Two-Door Credenza

A case of dowels, dovetails and tenons

by John McAlevey

Most of my furniture designs begin as simple sketches. I draw on a regular basis, sometimes entire pieces, other times just certain curves or details. When finished, I date the drawings and stack them with drawings from previous sessions. Then, when I need ideas, I rip through the stack.

The two-door credenza shown here began that way. I was asked to build the credenza as a companion piece to a South American mahogany conference table I had made for a law firm's library. When I dug out my first drawings of the table, the rough sketches showed how I had experimented with slight curves, plain round edges and large overhangs as I designed. I knew the credenza would need similar curves and an overhanging top for it to relate visually to the table.

I like to plan all my joinery and construction details before I even touch the wood. After rough-sketching the credenza, for example, I made a complete set of working drawings, including joinery details. Since this credenza has a top that overhangs the sides, I couldn't use dovetails, my usual method for casework, to join the corners. I knew I could have added an applied top to overhang the dovetailed case, but this seemed a waste of wood. Stub tenons would have worked, but they seemed a waste of time.

So, I began to rethink my ideas on joinery. Why not mix traditional joints, like dovetails and mortises and tenons, with production-oriented joints, like dowels or plate joints? These joinery combinations would save time while maintaining the structural integrity of the piece. For example, I planned to dowel the top to the case, and to have a frame-and-panel back. The back would sit in rabbets in the sides of the case, but I did not wish to rabbet it into the top for two reasons. First, I thought it would put unnecessary racking strain on the dowel joints, and second, I wanted to overlap the top at the back a little bit, and thought that a rabbet here would look unattractive. The solution was a dovetailed back stretcher to which I could screw the back. Through mortises and wedged tenons could fasten the bottom stretchers to the sides, as well as add a nice design feature. I could simply plate-join the bottom panel to the sides to keep this joint tight, and then use cabinetmaker's buttons, as shown in the detail on the facing page, to fasten the bottom panel to the stretchers.

Photo: Timothy Savaro, Photoworks

Combining traditional and production joining techniques allowed the author to build this credenza economically while maximizing structural integrity.

Since the conference table was made of South American mahogany, I used mahogany to build the credenza. I like the wood's grain and color. There are few knots and checks, and little sapwood. I view wood's figure as a beautiful landscape, and as I cut it into parts and edge-match pieces, I try to get the grain to reflect the abstract view of a hilly countryside.

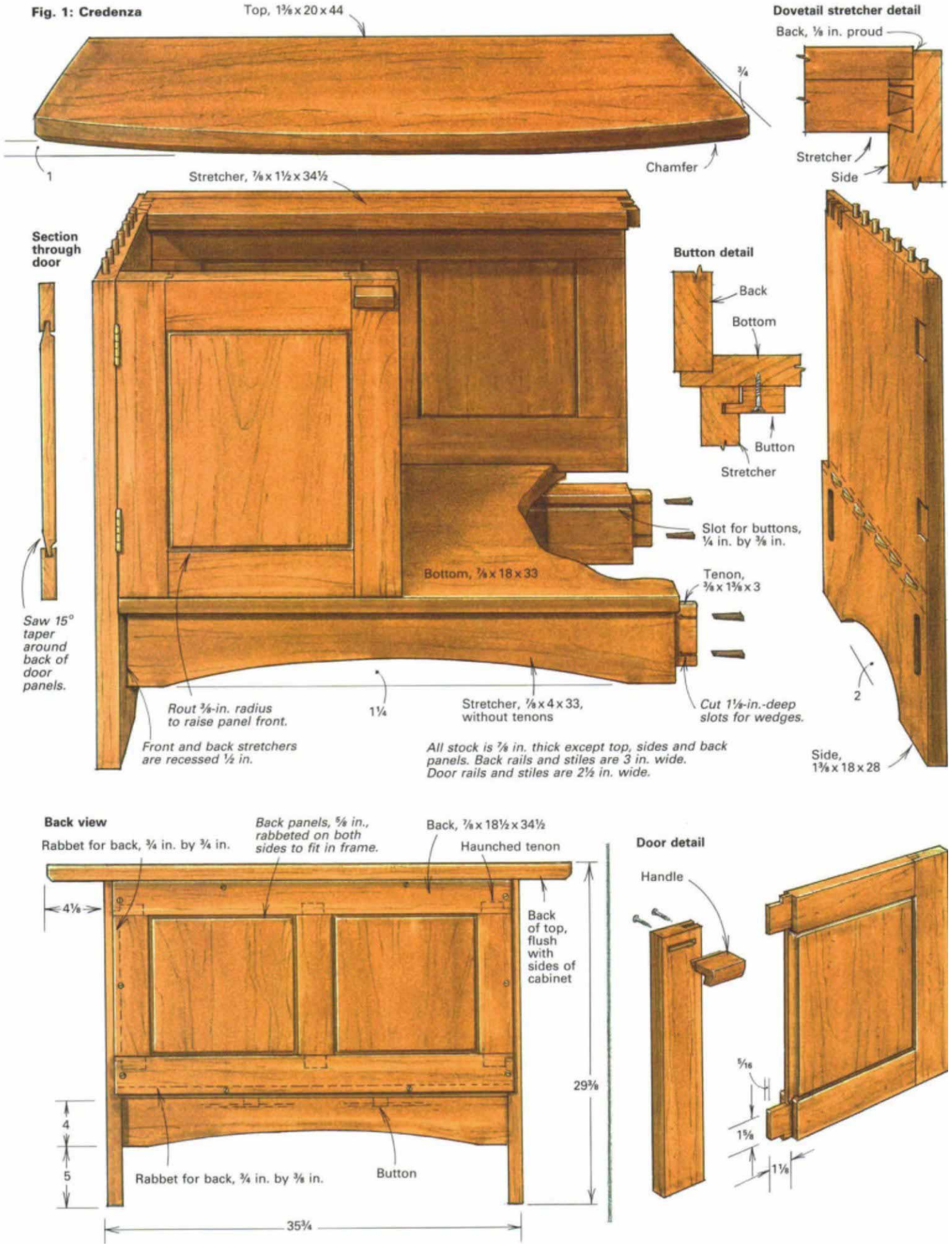
For this project, I cut the door's two center stiles from the same board so the grain would match across the gap. I prepared the stock for all parts shown in the drawing at once and labeled each piece so I could keep track of the grain patterns and orientations. I milled the slab sides and the credenza top from 6/4 stock and the bottom panel, stretchers, doors and back panel from 4/4 stock.

