TAUNTON'S Fine Wood Working®

Small Stand

A project plan for building a curved-front stand with a beautifully coopered door

Small Stand is a Lesson in Curves

Cut joinery first, then saw the curves

BY STEPHEN HAMMER

One way to add interest to a case piece is to add a gentle curve to the front plane. I wanted to explore this element of furniture making while attending a 12-week class at the Center for Furniture Craftsmanship in Rockport, Maine, so I designed and built this cherry cabinet, finding ways to curve the door and drawers that did not require steam-bending or veneering. The drawer fronts and the door frame are sawn out of thicker stock, and the door panel is coopered to match that curve—methods well-suited to the average small shop.

Arriving at a final design for a piece of furniture is often a laborious task. However, a few preliminary steps made this process easier and more successful. First, small thumbnail sketches allowed me to visualize the overall form quickly and easily. The thumbnails led me to a curved-body design with an overhanging top. Next, I drew the cabinet at quarter scale, where I set the top height at 35 in., then determined the width of the piece.

The appearance of this cabinet depended upon the leg shape being correct. I based the leg shape on the classical column, which curves slightly inward, starting one-third up the column height. Called an entasis, this narrowing is meant to keep the eye from thinking that the column is concave—an optical

A CASE BOTTOM THAT STAYS PUT

Double stub tenons and tongue-and-groove joinery will keep the bottom panel flat and stable.

First, rout the mortises and grooves in the side assembly. *Move the router in the proper direction, and the cutting force will keep it pressed against its guide.*

