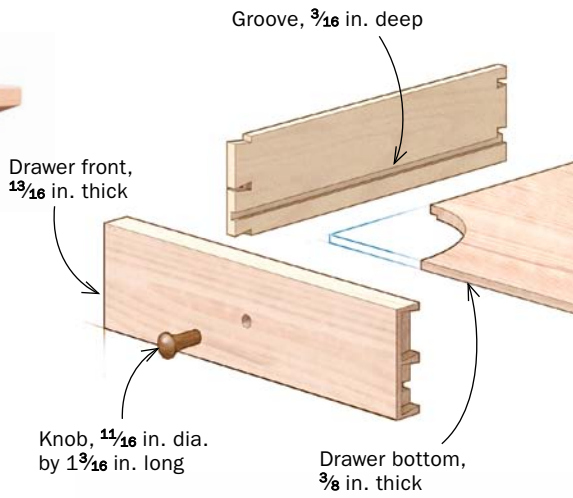
Frame-and-Panel Cabinet

Give your joinery skills a workout

BY TIMOTHY ROUSSEAU



I designed this cabinet to teach frame-and-panel case construction to students at the Center for Furniture Craftsmanship. What I like about frame-and-panel work is all the offsets between parts, which add shadows and details. All of that detail requires a lot of parts, and this small piece will give you a feel for building a complex case piece. I'll also show you a stress-free way to install knife hinges. Start by getting your stock prepped and milled.

Build the case frames

The first step is to cut the rail mortises in the legs. When that's done, cut the tenons on the rails.

I cut tenon cheeks at the tablesaw with a tenoning jig that rides on the rip fence and a pair of dado blades spaced to the tenon thickness. Once the size is dialed in, I get perfectly fitted tenons right off the saw.

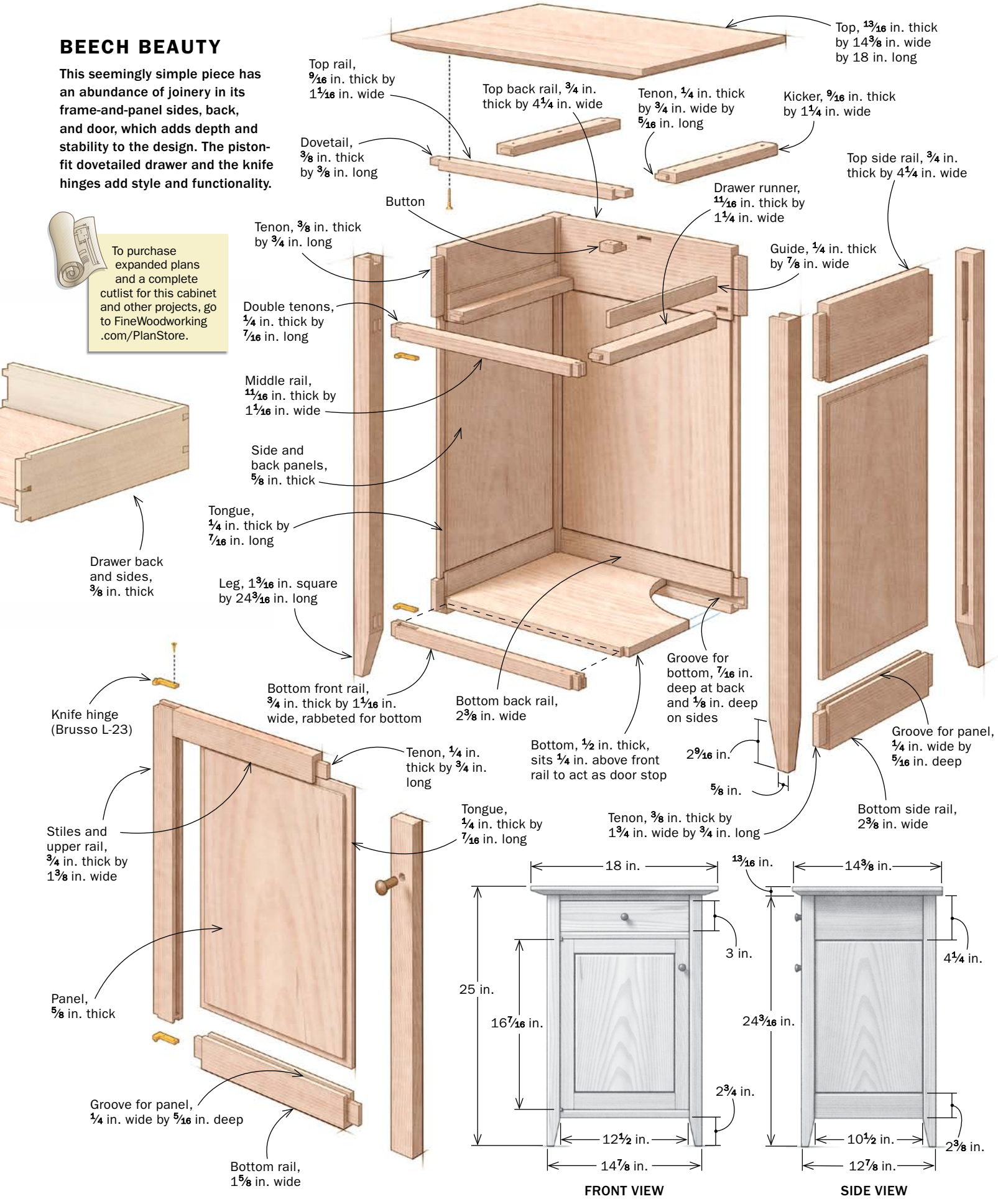
I cut the tenon shoulders at the tablesaw with a standard blade. But before doing that, I remove most of the waste at the bandsaw to prevent the offcuts from becoming projectiles. With the tenons all cut,

