Building a Tinware Cupboard

Flush panels modify a Shaker design

by Christian Becksvoort

The author's Shaker-inspired tinware cupboard is a functional piece that fits well in almost any room. The cupboard on the right is cherry with an oil finish. The other is birch, which Becksvoort ebonized on the outside and left natural on the inside. Adding to the beauty of each is a frame-and-panel back, shown on the cherry cupboard.

This Shaker tinware cupboard is a fascinating piece because it breaks all rules of proportion. The golden rectangle, a proportional principle used since ancient Greek civilizations, maintains that a height-to-width ratio of 1.6-to-l is most harmonious, and other proportions create conflict. Yet this cupboard's size is what makes it one of the most versatile pieces I build. It is equally suitable in a hallway, bedroom, bath, kitchen or living room—anywhere space is at a premium-to store crystal, linens, clothes, camera equipment, papers, books, canned goods or even stereo components. My adaptation of the tinware cupboard is based on a Shaker original I saw at the Renwick Gallery of the Smithsonian Institution, Washington, D.C., in 1973. Built in New Lebanon, N.Y., the dark red painted pine piece was probably used in a kitchen or pantry.

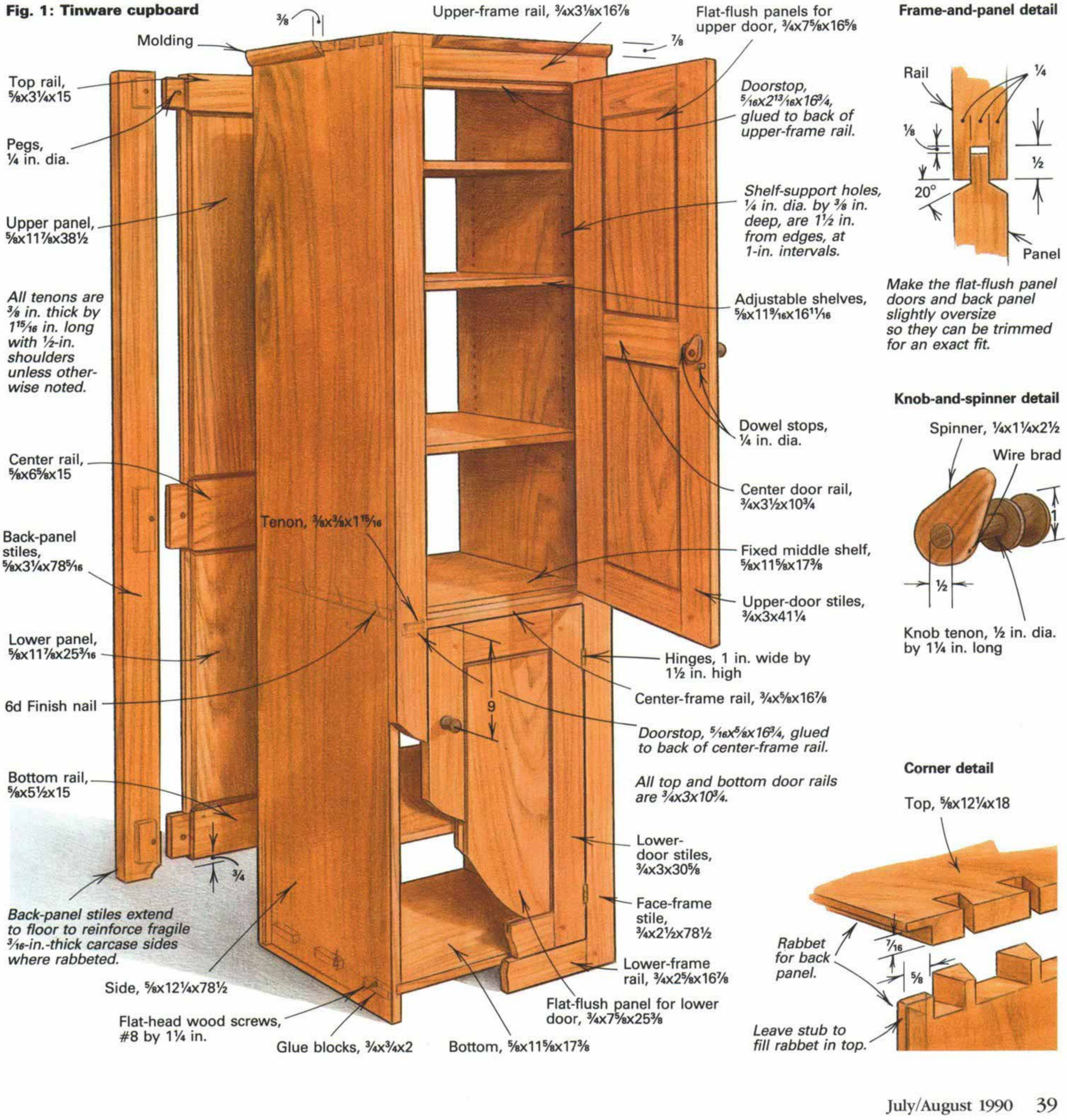
The first few cupboards I built were faithful reproductions, scaled from a photo. Since then I have made a few minor changes, such as lighter stock and movable shelves. I usually make the carcase from ⅝-in.-thick edge glued cherry and use ¾-in.-thick stock for the face frame and doors. The top and sides are rabbeted to receive the back and are dovetailed together, while the fixed middle shelf and the bottom are dadoed into the sides. The bottom is also screwed to the sides through glue blocks. Visually and structurally, the most important changes were to replace both the slab back and raised-panel doors with frames and flat-flush panels, as shown here, which give the piece a distinctive look while accommodating the natural expansion and contraction of the solid-wood doors and back panels. The face frame and flat-flush back panel are mortised and tenoned, and then glued to the carcase, resulting in an extremely rigid piece. Because five of the shelves are adjustable, rather than fixed as in the original, the cabinet is adaptable to a variety of storage requirements. And, instead of exterior spinners and a lock, I use interior spinners operated by the doorknobs.

