

# Build a Bookcase with Doors

*Structure and details make the difference in this Shaker-style case*



by Christian Becksvoort

**T**he essence of good design is a piece of furniture that seems right just the way it is. There should be nothing to add and nothing to take away to improve it. That's what I aimed for with this cherry bookcase. It was to be Shaker inspired, quiet and unpretentious, but not boring.

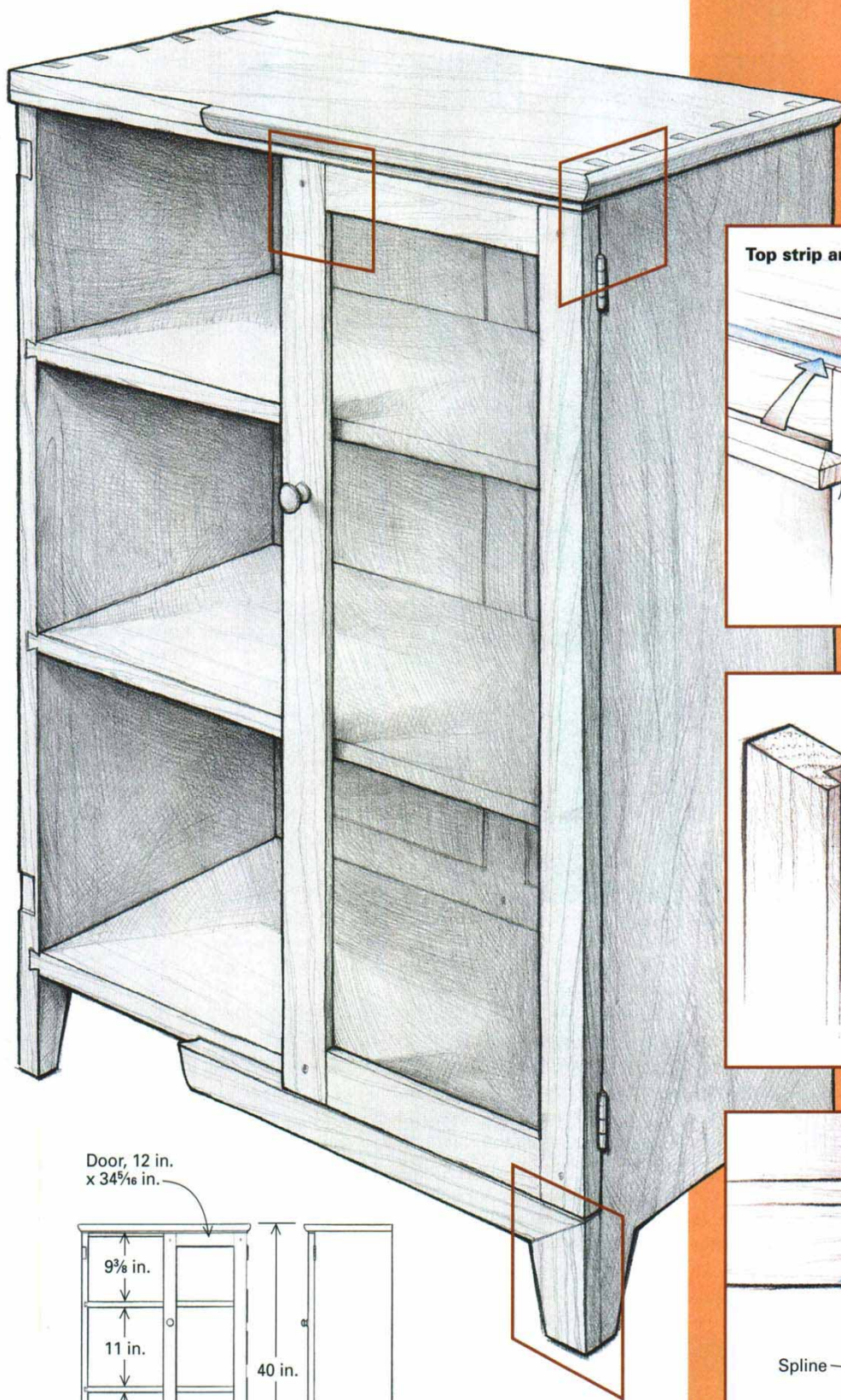
The bookcase needed to fit beneath a window sill, so it is relatively small, about 24 in. wide and 40 in. high. Its appearance and size are not overpowering, so I relied on careful workmanship and just a few details to carry the design. Each of these construction details—a dovetailed molding at the top of the case, a mitered base

and a strip of wood whose end grain doesn't show just above the doors—required a fair amount of extra work. The details don't jump out at you, but together they give the bookcase an appeal that it wouldn't otherwise have.