Cut the tenons on the bottom panel. *Transfer their layout directly from the mortised side assembly. Make the cheek and end cuts, then saw out the waste.*
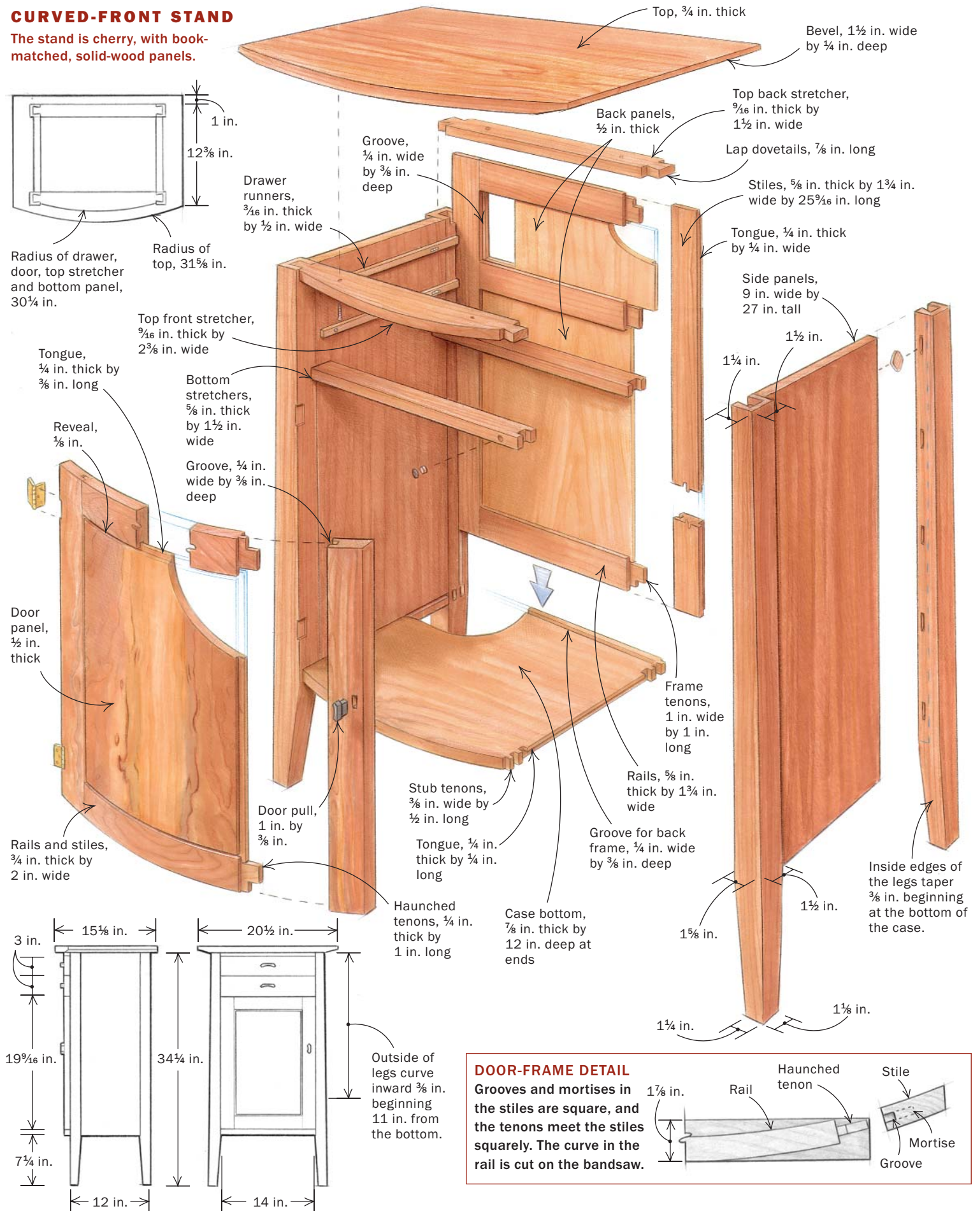
Rout between the tenons to form the wide tongue. *Carefully mark the starting and stopping points on the router-table fence.*
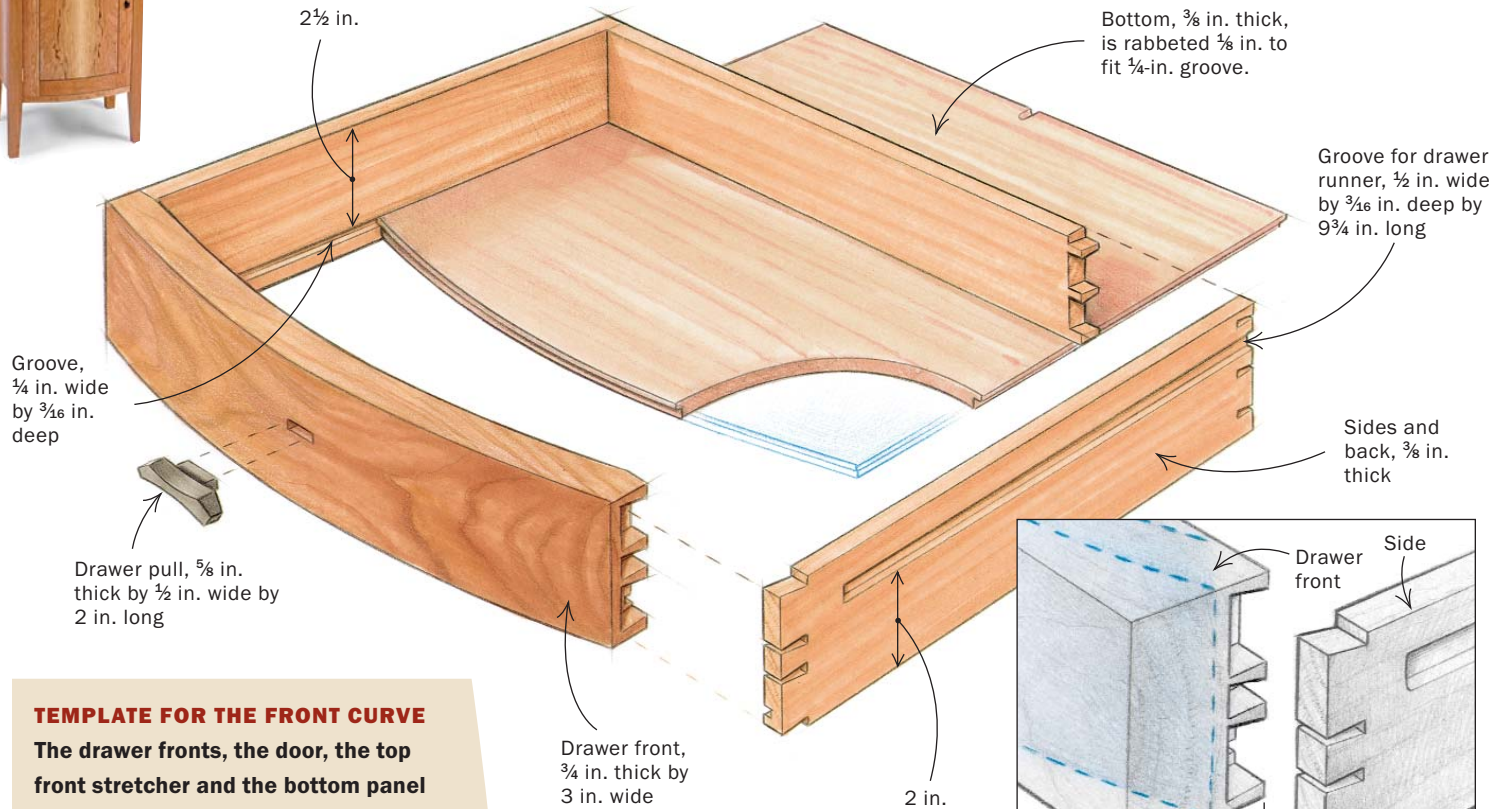
Test-fit the joinery. *Trim the joints as necessary to eliminate any gaps between the panels.*