While I usually prefer an oil finish on natural cherry pieces, I was intrigued by John McAlevey's article on ebonizing wood (*FWW* #76, pp. 47-49), a process that chemically dyes the stock, yet lets the grain show through. The Shakers often ebonized their chair frames, and so I thought why not an entire case? I experimented with one of my cupboards, making the carcase out of birch and leaving the interior natural to contrast with the dark ebonized exterior. When the doors are opened, the light, bright interior is a bit of a surprise, as you can see here.

Carcase construction—To build this cupboard, you will need about 60 bd. ft. of cherry or birch, most of which gets glued up into four slightly oversize panels. Two panels, ¾x12½x80, will make the sides, and two more, ¾x12½x70, will be cut into the top and bottom, the fixed middle shelf and five adjustable shelves. After planing these panels to ⅝ in. thick, cut the individual pieces to the correct lengths and widths given in figure *1* below. On the tablesaw, rip a ⅝-in.-wide by 7⁄16-in.-deep rabbet along the inside back edges of the two sides and top to receive the back panel. To dovetail the sides to the top, begin by laying out and cutting the tails on the top. The tails at the front and back edges are half-tails, and the tail at the back edge is positioned so the pin on the side does not interfere with the back-panel rabbet. Six more tails are equally spaced between the front and back tails. Now, secure the top to the sides with a 90° angle clamp, and lay out the pins by scribing the sides with a knife. Because I'm used to cutting pins for dovetails in a vertical position, I clamp the sides to the stringer of my open stairway and stand on the stairs to cut the pins. You may find it easier to lay the sides on sawhorses to cut the pins. When cutting away the waste for the pins, leave a stub at the back of the sides to fill in the gap left by the back-panel rabbet cut in the top, as shown in the detail in figure 1. Before assembling the top to the sides, rout the dadoes for the bottom and the fixed middle shelf, guided by the dual-fence router jig shown in the top, left photo on the next page. These dadoes can also be cut on the tablesaw guided by the miter gauge, but I find this operation unwieldy with long side panels. After sanding the interior surfaces, beginning with 120-grit paper and working up to 220-grit, I assemble the top to the sides. When clamping the dovetails, a spacer about a foot below the top keeps the sides from pulling together as the clamps are tightened (see the photo at right on the next page).