## **Dovetails hold the case together**

The basic structure of this bookcase is quite simple: Two sides dovetailed to the top and three shelves connected to the sides with sliding dovetails. A frame-and-panel back is set into a rabbet at the case's back. To begin, I milled, crosscut and ripped to width

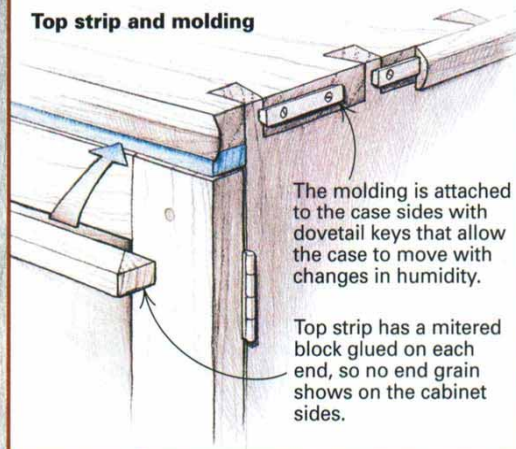




## Key design details

As with most Shaker-style designs, this bookcase relies more on its proportions and quality craftsmanship than on flash or ornament for its beauty. A few simple details elevate it above the ordinary.

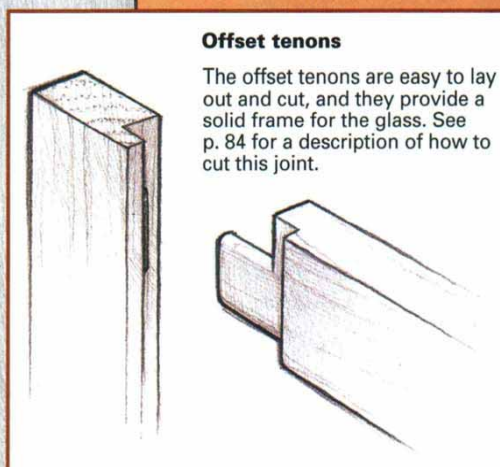
### Top strip and molding



The molding is attached to the case sides with dovetail keys that allow the case to move with changes in humidity.

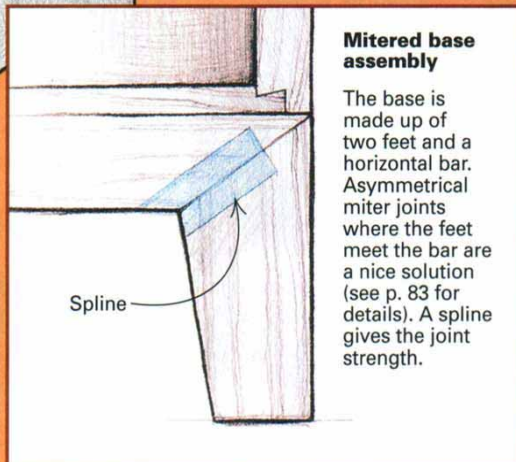
Top strip has a mitered block glued on each end, so no end grain shows on the cabinet sides.

### Offset tenons

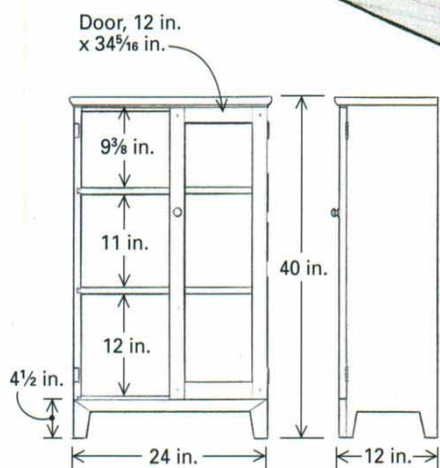


The offset tenons are easy to lay out and cut, and they provide a solid frame for the glass. See p. 84 for a description of how to cut this joint.