Building the carcase—The squarer a carcase is, the easier the pieces will fall into place, the better the glue joints will hold and the less time it will take to build and fit doors and panels. I follow a logical order in doing joinery, beginning with the joints that will govern how square the rest of the carcase will be.

Here's an overview of the process: When building the credenza, I cut the through mortises in the sides and then cut tenons in the mating stretchers. The large shoulders on the tenons make these joints easiest to square. After cutting the tenons, I ripped slots inside the stretchers for the cabinetmaker's buttons. Then, after dry-assembling the sides and stretchers, I cut the bottom to size, routed the rabbet for the back and dovetailed the blind stretcher across the top.

I used my mortising machine as a horizontal borer to dowel the sides. Normally, I do mortises on this machine as well, but the sides were too heavy and awkward to clamp to the machine. It was easier to cut them with my plunge router. I installed the stock fence guide and an Inca, ⅜-in. slot mortise miller bit (available from Precision Woodwork Machines, Mount Tabor Avenue, Danby Vil-

Fig. 1: Credenza



A temporary glue-up stick attaches over the dowels at the top to keep the sides from toeing in or out as glue dries.

lage, Vt. 05739; 802-293-5195) in my router. The Inca bit plunges deeper than a spiral-flute end-mill bit and leaves a cleaner mortise.

I began by carefully marking the mortise location, then clamping a scrap of poplar underneath to prevent tearout. Next, I ran the router fence along the edge of the wood and plunge-routed the mortise from the outside in three or four passes, bringing the bit to the marked edge of the mortise.

I cut the tenons on my tablesaw, first crosscutting the shoulders, then standing the piece on end in a tenoning jig to cut the cheeks. I filed the tenon cheeks round to match the radius of the mortises instead of chopping the mortises square to match the tenons. It's not necessary to match the radii exactly. The tenons will expand slightly to fill the mortises as you drive the wedges in. To accept the wedges, I handsawed two slots down each tenon to a depth of ¼ in. from the shoulders. I then drilled 1/16-in.-dia. holes in the bottom of each slot to prevent splitting and to permit the slot to open fully during wedging. To give contrast to the joint, I made rosewood wedges, 1 in. long, tapering down from about 3/32 in. to a featheredge.