CURVED-FRONT STAND

The stand is cherry, with book-matched, solid-wood panels.

Top, ¾ in. thick

Bevel, 1½ in. wide by ¼ in. deep

1 in.

12⅜ in.

Back panels, ½ in. thick

Top back stretcher, ⁹⁄₁₆ in. thick by 1½ in. wide

Lap dovetails, ⅞ in. long

Groove, ¼ in. wide by ⅜ in. deep

Stiles, ⅝ in. thick by 1¾ in. wide by 25⁹⁄₁₆ in. long

Tongue, ¼ in. thick by ¼ in. wide

Drawer runners, ³⁄₁₆ in. thick by ½ in. wide

Side panels, 9 in. wide by 27 in. tall

Radius of drawer, door, top stretcher and bottom panel, 30¼ in.

Radius of top, 31⅝ in.

1½ in.

1¼ in.

Top front stretcher, ⁹⁄₁₆ in. thick by 2⅜ in. wide

Tongue, ¼ in. thick by ⅜ in. long

Bottom stretchers, ⅝ in. thick by 1½ in. wide

Reveal, ⅛ in.

Groove, ¼ in. wide by ⅜ in. deep

Door panel, ½ in. thick

Frame tenons, 1 in. wide by 1 in. long

Rails, ⅝ in. thick by 1¾ in. wide

Groove for back frame, ¼ in. wide by ⅜ in. deep

Door pull, 1 in. by ⅜ in.

Stub tenons, ⅜ in. wide by ½ in. long

Tongue, ¼ in. thick by ¼ in. long

Rails and stiles, ¾ in. thick by 2 in. wide

Haunched tenons, ¼ in. thick by 1 in. long

Case bottom, ⅞ in. thick by 12 in. deep at ends

Inside edges of the legs taper ⅜ in. beginning at the bottom of the case.

1½ in.

1⅝ in.

1¼ in.

1⅛ in.

3 in.

15⅛ in.

20½ in.

19⁹⁄₁₆ in.

34¼ in.

7¼ in.

12 in.

14 in.