### Mitered base assembly



The base is made up of two feet and a horizontal bar. Asymmetrical miter joints where the feet meet the bar are a nice solution (see p. 83 for details). A spline gives the joint strength.





## Three tips for smoother dovetailing



*Picture-frame clamp keeps top and side at 90° for layout.*



***Keep the case square.** A piece of scrap cut to the interior dimension of the bookcase and placed at its base keeps the sides of the bookcase parallel and ensures that the top will clamp up square to the sides.*



***Sliding dovetails are glued just at the ends.** By leaving the joint dry until it's within 2 in. or 3 in. of home, the author prevents the dovetails from binding. The mechanical connection is plenty strong even without glue in the middle.*

the top and two sides from a single wide cherry board. I cut the rabbet for the back panel in the rear inside edge of each piece, and then I laid out and cut the dovetailed slots in the top. Because the top overhangs the sides by  $\frac{3}{4}$  in. at the front of the case, the half-slot there is set back  $\frac{3}{4}$  in. from the edge. To lay out the pins on the top of the sides, I used a picture-frame clamp, which holds the top and a side at precisely 90° to each other (see the photo at left above). Then I cut and chopped the pins.

I cut the foot profiles in the sides on the bandsaw, then laid out and routed the dovetailed slots for the three fixed shelves using a shop-built fixture to guide the router (described in *FWW* #119, p. 74). Before gluing the top and sides together, I sanded the insides. To be sure the top and sides glued up square, I placed a spacer stick between the two front feet when gluing and clamping the three pieces together (see the top right photo).

Routing the sliding dovetails on the ends of the shelves was next. After planing the shelves to thickness, then ripping and crosscutting them, I used the offcuts to set the fence on my router table. Once I had a perfect fit, I routed the dovetails on both ends of all three shelves and sanded them.

One at a time, I slid each shelf into its slot from the front, stopping

when 3 in. of shelf was still exposed. At this point, I applied glue to the dovetails at the top and to the slots underneath and tapped the shelf home, stopping when it was flush with the back rabbet and with the front (see the bottom right photo). I clamped the case from side to side, both front and back.

I built the frame-and-panel back about  $\frac{1}{8}$  in. wider and longer than its opening. To fit it to the case, I started by running the top edge over the jointer, fitting one side and then, carefully, the other. I was careful to take even amounts off both sides. With help from a little block plane, the back eased in nicely.

After sanding the back, I held it in place, marked the location of the shelves on the back of the frame and glued the back into its rabbet. After the glue had dried, I drilled holes for 6d finishing nails at the marks I had made, one at the center of each shelf and one near each end. I countersunk these nails about  $\frac{1}{8}$  in. deep and plugged the holes with whittled down cherry pegs. Then I sanded the back and softened all the edges with a worn piece of 220-grit paper.

There's only about 1 in. of case side extending below the bottom shelf and only the first and last 3 in. of the shelf is glued. So I glued and screwed two small blocks on the underside of the bottom shelf, one at the center of each end. I sanded the bottom edges of

the sides and back, as well as the angled sides of the feet. A belt sander quickly removed the rough spots, and a little hand-sanding eliminated the scratches.

## Miters solve two aesthetic problems

I planned to hang the double doors so they went all the way to the outside edges of the case rather than inside the case. This would leave the doors standing  $\frac{3}{4}$  in. off the front of the bookcase unless I added two horizontal strips of wood across the case front to even things out. One strip would go just above the doors and one just below. But I didn't want end grain showing on the sides of the case at the ends of the top strip, and I wasn't sure how to integrate the bottom strip into the foot assembly without it looking awkward. As it turned out, the solutions to both these design problems involved miters.

