Pegged Post-and-Beam

Skeleton-and-skin construction is adaptable to a range of styles

BY CHRIS GOCHNOUR

The trouble with most armoires is that if they're big enough to fit all your clothes—or electronic gear, board games or books—they're too big to fit through the door. This was brought home to me forcefully on several occasions when I received distress calls from people who, knowing I was a furniture maker, thought I might have a trick for shrinking the armoire they just bought to get it through their doorway. I soon found myself amputating a foot here, prying off a glued-on crown molding there.... When I decided to build an armoire myself, I discovered that a fine solution to this doorway dilemma has been around for centuries: the post-and-beam cabinet with pegged mortise-and-tenon joints.

Dutch and German *kasts*, Spanish *trasteros*, French armoires and Chinese *gui* all were large storage cabinets designed around a straightforward post-and-beam structure, a system sturdy enough to have been employed as well to construct the very houses these cabinets resided in. Post-and-beam cabinet construction—vertical posts and horizontal beams connected by large mortise-and-tenon joints—creates a framework that, once secured with drawbore pegs, is very rigid and durable. Yet it can be easily disassembled into small, maneuverable components.

I particularly admire the beauty and grand scale of antique French armoires, and I've made several of them. But I've also built armoires in the Southwest style and the Arts-and-Crafts style, and I have found that the post-and-beam structure is adaptable to a range of styles.

Inside-out design

Designing a post-and-beam cabinet begins with its primary skeletal structure: four corner posts connected by wide rails top and bottom. The strength of the cabinet is derived mainly from these members and the joinery that connects them. For maximum stability in my large country French armoire—90 in. high, 57½ in. wide and 24 in. deep—I used posts a beefy

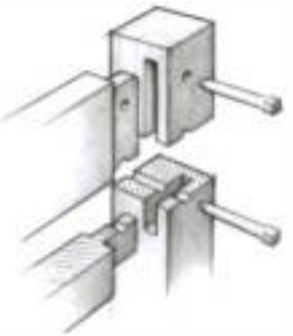
Three skins, one skeleton. *The author's armoires in an array of styles all use a centuries-old cabinet structure originally borrowed from post-and-beam houses. The post-and-beam structure makes a cabinet that is strong and handsome and perfectly accommodates wood movement. If the major joints are pegged instead of glued, the cabinet can also be knocked down for transport or repair. In the photo at right, the skeleton of a country French armoire in knotty alder stands dry-assembled with all its parts and panels leaning against it.*

Center photo: Ron Stout

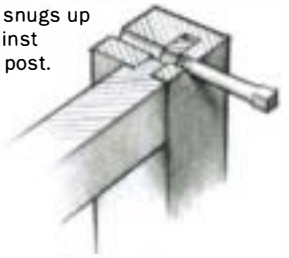
Armoire Knocks Down

GOT IT PEGGED

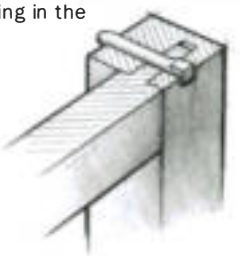
The mortise-and-tenon frame joints in the cabinet at left are held fast with drawbore pegs instead of glue, allowing easy disassembly for transport or repair.



Drawbore pegs actually pull the tenon home. The hole through the tenon is offset slightly toward the shoulder so that when the peg is pounded in, the rail snugs up against the post.



The shaft of the peg is waxed to make driving it easier. The square head bites in the round hole. To prevent splitting harder woods, square the hole with a chisel before driving in the peg.



The peg extends through the post. Disassembling the joint requires just a few taps from inside with a hammer and a drift pin to knock out the peg.

Color-coded layout. *Post layout is the most complex and crucial aspect of preparing to make a post-and-beam cabinet. To keep track of all the different parts that meet at the posts as well as the joints that secure them, the author uses a different colored pencil for each element.*

2⅝ in. sq. with rails ranging from 4 in. to 8 in. wide. Posts this big can accommodate large mortises without being unduly weakened; rails this wide have room for substantial shoulders along with wide tenons. On the widest rails, I used two tenons and left a bridge between them because a single large mortise would eliminate too much material and compromise the strength of the post.