Outside of legs curve inward ⅜ in. beginning 11 in. from the bottom.

DOOR-FRAME DETAIL
Grooves and mortises in the stiles are square, and the tenons meet the stiles squarely. The curve in the rail is cut on the bandsaw.

1⅞ in.

Rail

Haunched tenon

Stile

Mortise

Groove

2½ in.

Bottom, ⅜ in. thick, is rabbeted ⅛ in. to fit ¼-in. groove.

Groove for drawer runner, ½ in. wide by ³⁄₁₆ in. deep by 9¾ in. long

Groove, ¼ in. wide by ³⁄₁₆ in. deep

Drawer pull, ⅝ in. thick by ½ in. wide by 2 in. long

Sides and back, ⅜ in. thick

Drawer front, ¾ in. thick by 3 in. wide

2 in.

Drawer front

Side

1⅞ in.

Cut half-blind dovetails from square stock before curving the front on the bandsaw.

TEMPLATE FOR THE FRONT CURVE

The drawer fronts, the door, the top front stretcher and the bottom panel all share the same curve. Use a piece of template stock long enough to contain the curve's center point.

Make a simple curve-cutting jig with a stick clamped to the saw table and a screw driven through the pivot point. The blade should be buried about halfway into the stick. Pivoting the workpiece delivers a smooth, uniform curve.

illusion that happens when a column's sides are parallel.

A piece often changes when you take it off paper and put it into three dimensions. To work out the leg details, I made a full-scale mock-up in poplar, filling in the rest of the cabinet with cardboard cutouts. I curved the outside of the legs gently to the top, reducing the overall thickness by ⅜ in. The bottom inside edges of the legs taper toward the floor, starting from the case bottom. I tried different door and drawer dimensions by drawing them onto the cardboard.

It may seem like a lot of extra work to build a mock-up, but the process saves time during construction because you can focus on building the piece instead of revising its design. Also, you can refer to the mock-up for dimensions. My final step was a full-scale drawing to work out the joinery details.

Choose wood carefully and then build the case

The case consists of two solid sides joined to the legs, a solid bottom and a frame-and-

panel back. (The grain of the top, sides and bottom runs in the same direction, so it will expand and contract together.) The front door is a curved frame and panel, and the two drawers are side-hung.

I often buy 12/4 or larger lumber and re-saw everything I need out of a few planks to get consistent grain and color. When milling the stock, leave it ⅛ in. oversize in width and thickness and 1 in. oversize in length, then stack and sticker the pieces for about a week so that air can circulate around them. If the boards move during that time, there still will be enough wood left to correct slight cupping or twisting.

Begin construction of the case by assembling the sides. I used biscuits to register the panel flush to the legs on the inside plane of the cabinet. Before the panel and legs are glued up, shape the legs on the bandsaw and smooth the curves and tapers with a handplane and scraper. Use double-faced tape to mate the legs for

First, lay out the curve. *This will determine how deep the dovetails can go.*

Cut all of the tails, then transfer the layout to the drawer front. *Clamp the drawer front flush with the benchtop.*

Cut the front curve on the bandsaw. *Cut right to the line, then smooth the curve with a block plane and sandpaper.*

shaping on the bandsaw, and then clamp them together for the handwork.

Before the sides were glued up, I put a handplaned surface on all parts. I also prefinished as much as possible before glue-up. Prefinishing makes glue cleanup easier and protects the surfaces. I recently have begun using Tried & True Varnish Oil for all of my work. It is pleasant to work with and safe for kitchen pieces.

Joinery is next—Once the side panels have been glued up, do all of the joinery for the case. Two stretchers dovetailed to the tops of the legs anchor the top to the case. The front stretcher is curved with the front plane of the cabinet.

First, cut the dovetails on the ends of the stretchers. Then transfer their shapes to the legs using a sharp knife. I used a plunge router freehand to rough out the sockets in the legs, getting close to the line and then finishing with a chisel.