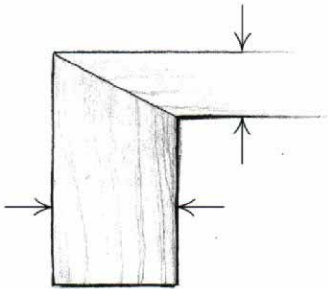
For the top strip, I decided to miter both ends and glue on little blocks oriented in the same direction as the case sides. Because the strip was glued to the overhang of the top as well as to the edge of the case sides, the end grain glue-up wasn't a problem. I started by

cutting a strip  $1\frac{3}{16}$  in. sq. and 28 in. long from heartwood scrap left over from the sides. I set the blade at  $45^\circ$  and ripped just shy of 4 in. into this strip on the tablesaw, keeping the kerf on the waste side of the diagonal center and carefully backing out the strip from the blade. I crosscut the strip at 24 in. and set that piece aside for a moment. Then I cut two  $\frac{7}{8}$ -in.-long pieces from the ripped triangular section. I mitered one end of the 24-in.-long piece at  $45^\circ$ , held it in place on the case, then marked and mitered the other end. I glued one of the little  $\frac{7}{8}$ -in.-long blocks at each end of the 24-in.-long piece, using masking tape as a clamp.

After the glue had dried, I carefully jointed the strip at the ends and ripped it to  $\frac{7}{16}$  in. wide by  $\frac{3}{4}$  in. deep. I glued the piece to the top of the case, under the overhang. As a result, all you can see from the front or sides is face grain.

The foot assembly—two feet and a horizontal bar connecting them—is made using asymmetrical miters (see the drawing and photos below). I started with a single piece  $\frac{3}{4}$  in. thick, 2 in. wide and 34 in. long. Then I cut a 5-in.-long piece off each end. After ripping the long piece to  $1\frac{1}{4}$  in. wide, I laid out the miters, as shown

## A quick miter for stock of different widths



### 1. Lay out the miter.

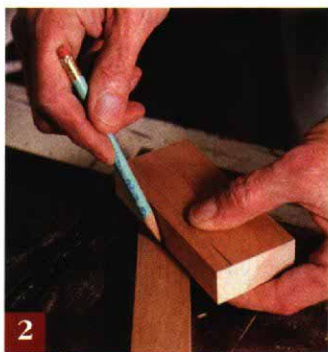
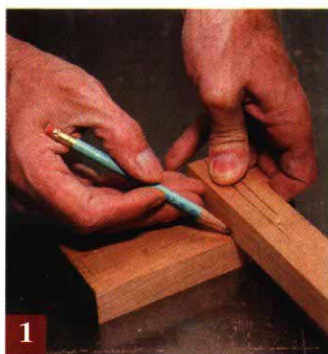
*Holding the horizontal bar on the foot piece, the author marks the face of the foot and the bottom edge of the horizontal bar.*

### 2. Connect the dots.

*Straight lines between these marks and the corner of each piece establish the miters.*

**3. Cut to the line.** *The author uses a bandsaw to cut each miter, then trues them up on a disc sander. A handsaw and plane would work just as well.*