After the basic skeleton is designed, I subdivide the cabinet sides and back using rails and muntins. The subdivision creates smaller, more manageable panel sizes, has a strong visual effect and contributes to the overall strength of the cabinet.

Embellishing the framework is the final step in the design process. Because the primary skeletal structure doesn't differ much from piece to piece, it is largely the details that distinguish one post-and-beam cabinet from another. These can include decorative panels, doors, crown and other moldings, turnings and carvings.

Layout is the linchpin

Laying out the joinery on the posts is the most complex and critical aspect of building a post-and-beam cabinet, because it is here that all of the components come together. On just one post there will be as many as eight mortises, 14 peg holes, two panel grooves, two notches for the top and bottom, and a dozen or more half-round notches for shelf supports. To make sense of this blizzard of joinery, I use a different colored pencil for each operation—one for mortises, another for peg holes and so on. I lay out the joinery in this order:

- mortises for the rails
- notches for the cabinet top and cabinet bottom
- holes for the pegs
- rounded notches for adjustable shelf supports
- grooves for the panels

And then I set about machining all the joinery, following the same sequence.

Machining the legs

I use a horizontal boring machine to cut the mortises and a benchtop hollow-chisel mortis-

Notch it. *After cutting the mortises for the rail tenons, the author uses a hollow-chisel mortiser to notch the posts where they accept the corners of the cabinet top and cabinet bottom.*

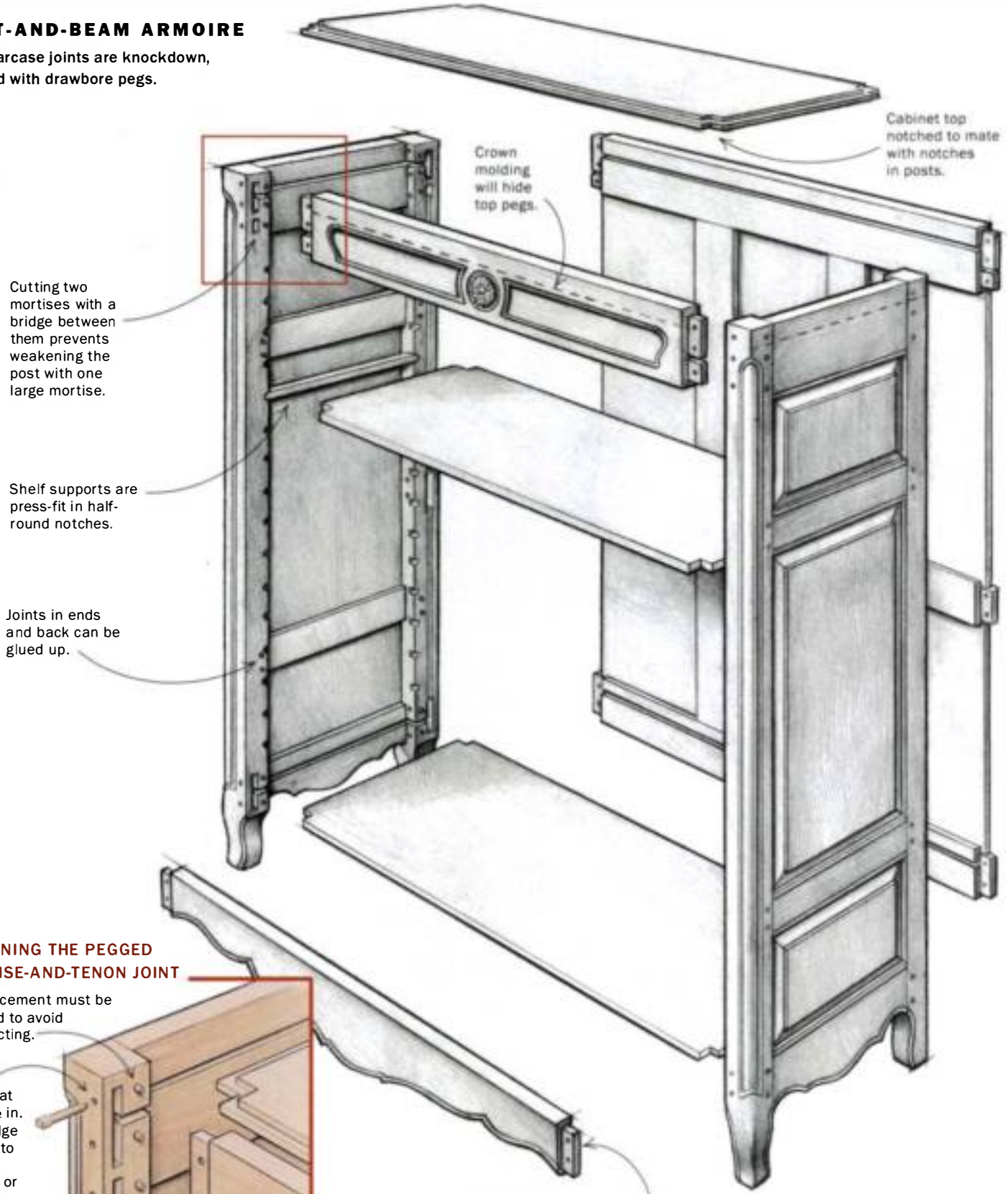
Temporary tenon. *A scrap the same thickness as the tenon fills the mortise to prevent tearout as the holes for the pegs are drilled.*