Photos, except where noted: Dillon Ryan

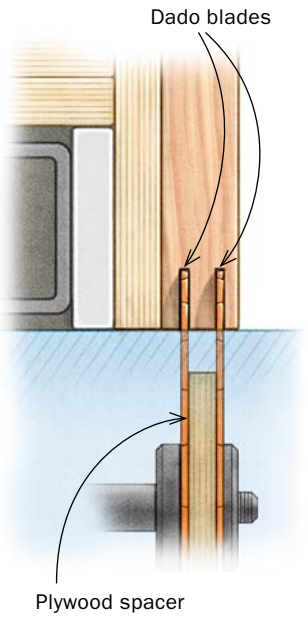
BEECH BEAUTY

This seemingly simple piece has an abundance of joinery in its frame-and-panel sides, back, and door, which adds depth and stability to the design. The piston-fit dovetailed drawer and the knife hinges add style and functionality.

To purchase expanded plans and a complete cutlist for this cabinet and other projects, go to FineWoodworking.com/PlanStore.



Drawings: John Hartman



Online Extra

To see a bandsaw option for double tenons, go to **FineWoodworking.com/extras.**

Tenons at the tablesaw. *Rousseau cuts the cheeks at the tablesaw using the two outer blades from a dado set with a plywood spacer between them. He uses dado shims to dial in the cut for perfectly sized tenons.*

I miter the tenons on the side and rear rails where they meet in the rear legs.

With the rails fitted to the legs, the next step is to cut grooves for the panels. I use a wing cutter in the router table. Start with the leg grooves, setting the height of the bit so that it's centered in the mortises. Add a zero-clearance fence to control blowout. Run grooves from mortise to mortise in each leg face.

To mark the side and back rail grooves, insert a rail into a leg and transfer the groove location to the rail with a knife. Then readjust the cutter height, add a fresh zero-clearance fence, and groove the rails.

With the leg joinery done, taper the feet at the bandsaw and clean up the sawmarks with a handplane. Now it's time to focus on the connections at the front of the case.