The bottom stretchers and the case bottom are joined to the legs with double mortise and tenons. This strong joint helps counteract the racking forces that can weaken a cabinet over time. The case bottom is joined to the side panels with a wide tongue and groove to counteract warping.

The bottom stretchers are not needed to support the side-hung drawers, but they stiffen up the cabinet. The front one also acts as a doorstop, so it is set back from the front plane of the cabinet and holds a rare-earth magnet that acts as a catch for the door. The door also receives a magnet.

Use a plunge router fitted with an edge guide and a ¼-in. up-cutting spiral bit to cut


An easy way to cut the inside curve. *Lay out the desired curve. Then ride the rip fence as shown to follow that curve, creating a consistent thickness. Use the offcut as a sanding block.*

1. MAKE A CLAMPING FORM AND MARK OUT THE STAVES

Coopering is a way to create a curved, book-matched panel from solid stock. After assembling a clamping form based on the curve template, lay out the overall width of the curved panel, then divide the arc into six even sections.

Form is based on the curve template.

Side is screwed into each section.

30¼-in. radius

Six even sections

Edge of panel
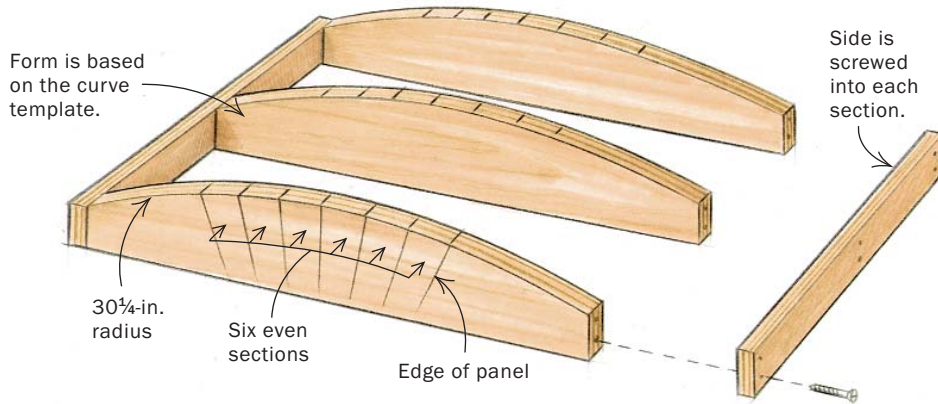
Figure out sections and angles right on the form. *Use a center divider to draw lines straight down from each division.*

all of the mortises. The fronts of the legs can be used as square reference surfaces for the edge guide.

Nothing ruins work faster than a router gone awry, so move the router in the direction that keeps the fence pulled tightly against the leg. Plunge-cut the front and back of each mortise, then remove the center material. Finally, take a pass through the entire mortise to clean up the sides.

Next, cut ¼-in. grooves into the bottom of the side panels to accommodate the tongue on the case bottom.

With the mortises and grooves complete, it is time to cut and fit all of the double tenons and tongues. First, use a marking knife to transfer the measurements for the tenons directly from the mortises. Cut and dry-fit all of the joinery. If any of the shoulders are not tight, use a chisel to pare them back, angling the shoulder inward so just its edge meets the mating piece.

Finally, shape the front edge of the bottom panel to the 30¼-in. radius of the cab-inet's front plane. I made a template first, large enough to hold the center point.

Make the back and assemble the cabinet

Before the case can be assembled, you must make the frame-and-panel back, cut a tongue around its outside edge and cut a groove for it in the back of the case—in the bottom, in the legs and in the stretcher. Another option would be to forgo the tongue and glue the back into a simple rabbet in the back of the case.

A curved door frame

Because the stiles are basically square, cutting their grooves and mortises is straightforward. But the curved rails—with angled tenons and a groove that follows the curve—are trickier.