Double drilling. *Pairing up the posts makes it easy to cut the half-round notches for the shelf-support bars. It also ensures the notches will correspond exactly in height.*

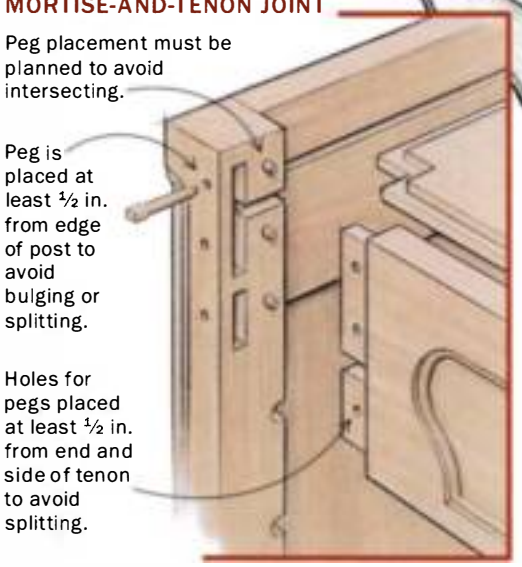
Photos except where noted: Jonathan Binzen

POST-AND-BEAM ARMOIRE

Main carcase joints are knockdown, secured with drawbore pegs.



DESIGNING THE PEGGED MORTISE-AND-TENON JOINT



Drawings: Bob La Pointe

Precisely off-center. *To give the drawbore peg its pull, the hole through the tenon must be offset toward the tenon's shoulder. The author marks the post hole's center point on the tenon with a brad-point bit (above). Then, using a low fence registered off the tenon shoulder (right), he sets up to drill the holes 1/32 in. from the center point. The fence also backs up the cut to eliminate tearout.*

