig. B). Lay out the tapers on one side and saw them (**Photo 5**). Rotate the posts 90°, lay out the second pair of tapers and saw them the same way. Use coarse sandpaper and a block to flatten the tapers.

Next, draw long notches on the bottom ends of both posts (Fig. D). To cut the notches, I used a special table that I clamp to my bandsaw (**Photo 6**). The table is a 22" wide by 26" long piece of 3/4" plywood with a groove cut into it to fit my miter gauge. The table also has a bar underneath it that sits in the bandsaw's miter slot, plus a slot for the blade. I screw a long fence to the miter gauge to guide the work.

This setup will allow you to cut a perfectly straight notch

with square ends. First, set up a stop block on the fence to limit the length of the cuts. Position the fence so it's 1/2" away from the blade and clamp the fence to the table. Saw both sides of the notch. Next, temporarily tape a 1/32" thick shim on the stop block to shorten the lengths of the next cuts. Unclamp the fence from the table, shift it about 3/16", re-clamp the fence and make another cut down the inside of the notch. Repeat this operation until you've made about six parallel cuts in the notch's waste. Slide the miter gauge out of the way and make a series of angled cuts to remove the thin wafers of waste left inside the notch. Be sure to stop all of these cuts about 1/32" short of the notch's top.

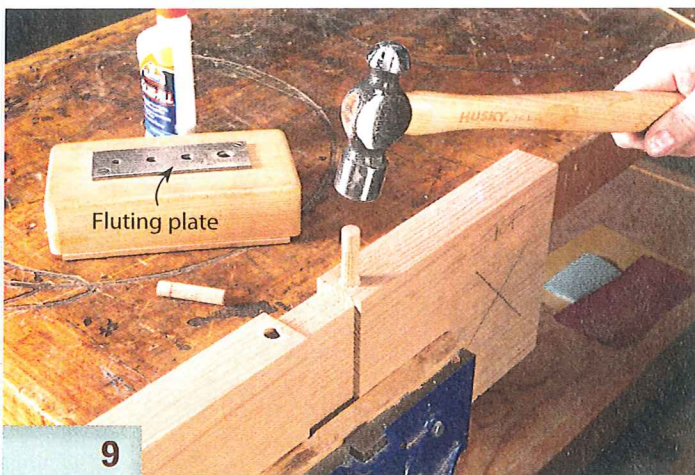
Move the miter gauge and post back and forth to nibble away at the stubble at the end of the notch (**Photo 7**). For the process to work, you must only remove a very small amount of material during each pass. Take a number of swipes, advancing the post each time, until the post butts up against the stop block. The result will be a square end.

Make the feet

The feet (B) are quite wide, so you may have to glue them up from two pieces. Mill two blanks to final size and mark their top edges. Cut dados across both faces and the top of each blank (Fig. D). The width and the depth of these dados are exactly the same all around. Draw the dados on both blanks.



Watch a video on how to set up and use this bandsaw fence system
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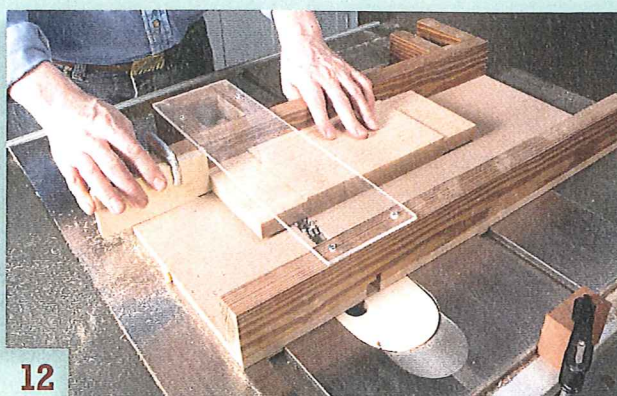
9 **Glue oak dowels** into holes alongside the dadoes. The dowels reinforce an area of short grain that will be created when you saw out the foot's profile. If your dowels fit too tight, compress them by pounding each one through a fluting plate.



10 **Cut out the foot's profile.** Drill two holes along the base of the foot first, using a Forstner bit in a drill press, so you don't have to saw a tight curve.



11 **Glue the foot** to the post. This bridle joint is difficult to pull together with more than one clamp, so don't make the fit too tight.



12 **Saw tenons** on the rails that will connect the posts. Use a dado set, making multiple passes on the end of each rail.

Stand up the blanks and mark the left side of each one with a big X, on both sides.

We'll fine-tune the *width* of the dadoes first, then the depth. Set up a 3/4" dado set in your saw and raise it 3/16" above the table (the final depth of the dadoes will be about 1/4"). I use the two-miter gauge setup for these cuts to ensure that the dadoes will be straight. Place one of the blanks against the fence of your miter gauge and line up the right side of the marked dado with the dado set. Butt a stop block against the end of the blank and clamp the block to the fence. Cut a dado across one side of the blank, flip the blank over (keeping the end marked X against the stop block) and cut the other side. Repeat these steps on the second blank.

Next, make a spacer that is 1-5/16" square. Place it against the stop block and cut more dadoes on both sides of the blanks. Remove the spacer and cut out the rest of the waste. You should now have a dado on both sides of the blanks that is about 1/16" narrower than its final width.