Next, I routed rabbets on the inside edges of the sides and on the bottom panel so I could fit the back. I cut the rabbet with a spiral end-mill bit and the same fence I used to rout the side mortises. Because the rabbet in the bottom panel goes all the way across, I routed it first. The rabbets in the sides are stopped flush with the rabbet in the bottom panel. Rather than measuring to locate the bottom of the rabbets in the sides, I assembled the sides to the stretchers and placed the rabbeted bottom panel in the carcase. Then, I marked a line on each side flush with the rabbet in the bottom panel. After disassembling the carcase, I routed the rabbets just short of the lines. To achieve the neatest joint where the rabbets met, I planned to wait until the carcase was glued to square up the ends of each rabbet with a chisel.

Before blind-dovetailing the stretcher, I reassembled and squared the carcase. I then measured between the two sides and added another 1½ in. to determine the total length of the stretcher. The extra 1½ in. is for ¾-in. dovetails at both ends. I ripped the stretcher 1½ in. wide, then crosscut it to length before cutting one full and one half dovetail pin at each end of the stretcher, as shown in the detail in figure 1. The purpose of the half-pin, of course, is to avoid undercutting the rabbet for the back. I cut the pins on my bandsaw, then marked matching sockets in the sides while holding the back of the stretcher flush with the back of each rabbet. I then sawed and chopped the waste from the sockets and test-fit the stretcher in place.

Next, I rested the bottom panel on the stretchers and lightly clamped the sides to be sure that the length of the bottom was correct. With all the parts lined up, I marked the edges of the bottom panel and the side. These marks would be the reference points for laying out the plate joints. With the case disassembled, I used the standard 90° fence on my plate joiner to cut the kerfs in the ends of the bottom panel. To cut matching kerfs in the sides, I removed the stock fence from my plate joiner and used a board clamped to the case side as a fence.

These plate joints deserve careful layout and precise cutting, because the case bottom must align with the tops of the stretchers. If things don't work out exactly, there are two cures: You can plane down the tops of the stretchers, or you can reshape the tenons slightly so the wedges will drive the stretchers up.

If you don't have a plate joiner, substitute ¼-in. by ¾-in. wooden splines for the plates. Dry-assemble as above, then mark the location for the splines. After disassembly, clamp a straightedge on the side as a fence and rout a ¼-in.-wide by ⅜-in.-deep slot in the side, stopping 1 in. short of the front and back edges. Rout the other side, and then rout matching slots in the ends of the bottom panel.

The next step is to lay out and bandsaw the curves in the stretchers, sides and top. Drawing the gentle curves is easy when using spline weights and a spline. (For more information on splines, see the sidebar on the facing page.) These curves are not necessarily segments of a circle, but can be varied to complement the overall design. Along the same lines, I prefer not to use standard router-bit profiles when rounding edges. On the underside of the top, for example, although I began with a chamfering bit and pilot bearing, I finished the job with files, planes and scrapers. This allowed me to maintain the feeling of the top's curve in the edge profile. Before glue-up, I finish-sanded the pieces on my stroke sander.

Gluing up the cabinet—The final glue-up of a cabinet can be one of those all-at-once procedures where everything goes very right or very wrong. I planned to slow things down a bit by gluing the cabinet in two steps: first the sides, stretchers and bottom panel, with the top being applied only after the other parts had dried. Gluing up in two steps would not only let me check for square twice, it would also allow me enough time to apply glue carefully, thus reducing squeeze-out.

In order for step one to work, though, I had to come up with a way to keep the sides from toeing in or out at the top-front corners as the glue dried. As a solution, I fashioned a temporary glue-up stick to fasten between the sides (see the photo above, left). I drilled dowel holes in the sides to accommodate the top, then placed dowels in the first hole of each side. I then drilled holes in the glue-up stick at each end and slipped the stick over the two dowels. The holes in the stick must be carefully spaced to hold the sides square: If the holes are not far enough apart, the sides will toe in; if they're too far apart, they'll toe out.

When gluing up, it's important to drive the wedges into the through tenons before the glue sets. After the glue dries, remove the clamps and glue-up stick. Before going to step two of the glue-up, dowel holes must be drilled in the top. To mark the locations for the holes, place dowel centers in the holes in the sides. Locate the top on the centers so that it overlaps the corners at the front and the back equally. Press down hard enough for the centers to mark the top, then bore at each mark. After drilling the holes in the top, glue the dowels in place and clamp the top to the carcase.

Making the doors and back panel—You don't often see a cabinet with a frame-and-panel back anymore, but I decided to install a finished back for two reasons. First, it added versatility to the credenza. Having an attractive back means the piece can be used away from the wall. Second, since the credenza has no

Laying out curves

A lot of my furniture has curved edges, which lend a subtle simplicity to my designs. But drawing large, smooth curves can be difficult. I solved this problem when I learned about splines and spline weights architects often use. They are available from Charrette, 31 Olympia Ave., P.O. Box 4010, Woburn, Mass. 01888; (617) 935-6010 or (212) 683-8822 in New York.