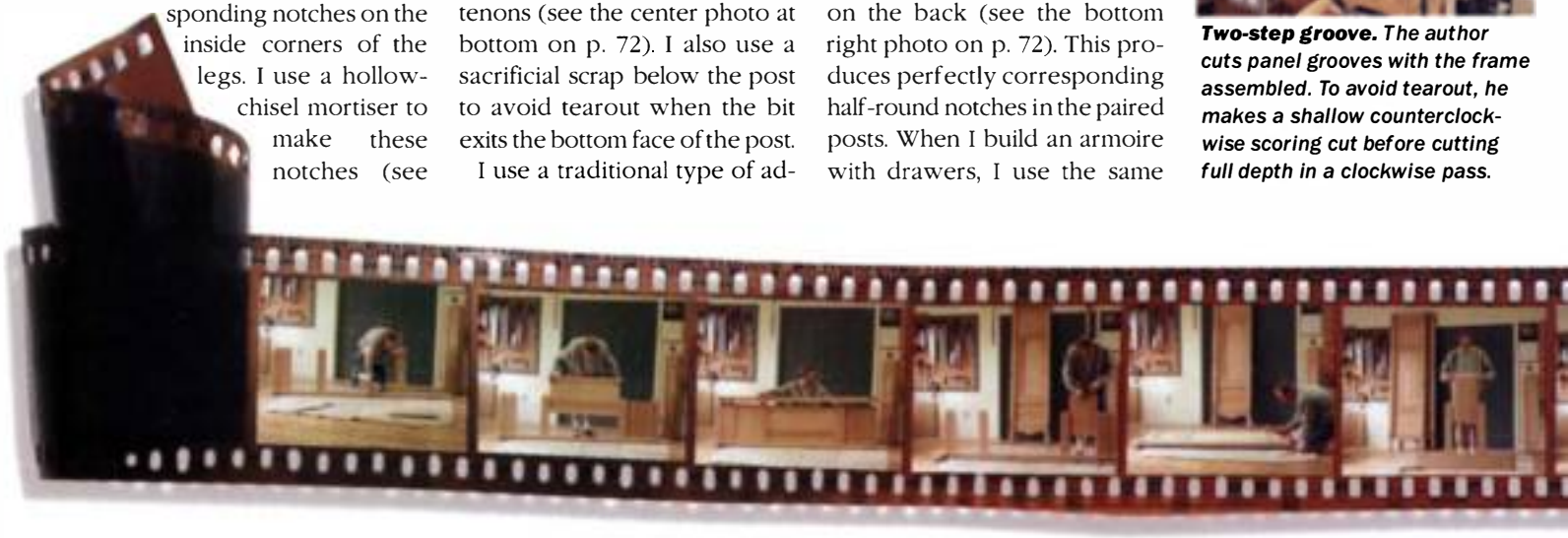
er to square up the ends. But you can cut the mortises in several different ways (see *FWW* #130, pp. 58-63) as long as you lay them out properly, size them correctly and mill them cleanly. I cut the tenons on the tablesaw with multiple passes over a dado head and adjust to a piston-fit with a shoulder plane.

Because the cabinet top and cabinet bottom float in a groove in the rails, I must make corresponding notches on the inside corners of the legs. I use a hollow-chisel mortiser to make these notches (see the bottom left photo on p. 72), but simply drilling a series of holes and then squaring them up with a chisel works fine.

After the peg locations have been laid out, I drill the holes for them on a drill press. I use a fence to ensure a consistent location of the holes on each leg. To eliminate tearout as the drill bit pierces the mortise, I fill the mortise with a scrap of wood the same thickness as the tenons (see the center photo at bottom on p. 72). I also use a sacrificial scrap below the post to avoid tearout when the bit exits the bottom face of the post.

I use a traditional type of adjustable shelving, one suited both to the style and the structure of post-and-beam cabinets. For shelf supports, it uses wooden bars, which are press-fit into rounded notches in the posts. To make these notches, I clamp the front and back legs together, being careful that they are aligned at the ends. Then I drill a series of holes with a Forstner bit so that half of each hole is on the front leg and half on the back (see the bottom right photo on p. 72). This produces perfectly corresponding half-round notches in the paired posts. When I build an armoire with drawers, I use the same

Two-step groove. *The author cuts panel grooves with the frame assembled. To avoid tearout, he makes a shallow counterclockwise scoring cut before cutting full depth in a clockwise pass.*



notches to house side-mounted wooden drawer runners.

Clamp up the side frame for more machining

The next two steps are best accomplished with the cabinet's sides assembled, without panels. Later, I will disassemble the sides, assemble the back and repeat these steps.

I groove the legs and rails for the panels they will hold and cut the grooves with a router. Using a slot cutter with a bearing wheel, I just run the router around the frame. The one drawback to routing the grooves this way is that you wind up with rounded corners, but a sharp chisel makes quick work of squaring them up.