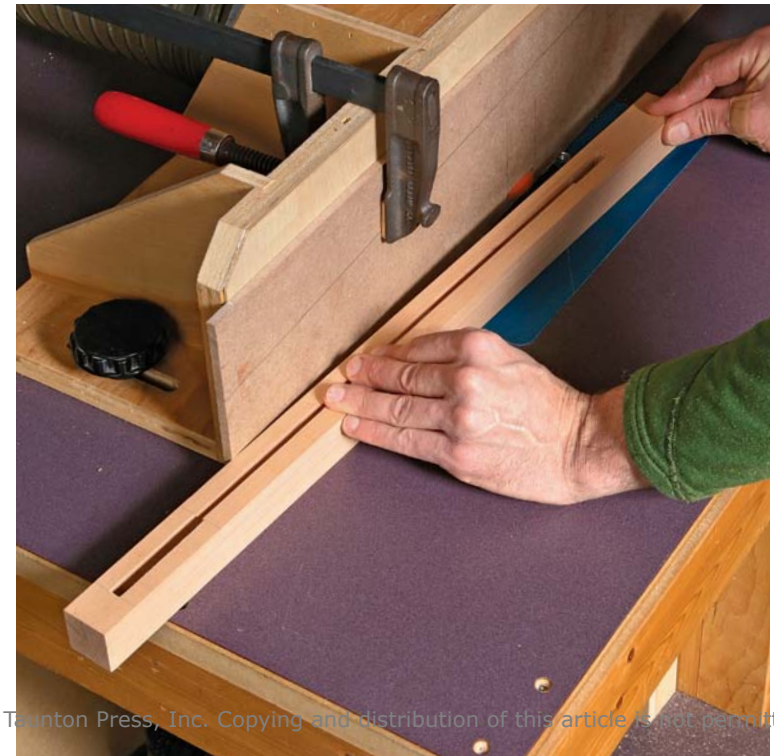
Handling the rails

The front rails connect to the legs in two ways. The top rail is dovetailed into each leg and the lower two rails are double-tenoned into the legs. The double-tenon joinery method I use was covered in "Float the Top" (*FWW* #229).

I cut the dovetails in the top rail on the bandsaw. I also cut a shallow rabbet under the tail so I have a shoulder to register against the leg. To get the shoulder-to-shoulder length of all three front rails, mark them directly off a rear rail. This will keep the case square. To cut the sockets,

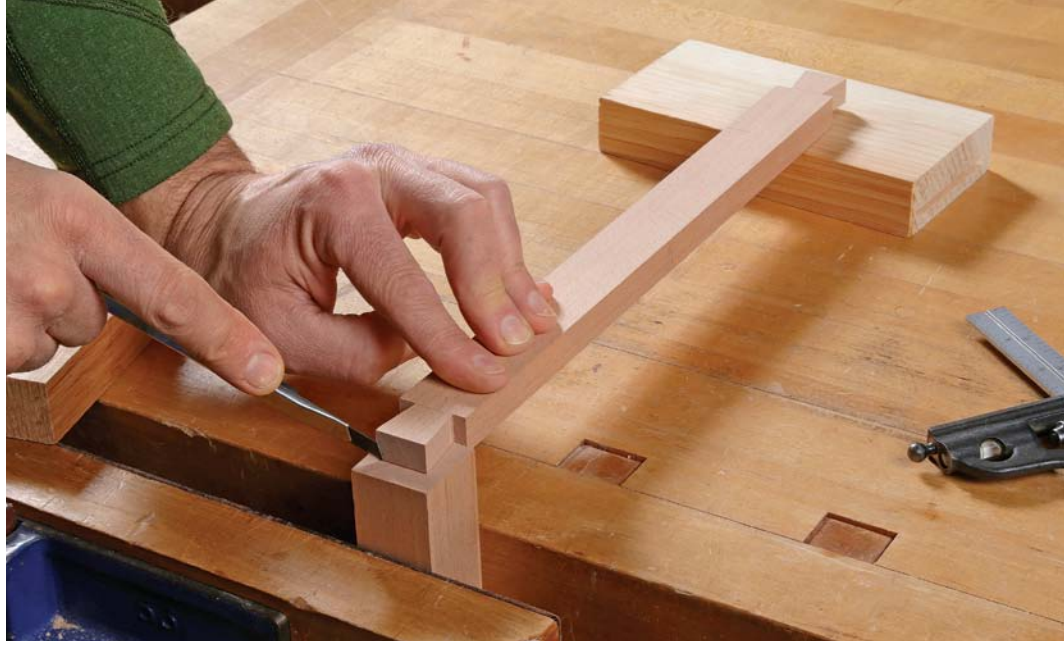
Mitered where they meet. *The tenons on the upper and lower rails are mitered where they intersect in the rear legs. Rousseau cuts the miters at the tablesaw.*

Groove the rails first. *To accept the panel, the rails are grooved with a wing cutter at the router table. A piece of thin brownboard, used as a zero-clearance fence, keeps the bit from tearing out the piece.*



Now groove the legs. *To cut the grooves in the legs, start by marking the fence with the position of the cutter. Place the cutter into the mortise for the rail tenons—which is wider than the wing cutter—to start the cut. End the cut inside the opposite mortise and turn off the router before removing the workpiece.*

Take care of the feet. *Cut the tapered feet at the bandsaw. A simple jig ensures consistent cuts.*



Top rail gets dovetailed. *Although the two lower front rails are attached to the legs with double tenons, the top rail is dovetailed in. The dovetail is shouldered on the underside, which makes it easy to register the piece against the leg for marking.*

transfer the tail to the leg, then saw down the lines as far as you can. Drill most of the waste and pare with a chisel to fit the joints. Cut the mortises for the lower rails, then cut and fit the tenons.