While the glue dries, sand the middle shelf and bottom as before, working up to 220-grit sandpaper. Slide the middle shelf into the dadoes and toenail it from underneath with three 6d finish

Fig. 1: Tinware cupboard



Left: This dual-fence jig guides the router from both sides, minimizing any possibility of miscutting the dado, and it is long enough to rout both side panels at once. The batten clamped beside the jig aligns the panels.

Right: To bold the sides in position for installing the top, the author clamps them to the workbench and a sawhorse. A spacer wedged between the sides prevents the clamps from bowing the sides during glue-up.

Below: This shopmade drill guide automatically spaces holes for movable shelf brackets and locates them 1½ in. from the carcase edge. A ½-in. dowel on the drill bit controls the depth of cut.

nails per side. You could glue the shelf in place, but it isn't really necessary because the rear panel and face frame will prevent the sides of the carcase from spreading. The bottom is assembled the same way, but for extra support, I prefer to add three ¾x¾x2 glue blocks to each side and screw up into the shelf, as well as into the sides (see figure 1). Using three separate blocks, rather than a single cleat, allows the solid-wood sides and bottom to move as moisture conditions change. While you are working on this end of the carcase, lightly chamfer the bottom edges of the sides. This makes it easier to move the cupboard across the floor.

Now that the case is fairly rigid, but before the back goes on, I drill the ¼-in.-dia. by ⅜-in.-deep shelf-support holes using the shopmade drill guide shown in the bottom photo. I made several of these ¾-in. by 4-in. hard-maple guides in different lengths for use in a variety of cabinet interiors. To make a guide, clamp a fence to the drill-press table and bore a row of holes 1½ in. from the edge of the drill guide at 1-in. intervals along the entire length.

To use the guide, label one end "down" on both sides. Butt this end against either the bottom or the middle shelf, and clamp the guide so that the holes are 1½ in. from the carcase edge. To get the cleanest holes, I use a brad-point bit chucked in my hand drill. A section of ½-in. dowel, drilled lengthwise and left on the bit, serves as a positive stop to prevent drilling through the cabinet sides. Determine the length of the stop by subtracting 1⅛ in. (¾ in. for the drill guide and ⅜ in. for the depth of the shelf-support hole) from the exposed length of the drill bit. Now, carefully insert the bit into the guide until it hits the cabinet side and drill until the dowel stop bottoms out. Repeat this process for all eight rows of holes, sanding the "fuzz" around the holes with 220-grit paper.

Making the face frame—When made as a single mortised-and-tenoned unit, the face frame strengthens the carcase greatly and prevents the sides from spreading or compressing. I use the assembled carcase as a reference for measuring the stiles and rails and for laying out the mortises and tenons. This reduces measurement errors and ensures the face frame will fit properly. The carcase is easier to work on if laid flat across two sawhorses. Measure the diagonals to be sure the carcase is square, and sight from top to bottom, across a pair of winding sticks, to check flatness. Clamp from opposing corners to correct squareness, and shim as necessary to remove any twist.

I cut the frame stiles and rails 1/16 in. larger than the dimensions in figure 1 so I can plane the installed face frame to fit the carcase exactly. Place the stiles in position on the carcase, and lay the frame rails in position over the stiles. The center and bottom rails should be laid out so they cover only the bottom half of the middle shelf and the bottom. The exposed upper half of the shelf thickness acts as a doorstop. Markthie position of the rails on the stiles and then lay out the mortises, leaving at least ½ in. to the ends of the stiles. I have a horizontal boring machine for cutting the ⅜-in.-wide by 2-in.-deep mortises in the stiles, but you can also use a router or drill press, or chop them out with a chisel and mallet. I cut my mortises first so that I can test the adjustment of my tablesaw when crosscutting the tenons. I set up the saw so the fence acts as a stop for the tenon, and I hold the stock against the miter gauge as I make multiple cuts on each face of the rail to form the tenon.