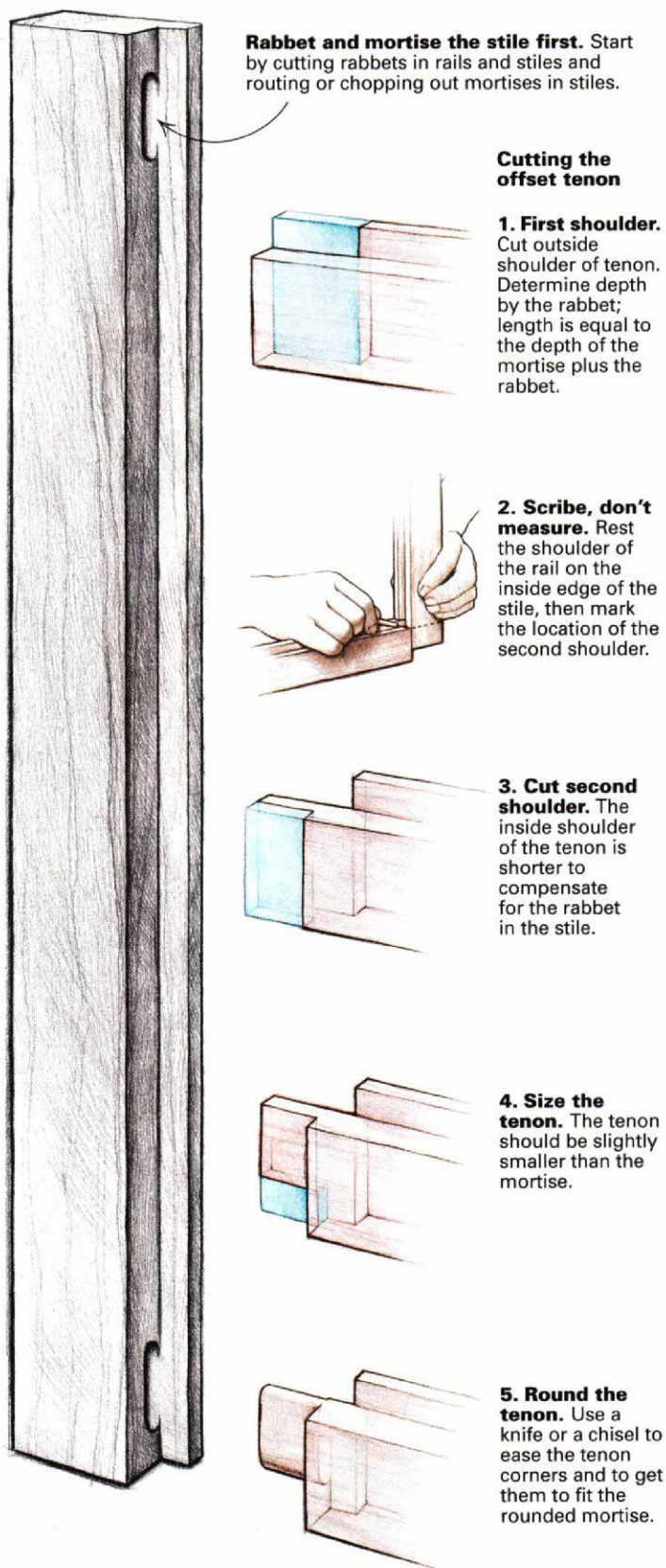
**4. Attach the base assembly to the case by gluing it to the case sides and the bottom half of the bottom shelf. The top half of the bottom shelf is exposed and acts as a doorstop.**





## Frame joinery that you don't have to measure

The offset tenon shoulders on the rails make these door-frame joints look more difficult than they really are. The only real trick to getting joints that fit perfectly is to use the first shoulder as a reference when laying out the second, as shown below.



in photos 1 and 2 on p. 83. I cut the miters close to the line on the bandsaw (see photo 3 on p. 83) and sanded right up to the line on a disc sander.

To give this joint some strength (it's just end grain meeting end grain), I used a 1/4-in.-thick spline that stops short of the top of the joint, so it's hidden from view (see the drawing of the mitered base assembly on p. 81). When I glued up the assembly, I used a bar clamp to pull the joint in from end to end and two hand screws to exert pressure top to bottom. Once the glue had dried, I ran the whole assembly along the rip fence, crosscutting the legs to 4 1/2 in. Then I cut the foot angles and trimmed the protruding splines on the bandsaw. I sanded the underside of the horizontal bar and the foot angles next and glued the assembly onto the case (see photo 4 on p. 83).

To make the feet a little beefier, I installed glue blocks on their inside corners where the sides meet the front and the back. I took a piece about 7/8-in.-sq. and 10 in. long and ripped it diagonally on the bandsaw, using a V-block as a cradle. Then I held a piece in each corner, marked and cut it to its actual length and planed the bandsawn face smooth. I glued one into each corner, using a spring clamp for pressure.

After beltsanding the feet flush on the bottom, I drilled a 1/8-in.-deep, 3/4-in.-dia. hole in the center of the bottom of each foot with a Forstner bit. I drilled a 1/16-in.-dia. pilot hole in the center of each of those holes, then nailed in nylon furniture glides. Only about 1/16 in. protrudes, so they are not visible unless you happen to be lying on the floor. After using a block plane to chamfer the feet lightly all the way around, I sanded the whole case to 320-grit. Then I followed up with 0000 steel wool and eased any sharp edges.

## Door-frame joinery looks tricky—but isn't

The two door frames for this bookcase are joined with mortise-and-tenon joints and are rabbeted in the back to accept glass. I used quartersawn stock for the frames, both to minimize wood movement and for appearance. After choosing the frame pieces and cutting them to length, I rabbeted them, making two cuts on the tablesaw. I saved the waste strips from the rabbeting operation for use as glass retaining bars. I laid out and bored the mortises in the four stiles next.