Size the panels and fit the bottom

With the bones of the case fitted, the next step is the panels. When cutting the panels to final dimension, be careful to note the season and adjust the fit for expansion and contraction. Cut a rabbet around each panel at the router table with a rabbeting bit and a zero-clearance fence. I use a short 1¼-in.-dia. router bit made by Whiteside (No. 1304).With the sides and back panels fitted, move on to the case bottom.

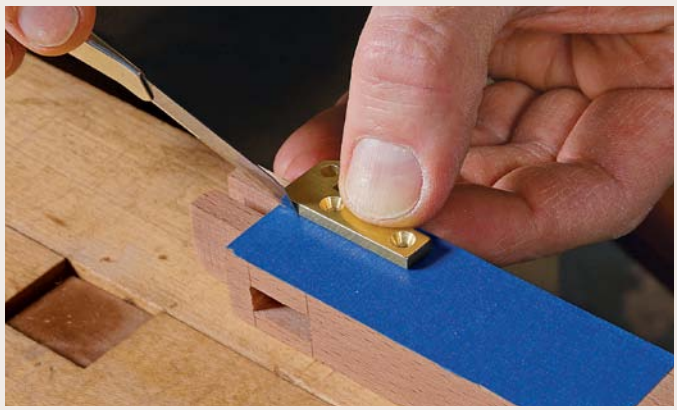
The bottom is held by grooves in the lower case rails and a rabbet in the lower front rail. I cut the rabbet so that the bottom will sit slightly proud, creating a solid stop for the door. Make the rear rail's groove deeper to allow room for seasonal movement.

To mark for the rabbet in the lower front rail, assemble one side rail and the lower front rail into a leg, and transfer the groove from the side rail to the front rail. After cutting the grooves and rabbet, you must notch the bottom to fit around the legs. Mark the notches from the dry-fitted case to get a perfect fit. Now cut the mortise-and-tenon joints for the runners and kickers. To cut the mortises in the rear rail, I drill out most of the waste at the drill press and then pare to the line with a chisel. There's no joinery at the back of

TIP

Mortise for the knife hinges before assembly

Knife hinges are a simple yet elegant way to hang a door. Making sure the mortises for these hinges are cut accurately can be daunting, but here's an easy way to get crisp, tight-fitting mortises with just a bit of tape.



Cut through the blue tape. *After placing double-sided tape on the back of the hinge and pressing it firmly in place on the rail, knife around the hinge. When the hinge is pulled off, it will lift the cut piece of blue tape, leaving a perfect outline of the mortise.*

Rout out, then pare. *Remove the majority of the waste with a trim router and ⅛-in. spiral bit. Clean up the shoulders with a chisel.*

Hinge photo: John Tetreault

BRING THE CASE TOGETHER

Sides first. *In a multi-panel case, it's important to tackle the glue-up in stages. Start by gluing up the individual sides, making sure they're square and the panel is centered in the frame. To make things easier later, finish the panel edges (above) and frame grooves before gluing things together.*

the kickers, so the top rail assembly can drop into place after the case is glued. The runners and kickers also get notched to fit around the leg. To finish the drawer pocket, drill the screw holes for the top in the kickers and top rail.

Mortise for the knife hinges

Installing knife hinges can be tricky. But I use a cool method for marking the mortises that makes it easier to see where to cut.

Start by placing a piece of blue tape where the hinge will go, then use double-sided tape to attach the hinge in its exact location. Knife around the hinge and remove the hinge along with the blue tape beneath it. You'll be left with a perfect outline of the mortise.

Using a laminate trimmer with a ⅛-in. straight bit, rout out the bulk of the mortise. Get as close as possible to the blue tape and finish squaring the edges with a chisel. When you've cut the hinge mortises in both rails, it's time to get out the glue.