After cutting the tenons, assemble the face frame and sand it as before, working up to 220-grit. Dry-fit the frame onto the case so you can check for side-to-side fit, length and squareness. If the case sides are perfectly straight, you can joint the face frame's 1/16-in. overhang

Hanging flush cabinet doors

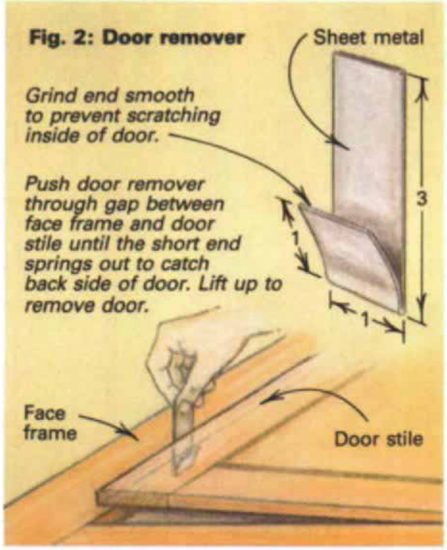
Everyone develops their own methods and routines for hanging doors. But I like to keep things as simple as possible, with a minimum of measuring. The tinware cupboard described in the main article is a good project for practicing door hanging because the carcase can be laid flat on its back and gravity will hold the doors as you adjust and position them for a perfect fit. Although it's easiest to install doors with the case on its back, these techniques will also work on vertical installations.

Fitting the door: I make my doors slightly oversize and then saw or joint the lock stile to fit, taking the dimensions directly from the opening. Leave the door relatively tight in the opening; you can always shave off more later. To mark the door bottom for trimming, first place the door in its opening as tight to the bottom as possible, and then draw a line on the door, parallel with and as close to the frame rail as possible. Saw or joint to this line. The door should now fit on three sides. With the door placed back in its opening, mark the top for cutting by drawing a line a full ⅛ in. below and parallel to the top frame rail. *Saw* or joint to this line and retest the fit.

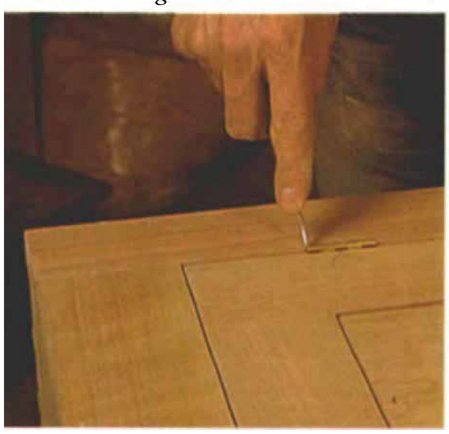
A flush door sitting in its opening is extremely difficult to remove. You can put a screw where the nob will go, predrill the knob hole to provide a fingertip grip or make a sheet-metal "door remover," as shown in figure 2 above, but don't try to pry the door out with a screwdriver or chisel.

Selecting the appropriate hinge depends on the size of the piece and the weight and width of the door. Generally, the larger the piece, the bigger and heavier the door will be and the larger the hinge needs to be. Also, the wider the door, the greater the leverage it exerts on the hinges. I've found that 1½-in. or 2-in. hinges work on 90% of the case goods I build, but for larger pieces, like an armoire, I'll use 2½-in. or 3-in. hinges. For smaller projects, such as jewelry boxes, aesthetics become more important than strength, and so much smaller hinges can be used.

The exact gap needed around the door is determined by the hinge type, the season of the year and the moisture content of the wood. As a very rough rule, I like to leave about 1⁄16 in. plus on the two sides and the top, and a bit more on the bottom. Age, wear and gravity conspire to move doors down, never up. While the gap on the hinge side is predetermined by the hinge, it is not unchangeable. The gap on the lock side should be bigger if it is winter and the wood is dry because next summer's humidity will cause the stiles to swell. Leave the gaps a bit bigger all around if the cabinet is to be painted. On the other hand, if it is mid-summer and the moisture content of the wood is 11% to 12%, the gap can be quite small. Remember that the hinge-side gap will remain constant; so all the wood movement of the door frame will be apparent on the lock side. Also, I usually bevel the edge of the lock stile a few degrees for greater swing clearance.



For best fit, hinge mortises must be accurately laid out. Here the author uses a knife to trace the hinge outline to the door stile.