Cut the tenons on the rails while the stock is square. *Make the cheek cuts first (left), then make the shoulder cuts (above).*

Curved fence to rout a curved groove. *After cutting and smoothing the curves in the rails, use the curve template to make a curved fence for the router table. Keep the workpiece steady on the table as you slide it along the fence.*

Use a sliding bevel to find the angle for jointing and ripping the staves. *Balance the tool on the center of a section as shown to find the angle.*

During glue-up, assemble everything but the back panel and the top back stretcher. Then you can slide in the back panel and glue the stretcher in place on top of it.

For the back panel, I resawed a board to create a book-match, and then I crosscut the panel to form top and bottom sections. I used mortise-and-tenon joinery for the frame. Rabbet the edges of the panels to fit a groove in the frame, but leave a ⅛-in. gap all the way around for expansion and contraction. It also makes an attractive shadow line.

Build the curved-front drawers

The main feature of this cabinet is the curved front. You should start with the drawers, then fit the door once the drawers have been installed.

It is important to cut all of the dovetails for the drawers before shaping the curved fronts. It is much easier to lay out and cut dovetails in square parts. I used standard half-blind dovetails in the front and through-dovetails in the back. Mark the curves on the fronts before laying out the half-blinds. This ensures that the tails don't break through when you are shaping the front. I prefer the pins to be very narrow and unequal in their spacing so there is no mistaking that they are hand-cut.

For the half-blind dovetails at the front, mark the pins from the tails with a knife, then use a router freehand to waste out as much of the socket as your nerves can handle before finishing with a chisel. For all

2. BEVEL AND GLUE THE STAVES
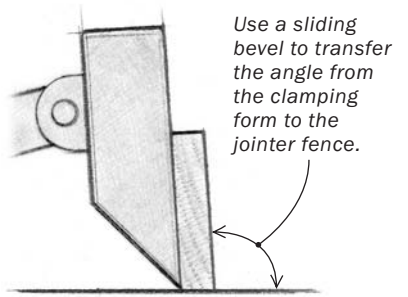
Use a sliding bevel to transfer the angle from the clamping form to the jointer fence.

Joint and rip the staves. *First, rip the staves on the bandsaw to minimize waste and preserve the grain match across the panel. Next, bevel one edge of each strip on the jointer (above). Finally, bevel the second edge on the tablesaw (below) to ensure parallel edges.*
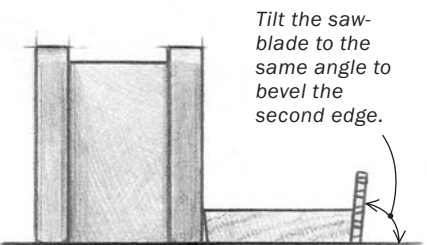
Tilt the sawblade to the same angle to bevel the second edge.

Glue up the panel. *Lay the staves on the form to make sure all of the joints close perfectly. Use bar clamps and strap clamps as shown to draw the staves together and down against the form. Use a yellow glue with extended working time.*

Smooth the panel across the grain. On the outside (right), take off the corners with a block plane until you don't hear or feel any bumping. Then switch to scraper and sandpaper. On the inside (below), a card scraper quickly turns six flats into a smooth curve.

dovetails, I try to do as little paring as possible. It is important to mark accurately, then cut right to the line. By the way, lay out the dovetails so that the groove for the drawer bottom doesn't hit any of the pins.

With the dovetails cut, you can shape the drawer fronts. Rough-cut the shape on the bandsaw, and then finish the work with a handplane and scraper. I like to curve the inside of the drawer front as well for a more refined look, although this means the drawer bottom also must have a curved edge. After laying out the inside curve, use the bandsaw's rip fence to make the cut (see the bottom photo on p. 75). Then use the offcut as a sanding block.

Next, cut the groove in the front and the sides for the drawer bottom using a ¼-in. bearing-guided slot cutter in the curved drawer front. Cut the drawer back short enough to let the bottom run under it. The grain must run across the width of the drawer so that the bottom can expand toward the back.