Plan the glue-up carefully

Before going through a dry run of the glue-up, apply finish to the panel tongues and the frame edges. Finishing these parts now will eliminate the hassle of getting finish into the crevices later. When the finish

Fill in between the sides. *Once the sides are dry, join them with the case bottom, lower front rails, and the rear panel and rails. The dovetailed rail at the top is only dry-fitted at this stage (left). While it's still in the clamps, check the case for square (above). If the case needs to be adjusted, the clamps can be tilted slightly to apply pressure to rack it back into square.*

is dry, walk through the glue-up without the glue. Once you feel confident, glue up the sides first. Check each side frame for square and be sure the panel is centered in the frame. A small dab of glue in the center of the top and bottom rail groove will keep the panel in position after glue-up.

With the two sides dry, glue the remainder of the case together. This includes the rear rails, the rear panel, the bottom panel, the lower two front rails, and the runners. Again, a dry run is very helpful.

In this wave of the glue-up, don't glue in the top dovetailed rail, just set it in dry.

ASSEMBLE THE WEB FRAME

Stick clamps. *To get pressure on the drawer guides, Rousseau uses spring sticks—thin, flexible pieces of wood cut slightly longer than the width of the web frame.*

Keep the pocket parallel. *Two strips of waxed Masonite ripped to the exact height of the drawer opening keep the kickers parallel to the runners during assembly for a perfectly square drawer pocket.*

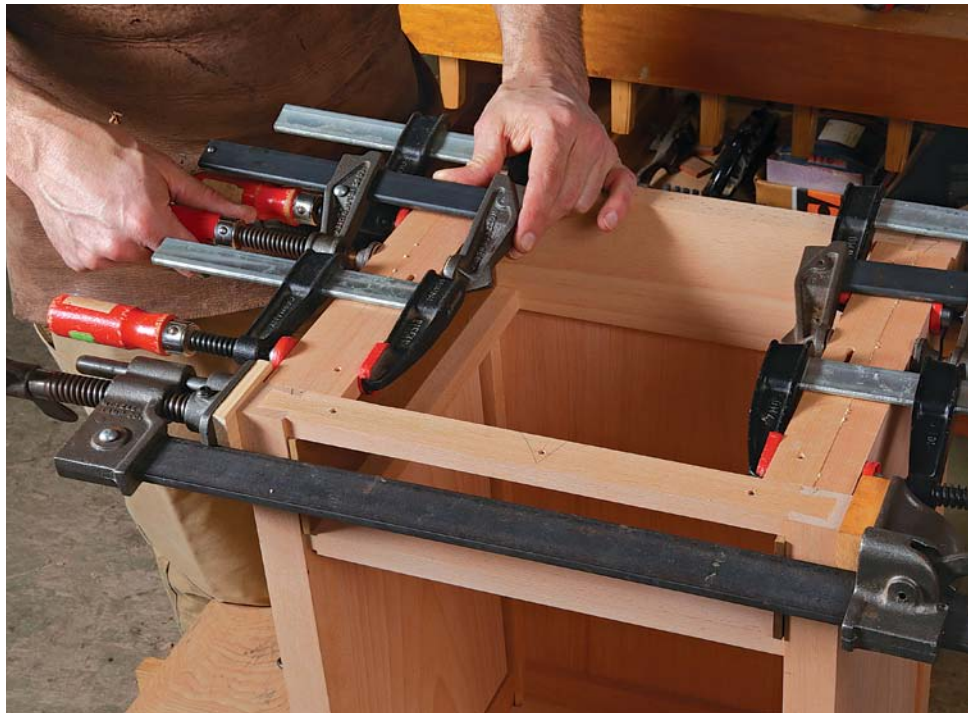
Seat the rail and kickers. *After the tenons on the ends of the kickers are glued into the mortises on the dovetailed top rail, put the whole assembly in place on top of the waxed spacers.*

Make sure the clamps are parallel to the rails; otherwise, it's very likely they'll rack the case out of square. At this point, make sure all of the joints are tight.

With everything together, check for squareness along the case front, back, and top. I use a tape measure on the outside dimension, or a folding ruler with a slide on the inside. Once the case is square, clean up any squeeze-out.