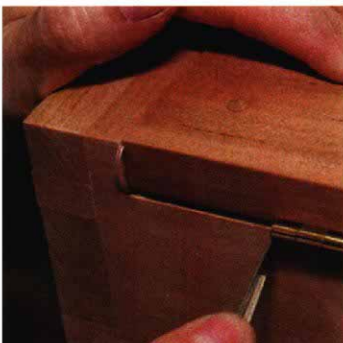
The rail tenons are a bit complex conceptually because they have offset shoulders, but the work is actually quite simple. The drawings at left explain the process. I cut the tenons on the table-saw, setting the fence for the shoulder distance and using the miter gauge to keep the cut straight. Then I eliminated the waste up to the cheek by running the rails back and forth over the blade beginning at its leading edge, taking off just a little with each pass over the blade. As the drawing at left shows, the trick to getting the shoulders to line up perfectly is to mark the second shoulder while using the first as a depth stop.

After all the tenons were cut, I rounded over their edges with a knife. Once they all fit, I glued and clamped the frames together, checking to be sure they were square. When the glue had dried, I pinned the joints all the way through with 1/4-in.-dia., 7/8-in.-long sections of cherry dowel. I used only one pin per joint because the tenons are quite small. Then I sanded and steel-wooled the doors as I had the case.

Fitting the doors was straightforward, I placed the case on its back on sawhorses and aligned the first door flush with the outside edge. I marked and jointed the top square, then the bottom, and repeated the process for the other door. I always try to get a



## My 10¢ trick for hanging doors



**Hinge location is marked on the edge of the case sides.** Pinching a dime—about  $\frac{3}{64}$  in. thick—between the top of the stile and the case gives the author the reveal he wants at the top of the door. Waste is removed with a laminate trimmer; then the joint is cleaned up with a paring chisel.



reveal of  $\frac{1}{16}$  in. or less at the top and about  $\frac{3}{32}$  in. at the bottom. Doors droop over time; they never creep up. Finally, I planed the inside edges of the two doors to get a  $\frac{3}{32}$  in. reveal between them. Because I used quartersawn stock, total movement for both doors, side to side, should be less than  $\frac{1}{16}$  in.

I hinged the doors with 1½-in. broad brass hinges from Whitechapel Ltd. (P.O. Box 136, Wilson, WY 83014; 800-468-5534). I laid out the hinges in the doors first, scribing around the hinges with a knife. I routed out most of the waste for the door-hinge mortises using a laminate trimmer, and then I cleaned up the corners and edges with a wide chisel. I installed the hinges in the doors, waxing the screws to ease their entry.

To lay out the positions of the hinge mortises on the edges of the case sides, I laid the doors on the case, one at a time. I made sure the outside edge was flush while I pinched a dime between the top rail and the top of the case (see the photo at left above). I made a knife mark on both sides of each hinge, then removed the doors.

To lay out the perimeter of these hinge mortises, I laid a door upside down on a sawhorse, right next to the case, and held a hinge in place between the knife marks I'd just made. The barrel of the hinge acted as a depth stop, allowing me to mark out the perimeter of the mortise.

Before attaching the doors to the case, I

drilled for the knobs, which I'd already turned. To install the knobs, I dabbed a little glue in their mortises and used a hand screw to exert pressure on the knob until it was fully seated. I drilled holes in the upper shelf for round magnetic catches and recessed the strikes into the backs of the door stiles.

I applied a thumbnail molding on the front and sides of the bookcase. It is attached to dovetailed keys on the sides (see the photo below), so the molding wouldn't prevent the sides from moving (see *FWW* #122, pp. 52-55 for a more complete description of this process). Once the molding was finished, I sanded the back of the molding flush and sanded the entire top through 320-grit, finishing with 0000 steel wool.

After three coats of Tried and True varnish oil, steel-wooled between coats, the doors were ready for glass. I removed the doors and cut the retainer strips to length, leaving their ends square. Then I predrilled and nailed them in place over the glass with ½-in.-long brass escutcheon pins. After the doors had been rehung, I added leather buttons to the door stops, top and bottom, to deaden the thunk as the doors are shut. □



**Molding is attached to case with dovetail keys.** This prevents the case from cracking by letting the side expand and contract.

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