The drawers ride on runners that are screwed to the interior of the cabinet, so you'll have to rout grooves into the sides of the drawers. After the drawers have been assembled, use a spacer block to locate the drawer runners. Then use the same spacer block to set up the tablesaw for a stopped groove in the sides of the drawers. Locate the runner for the bottom drawer first, placing the spacer block on the middle frame member. After that drawer has been hung, use the spacer to measure up from the top of it. For each of the runners, the front screw can be fixed, but the rear screw hole must be slotted to let the case side expand and contract.

Cut the door joinery, then add the curves

As with the drawer fronts, the door curve is shaped after the joinery has been completed. Mill the rails and stiles thick enough to contain the curve, then mark out the curve and mortise-and-tenon joinery. Lay out the tenon shoulders on an angle that will meet the stiles squarely. That way, the edges of the stiles can be square, and its mortises and groove will be easy to cut. The rail is where the joinery gets more complex.

Now you can cut the frame members to rough shape on the bandsaw. The inside and outside of each rail can be shaped and smoothed with the same techniques used on the drawer fronts.

When the curved frame is smooth and even, cut the grooves for the door panel.

Be careful here: You must cut a curved groove in the rails and a straight groove in the stiles, and the grooves must mate precisely at the corners. The groove in the curved rails can be made on the router table, using a curved fence (see the bottom right photo on p. 76).

Coopering the panel—The panel is coopered to fit inside the shaped frame. Using the frame as your pattern, trace the curve on paper and build a simple clamping form (see the drawing on p. 76). The form curves outward, not inward, so you can see if the visible glue joints are coming together properly.

Use the form to determine the size and bevel angle for each piece, or stave. I wanted the panel to be book-matched, so I resawed a board into two thinner pieces and then cut three strips from each. I used a combination of bandsaw, jointer and tablesaw to mill the pieces to size and bevel the edges, minimizing waste to maintain the grain match between them.

Position the boards on the form to check the joints. If necessary, do some fine-tuning with a handplane to ensure the joints fit perfectly. You can glue up the entire panel at once, using bar clamps to pull all of the

With the concave side down, trim the panel to size. *Use a sled for crosscutting, with the blade at its highest point.*

Rabbet the curved edge. *Use a good dado set and keep the panel in contact with the table at the cutting point. The rabbet also may be cut on the router table.*

pieces together and strap clamps to keep them from opening outward.

After the panel has been glued up, smooth the beveled surfaces to a fair curve. Shape the panel using a handplane and a scraper, then sand. After sanding I used Abralon pads up to 4,000 grit to give it a polished look. Last, glue up the door and bevel its edges to fit the opening.

Rare-earth magnets serve as door catches. Bore a hole in the door and cabinet frames to accommodate the magnet and a wood plug above. With the magnet in place, bore a larger hole for the plug to create a better glue surface. Trim the plug flush and cover it with a circle of leather, which gives the door a soft stop.

Attach the door using high-quality butt hinges mortised into the frame (see *FWW* #159, pp. 52-57). I inset the door ⅛ in., making the necessary adjustment to the hinge mortise on the door.

Top off the cabinet

The only things left to do are the top and the pulls. The top is book-matched, glued up and then shaped. Bevel the underside of the right and left sides. The front edge overhangs the drawers by 1⅜ in., so its radius is that much larger.

The finish on the top is critical, because any flaws will be reflected. Make sure you have lots of light when doing the smoothing. Then screw the top onto the top stretchers from beneath. It will move in the same direction as the rest of the case, so you don't have to slot the screw holes.

The final touch for this piece is to add carved ebony pulls. Getting the design right for these was a long and frustrating ordeal, but they are one of my favorite elements. I cut the facets on the bandsaw and formed the curves with a sanding drum. Leave small tenons on them to mortise into the door and drawers. □

Prefinish the panel and dry-fit the door. *Use a shoulder plane to fine-tune the joinery.*

Stephen Hammer is a furniture maker in Brooklyn, N.Y.