Finish the web frame

The next step is to take care of the drawer pocket. Before the dovetailed rail and the kickers get glued in, glue in the guides, which ensure that the drawer slides in straight. They're simply two pieces of wood planed down to fill the gap between the leg and the side rails. Dial in their fit so they're flush to the front leg, and glue them in with a couple of spring sticks (see top photo, above). Now, glue in the kickers. To make sure they're parallel with the



Lock it in place. *A handful of clamps is enough to get a good bond between the kickers and the side rails. Be sure to clamp along the dovetailed top rail as well.*

Get the door together. *The door is built just like the sides of the case—mortise-and-tenons for the frame and a groove along the inside for the panel.*

Size for the reveal. *The door should be built slightly larger than the opening, and then fitted to have consistent reveals top to bottom and side to side.*

runners, make two Masonite spacers for them to register against. The dovetailed top rail and kickers are glued and clamped into place.

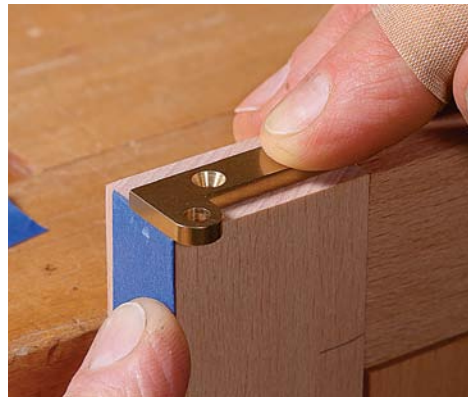
Fit the door, drawer, and top

The frame-and-panel door is built like the other panels. It's important to make the door slightly larger than the opening so it can be trimmed to fit. Again, pre-finish the panel and then glue it up.

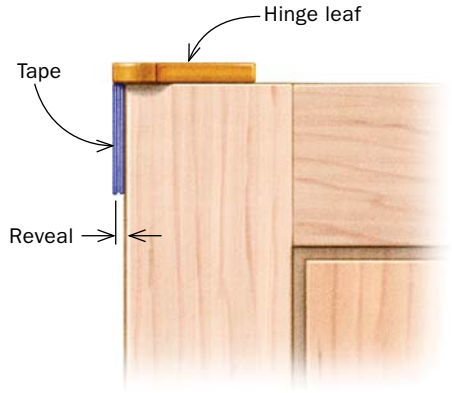
Once it's dry, use a handplane to fit the door to the opening. In my experience, most cases are not perfectly square. But the eye is drawn mostly to the reveal around the door, so if the door is planed to create an equal gap, no one will ever know. The size of the washers on the knife hinges equal the reveal size.

While the hinge mortises in the rails butt right up to the legs, the door-side hinges must hang over the edge of the door to create a reveal. To set the overhang, use a shim made of layers of blue tape to offset the hinge mortise location.

Cut the mortises in the door and fit the hinges. The brass screws supplied with the hinges break easily. To avoid this, I always pre-drill the hole and then cut the threads



Space out the door's hinge mortise. *To get a reveal on the hinge side of the door and prevent binding, use a folded piece of blue tape to guide how far the hinge should overhang the edge of the door.*



with a steel screw. For added security, I wax the brass screws before final installation. Once the door is installed, you can make any adjustments to that last reveal between the door and leg.

The drawer has half-blind dovetails on the front with through-dovetails at the rear—fairly standard construction. I build all my drawers slightly oversize in width and then handplane them for a piston fit.

The top of the case is beveled on the underside of the front and sides to lighten its appearance. I cut the bevels on the tablesaw using a tall fence with the blade at an angle. The top is screwed to the case via pre-drilled and slotted holes in the kickers.

Choosing the right finish

The European beech I used for this cabinet really called for a finish that wouldn't alter the wood's tone. For this piece, I wiped on Osmo Polyx hardwax oil. After that, I waxed and rubbed out the finish with a piece of burlap. □

Timothy Rousseau is a furniture maker in Appleton, Maine, and a regular instructor at the nearby Center for Furniture Craftsmanship.

HANG THE DOOR

Hinges in order. *Install the hinge halves in the case first (left), then on the top of the door (right). Make sure the threads in the case and door are drilled and pre-cut with a steel screw before driving in the brass screws.*

Slide it into place. *To get the door in place, start by putting the upper hinge pin into the case. Then slide the lower hinge half into the mortise in the bottom of the door. Now, adjust the final fit of the door and set the ball catch (9-mm ball catch, No. 241.86.105, hafele.com) before screwing the hinge in place.*