With the frame still clamped snugly, I insert a brad-point drill bit into each peg hole and, with a twist of my fingers, mark the hole's center point on the tenon. Then I disassemble the cabinet side and drill the peg holes through the tenons on the drill press. I don't drill right on the center-point marks, but 1/32 in. toward the tenon's shoulder. When the peg is driven through, this vital 1/32 in. offset draws the tenon home tight and keeps the joints from loosening over time. In a cabinet built of soft wood, I would make the offset a shade more than 1/32; in the hardest woods, a shade under.

The humble peg

Holding all this work together is a handful of little pegs. I always make them of hardwood, and whatever wood I choose, I make sure it is as hard or slightly harder than the wood the pegs will be driven into.

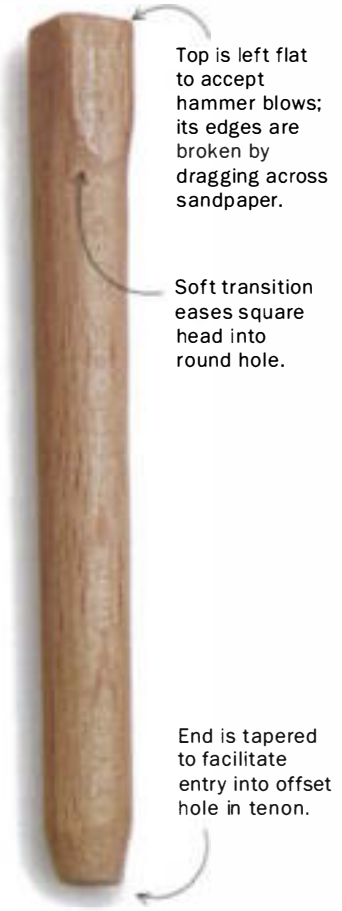
I make the pegs by first milling square blanks 2 or 3 ft. long. I round 2½ in. or so at either end of the stick using a beading bit on a router table. Because the center section of the blank remains square, I still get good registration against the router table and fence even after the ends are cylindrical. Next I taper both ends of each long stick by turning them against a belt sander. Finally, I cut a peg from each end of the stick, leaving a ½-in.-long square section at the head. I repeat the steps to make more pegs, continuing until the blanks are getting too short to hold safely.

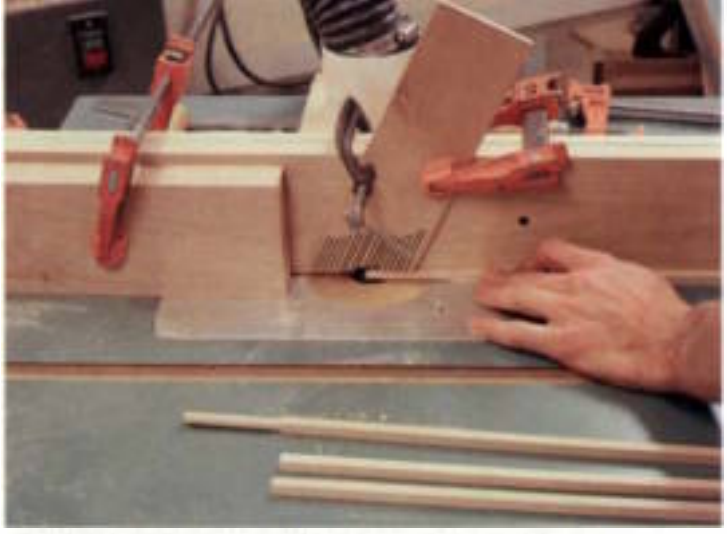
When I'm finished, I wax the peg shafts and get to the fun part—driving them home. □

Chris Gochnour builds furniture in Salt Lake City.

PROFILE OF A PEG

This cabinet uses a 3-in. peg for its 2⅝-in. posts. The pegs start out as 7/16-in. square blanks. For this alder cabinet, the pegs are made of beech because it is a harder wood.





Pegs' parents. *The author starts with long, square blanks and rounds a section at each end with a beading bit on the router table. He tapers the ends against a belt sander and then cuts the pegs to length on the tablesaw.*

Don't forget to steer when you drive. *An adjustable crescent wrench keeps the head of the peg from twisting as it is driven home. The author leaves the peg one hammer tap proud of flush with the post.*