With the door positioned, Becksvoort uses a knife to transfer the hinge location to the face frame. For accuracy, you must not move the door when making these marks.

Hinge layout: Butt hinges are usually set at the intersections of the door rails and stiles: the top hinge even with the top of the panel and the bottom hinge even with the bottom of the panel. Setting the hinge as close as possible to the rail is not only structurally sound, but also aesthetically pleasing, forming a sight line between rails and hinges. Also, I set hinges with the barrel fully revealed, which provides clearance when the door is opened 180°.

To set the hinges, first place the door in a vise, hinge-side up. Using a square, locate one end of the hinge by transferring the rail-stile intersection to the edge of the stile. Turn the hinge upside down and press the barrel against the outside face of the door, as shown in the top photo, aligning the top or bottom with the mark. With a knife, scribe the stile carefully for all three sides of the hinge. Then set your marking gauge to the thickness of the leaf and scribe the outside face of the door between the knife marks. Rout or chisel the hinge mortise as marked. For hinges with tapered leaves, chisel upward to the back of the mortise, matching the bevel of the hinge leaf. Repeat for the other hinge. Mount the hinges with screws in just the center holes so you have the option of persuading the hinge into a better position later, should that be necessary.

Now, carefully place the door in its opening with the desired gap left at the top and bottom. With a knife or razor, mark the tops and bottoms of the hinges where they touch the cabinet frame, as shown in the bottom photo, being careful not to shift the door. Remove the door and one of the hinges. Place the hinge barrel between the marks on the frame so that the barrel sits on the frame and the leaf hangs down along the inside frame edge. Then, scribe the hinge location with a knife and marking gauge and chisel out the waste as before. Test the fit by remounting the hinges with one screw per leaf, and make any necessary adjustments before installing the other screws. —*C.B.*

During glue-up, clamping strips are used to protect the face frame and the rabbet on the back edge. The large number of clamps ensures a good bond. The wedges and batten help secure the center-frame rail, where clamps won't reach. Wedges under the feet of the sawhorse remove twist from the carcase.

or you can wait until the face frame is attached to the carcase and then plane the overhang for an exact fit. Before gluing the frame in place, get all your clamps ready; I use 20 or more, as well as protective strips for the face frame and the fragile rabbet along the back edge. Then, spread the glue, position the face frame and clamp it to the carcase, as shown above. Two 5/16-in.-thick boards, glued and clamped to the back side of the center-frame rail and the top-frame rail, as shown in figure 1, serve as the top doorstops. These stops extend the full width of the cupboard's interior, butt against the top and the middle shelf, and extend 5/16 in. below the frame rails, balancing the 5/16-in. exposed edge of the middle shelf and bottom.

Building frames and panels—I like double-sided, flat-flush frames and panels for the doors and back panel instead of the raised-panel doors and the single-board back on the original cupboard. The ¾-in.-thick doors and the ⅝-in.-thick back are slightly oversize so they can be trimmed to fit. Mortise the stiles ⅜ in. wide by 2 in. deep, as previously described, and then tenon the rails to fit Dado ¼-in.-wide by ½-in.-deep stopped grooves on the stiles, and dado through grooves on the rails for the panels. By stopping the stile's groove, you eliminate the need to cut a haunched tenon on the rail without leaving a visible groove at the ends of the stiles. The ¼-in.-thick by ½-in.-wide panel tongues are cut with only two tablesaw setups. Although the shoulder cut can be vertical, I like a slight bevel, as shown in figure 1 on p. 39. The first setup cuts the face of the tongue. Set the blade ½ in. above the table and add a high auxiliary fence to support the panel on edge. Adjust the fence to leave a ¼-in.-wide center section, which will form the tongue. Cut the panel by running it over the blade vertically on all four edges, referencing for the first cut from the face of the panel and for the second cut from the back of the panel. Then, tilt the blade 20° to 25° and set the fence ½ in. from the side of the blade farthest from the fence. With the panel fiat on the table, cut the waste from the tongue, which now forms the beveled shoulder. Sand the tongue and bevel carefully to remove sawmarks.