Add shims to the spacer to gradually increase the width of the dados (**Photo 8**). I use playing cards, cut in half lengthwise, and tape them to the block one at a time until the width is almost right, then add pieces of notebook paper on top of the playing cards until the width is perfect. How will you know when it's perfect? It's easy—place one of the posts on your

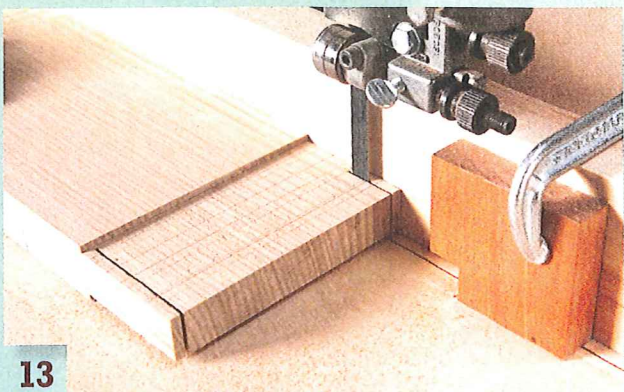
bench with the mortises facing up, then try to slide the blank along the top of the post. Keep widening the dado until you can push the blank with one finger.

Now for the dado's depth. Raise the dado set a little bit and re-cut both sides of the blanks. Try inserting the blank into the notch. Keep raising the blade, making more cuts, until the blank slides easily into the notch. Finally, cut a dado in the top of the blank by standing the blank on edge.

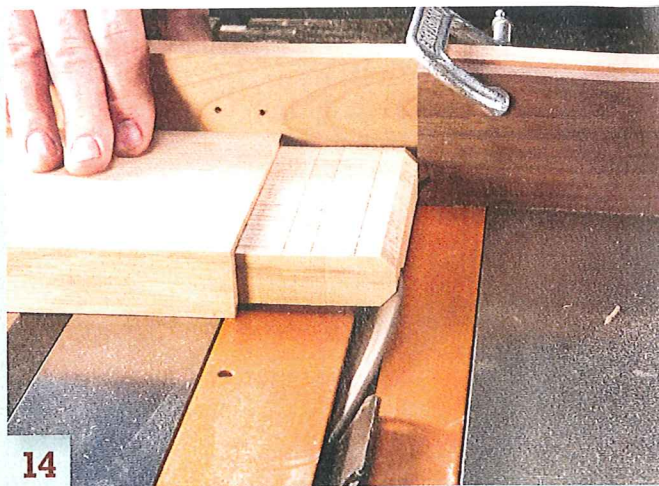
The original builders of this coat rack added dowels (D) to reinforce the feet (see Sources). Lay out holes for the dowels (Fig. E) and drill them by hand or on a drill press. Cut the dowels about 1/4" extra long and glue them into the holes (**Photo 9**). (My dowel rod was a bit too fat, so I pounded the pieces through a fluting plate to compress them—see Sources, page 41. I left the top ends of the dowels round, so the flutes wouldn't show.) Cut the dowels flush and sand them even with the top of the feet.

Draw the profile of the feet on the blanks (Fig. E). Drill two holes along the bottom of each foot using a Forstner bit, then saw the profile on the bandsaw (**Photo 10**). Sand the sawn surfaces, then rout a 1/8" roundover around the feet. Rout the same roundover along all the edges of the posts.

Glue the feet to the posts (**Photo 11**). I used Elmer's Glue-All because it seems to be more slippery than other kinds of glue—you sure don't want this long joint to get stuck halfway home!



13
Cut the shoulders of the tenons on the bandsaw, using a fence. Cut off the waste piece by hand.



14
Saw chamfers on the ends of the tenons. Use a stop block to control the width of the chamfers.



15
Drill holes for pegs which will lock the joints in place. To prevent blowout, insert a tight-fitting block into the mortise. Drill from both sides.



16
Glue the stand together. After removing the clamps, continue drilling the peg holes through the tenons, then add the pegs.

Make the rails

Mill the rails (C) to final dimension. Cut the tenons on the tablesaw (Photo 12). Aim for a fit that allows the rails to drop through the mortises without any pressure. On a large joint like this, there's a fine line between too tight and just right—lightly sanding or planing the tenons after cutting them on the saw may make all the difference.

Cut the tenon's shoulders on the bandsaw (Photo 13 and Fig. C). Use a handsaw to remove most of the waste, then pare the remainder with a chisel. Saw chamfers on all four sides of each tenon (Photo 14). Sand the chamfers and rout a 1/8" roundover on all four edges of the rails.

Final assembly

Lay out and drill holes for the pegs (E) that will go through the rails and the feet (Photo 15, Figs. C and D). Glue the sides of the coat rack together (Photo 16). Cut the pegs a bit extra-long and glue them in the holes. Trim and sand them flush.

Quartersawn oak is a wonderful wood to finish, and there are many ways to do it. For some ideas on how best to bring out its figure, visit the AW website at the address at right.

Add the hardware (See Sources) after you apply the finish. I found a company that makes beautiful reproductions of the hangers used on the original coat rack, but you may want to use hardware that's less expensive. 

SOURCES

- Woodcraft, woodcraft.com, 800-225-1153, #50A03, 1/2" Round Oak Dowel, 36" L, \$3.49 ea.
- Highland Woodworking, highlandwoodworking.com, 800-241-6748, Dowel Former for 1/4", 5/16", 3/8" and 1/2" dowel stock, #128251, \$14.99.
- Arts & Crafts Hardware, arts-n-craftshardware.com, 586-772-7279, Gustav Stickley Coat Hook, \$45 ea.
- House of Antique Hardware, houseofantiquehardware.com, 888-223-2545, 5-1/2" Cast Iron Mission Style Coat Hook, #R-010BM-9907, \$5.29 ea.



Stewart Crick

A lifelong woodworker, Stu writes, teaches and builds Arts & Crafts furniture from his Manassas, Virginia workshop. He also serves as an at-large director of the Washington Woodworkers Guild. Visit his website at www.stuswoodworks.com.



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