The spline is nothing more than a 5/16-in.-wide strip of clear plastic. Spline weights are cast, felt-bottom weights with hooks in their ends to hold the spline. Pulling or pushing on the spline after each end is hooked in a spline weight bends the spline in a smooth arc, which can then be easily followed by a pencil.

Each spline weight costs about $14. Four splines are available in lengths of 23½ in., 35½ in., 47 in. and 59 in. They range in price from $3 to $7.

Because splitting shallow curves requires very little bending, you can substitute a narrow strip of oak for the plastic spline. That's what I did to mark the credenza's top.

To lay out the curved edge in the front of the credenza, as I'm doing in the photo at left, I marked a line at midpoint along the front edge of the top. Next, I penciled marks ¾ in. back from the front edge on each side and placed the spline weights near those marks. I put each end of my oak spline under a spline-weight hook, placed a finger on the spline at the point where I had marked the center, and then pulled the spline to the edge. While doing this, I moved each spline weight so the ends of the spline lined up with the marks on each side. With everything aligned, I ran my pencil along the spline to transfer the curve to the top.

With minor variations, I used this same procedure to mark all the curves on the edges of the credenza. For instance, because I wanted the curves in the sides of the top to arc more heavily toward the front, I pulled the front spline weight back to tighten the radius in front and pushed the rear spline weight forward to open up the radius in the back. To make the tighter concave curve at the bottom of each side, I used a short plastic spline and pushed it away from the edge to form the arc. ***—J.M.***

The author uses his spline weights and an oak spline to lay out the curve in the top front of the credenza.

drawers or shelves, you're likely to see the inside of the back when the doors are open, unless the credenza is chock-full.

The stile-and-rail frames for the doors and back are of standard haunched mortise-and-tenon construction. To raise the door panels, I sharply radiused the edges in the front of each panel with a ⅜-in.-radius cove bit in a router mounted in my tablesaw extension. I stood the panel vertically and guided it against the tablesaw fence. Because the edge was fairly thick, and my cuts were shallow, I didn't take the trouble to use an extra-high fence, which would have provided more support and made the work much safer and easier.

I also raised the backs of the door panels slightly. I set the tablesaw blade to 15° and again held the panel vertically against the fence. I made the panels in the back from ⅝-in. stock. Instead of raising these, I rabbeted the edges to create a centered tongue to fit the frame. After scraping and sanding, I gave each panel one coat of Watco oil, front and back, to keep it from adhering to its frame during glue-up.

Finishing the credenza—Because I sanded the carcase pieces on my stroke sander before glue-up, the only sanding left to do was on the frames of the doors and back. Machine-sanding certain components gives them a sanded-to-death look. I find this to be especially true of the frames surrounding raised panels, because there are so many lines that must remain parallel or square to each other. As such, I spent a lot of time scraping and hand-sanding the door frames to give them crisp, sharp lines.

Once that was done, I mortised the doors and sides for the brass butt hinges, made and installed door handles and fastened the panel on the back with brass flat-head wood screws. To keep the doors closed, I installed simple magnetic catches to the underside of the top.

I agonized over where to put the door handles. If I mounted them at midpoint on the stiles, they would balance the look of the credenza but would obstruct the beautiful figure that continued across the door gap. I finally decided to tuck the handles up under the top where they would be unobtrusive and easy to reach without bending down. To make the handles, I roughed a long blank on my tablesaw, cut the handles to length, then smoothed the surfaces with files and block plane. In the past, I had simply mortised this sort of handle in place, but I found the tenons on the handles occasionally broke off. So, on this credenza, in addition to mortising the handles, I fastened them with screws from the back.

I never put less than three coats of oil on a piece I've made, but there are times when I apply many more: It all depends on how long the piece hangs around the shop. I apply the first coat of oil and let it dry for a few days. Between subsequent coats, I rub down the wood with 0000 steel wool. Before delivery, I apply a coat of Watco satin wax.

There's a secret advantage to using Watco oil and wax. Clients will be bound to call me some day complaining of a scratch, expecting me to drive to their home or office to make a repair. It's certainly easier to explain that they can not only do the repair themselves with products available at any hardware store, but they can also maintain the finish with ease. □

John McAlevey designs and builds furniture in Franklin, N.H.