Dry-fit the doors and back panel, making adjustments for a snug but not-too-tight fit, and then glue and clamp the frames around the floating panels. In keeping with Shaker tradition, I peg the doors' mortise-and-tenon joints and the back panel. To save time and to free up clamps, I drill for the ¼-in. pegs right away, pound them through and then remove the clamps. Excess peg length is sawed off both sides. Although you can plane and hand-sand the doors and back panel to final dimensions, I rely on the wide belt sander at a local mill shop to save me hours of labor. 1 have the panels sanded to 180-grit, which leaves barely perceptible cross-grain scratches on the rails. I easily remove these scratches with a vibrating sander.

To install the back panel, turn the carcase facedown on the horses and fit the back snugly into its rabbets. The bottom rail on the back will be ¾ in. from the bottom of the carcase, but the stiles continue to the floor to reinforce the fragile 3/16-in.-thick carcase sides where rabbeted. Beveling the inside corners of the back panel makes it easier to slide into its rabbets, as well as provides space for excess glue. Get the clamps and clamp sticks ready, apply the glue and clamp everything togemer. The back should be clamped front to back, as well as side to side, to fully seat it in the rabbets. If you don't have enough clamps, 6d finishing nails help hold things together while the glue dries. Countersink the nails deeply, and plug the holes by gluing in wooden pegs and chiseling them flush to the back panel.

The top molding shown in figure 1 is one of my favorites. While the glue is drying, I shape the molding stock with a cutter in a molding head on my tablesaw. Since you only need 46 in. of molding, however, it can be roughed and shaped easily with a block plane in 10 to 15 minutes. Start with a piece of ⅞-in.-thick stock that is 4 in. to 6 in. wide by 50 in. long. Draw the profile on each end, mark off ⅜ in. (the total thickness of the molding), clamp the stock in a vise and plane the stock to shape. When it looks just right, rip the ⅜-in. molding on the tablesaw and finish-sand it.

Before applying the molding, I sand the carcase, starting with 150-grit paper in a belt sander and working up to 180-, 220- and 320-grit paper in a palm sander; finish up by hand-sanding with 320- and 600-grit. Now, miter the front molding and glue it in place. To keep the molding from slipping while clamped, I drive two small brads into the carcase at the molding location, snip off their heads and force the molding onto the pins. Glue the miters and the first 2 in. of the side molding, and then nail the rest in place with countersunk and filled 6d finish nails, which allow for seasonal movement of the carcase side. Now, sand the top, following the same sequence as before, and touch up the molding as needed. Be careful not to leave cross-grain scratches on the case sides.

The details—I fit and hang the doors as described in the sidebar on the previous page, and then I install the door bumpers, knobs and spinners as shown in figure 1. Shopmade ⅜-in.-dia. leather pads, glued to the lock side of the upper and lower doorstops, make for quiet closings and convey quality construction. I turn the knobs from a 1¼x1¼x2½ block on the lathe after shaping the knob tenon with a ½-in. plug cutter on the drill press. Drill the knob holes with a 33/64-in.-dia. bit, which will allow the knobs to turn easily in the doors, as shown in figure 1.

The spinner, a ¼x1¼x2½ scrap with a ½-in.-dia. hole, is cut to a pointed oval shape so that it protrudes about ⅜ in. beyond the door frame. The spinner's placement on the tenon is critical: too loose and it feels sloppy, but too tight and the knob won't turn. I carefully hammer the spinner into place until it feels just right, and then drill a pilot hole and drive a brad through the spinner and tenon to lock them together. Cut off the excess tenon and install the ¼-in.-dia. dowels that stop the spinner in the open and closed positions.

A final sanding and the finish of your choice completes the cupboard. I normally use Watco oil on my cherry cupboards, but I ebonized my birch cupboard following the process in McAlevey's article. I applied two coats of the steel wool/vinegar ebonizing mixture, sanding lightly between coats. Some experimenting with ebonized scraps showed oil does not give very satisfactory results, but a sprayed lacquer finish brings out a rich ebony color and provides a satin sheen. Don't polish the lacquer. Remember, this is a Shaker cupboard, not a grand piano. □

Christian H. Becksvoort builds custom furniture in New Gloucester, Maine, and is a Contributing Editor to FWW