



Building Louvered Shutters

Jigs and careful planning make quick, accurate work of a potentially tedious job

by Rob Hunt

A few years back, I was asked to build movable louvered shutters for a Victorian house that was built in 1888. The house's new owners were restoring the building, and they wanted new shutters made to match the old ones that had deteriorated over the years. Thanks to this first commission, we've been building shutters for a number of clients. Out of necessity we've found ways to make the work go quickly and accurately.

Many early homes had shutters. Hinged to open and close over windows, and with movable louvers, they served to protect the windows from bad weather and to diffuse the incoming light. Changing the position of the louvers changes the flow of light and air through the room, giving you a range of lighting conditions to choose from. Shutters can do a lot to enhance windows, and they give you more control in adjusting the amount of

daylight you want in a room, and more control over the ventilation day and night.

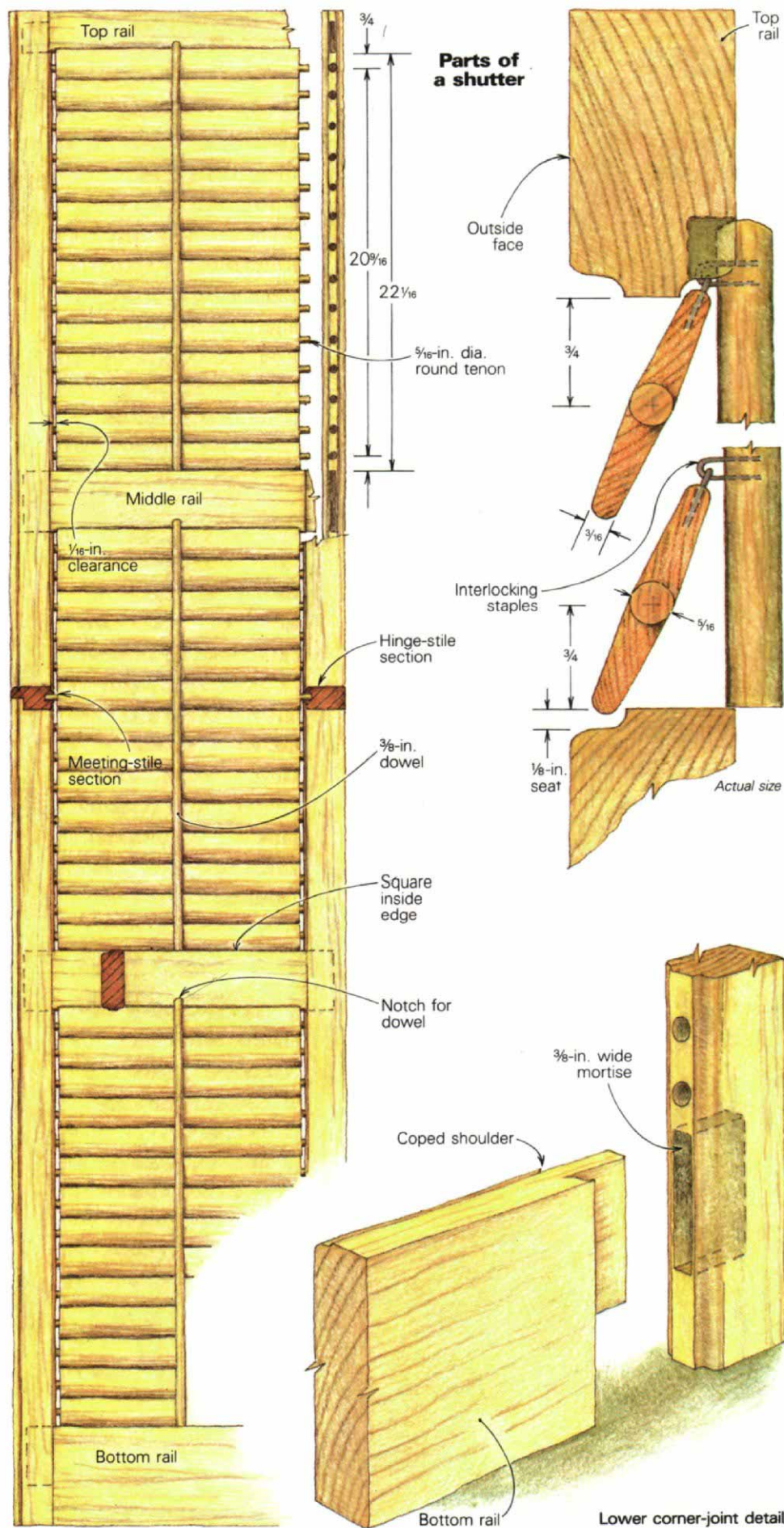
The frame of a shutter consists of two vertical members, called stiles, and at least two horizontal members, called rails. The shutters shown here have two central rails in addition to the top and bottom rails, dividing each shutter into three sections. The louvers are beveled slats with round tenons that fit into holes in the stiles. Each set of louvers pivots as a unit thanks to a vertical rod coupled to the louvers by an interlocking pair of staples.

Cutting the louvers to uniform size, calculating the amount of overlap (the spacing between each louver) and mounting the louvers accurately within the frame are critical steps in the production process, and we've been able to increase both the accuracy and speed of the job by using layout sticks and several jigs that I'll describe as we go along.

Layout—The first step in laying out louvered shutters is to make precise measurements of the opening where the shutters will go. Measure from the top of the window or door jamb to the sill on each side, then measure across the jamb at top and bottom and at several places in the middle. Taking extra measurements for height and width is especially important in older houses, since their jambs are seldom square.

If the jamb is out of square by $\frac{1}{8}$ in. or less, I build the shutters to fit the smaller measurement. If the skew is worse than this, I build them $\frac{1}{8}$ in. smaller than the largest measurement and then trim them to fit the opening after they are completed.

When you measure the height of the opening, remember that the sill is beveled. Run your tape to the point where the outside bottom edge of the shutter will hit the sill. Then



when the shutters are built, you can bevel the bottom edge of the rails.

For projects like this, which require a number of identical, precisely cut pieces, we find layout sticks very helpful. They serve as full-size templates and contain all the required dimensions and joinery details. The horizontal stick we made for these shutters is basically a full-size sectional drawing. It shows the width of the opening, the width of the stiles, the length of the rails, the lower dimensions, the bead on the stiles and the coped mortise-and-tenon joint that joins stiles and rails. All these measurements are critical, since each pair of shutters has to swing closed along a 1/4-in. rabbet. And finally, the louvers need to operate smoothly, without binding.

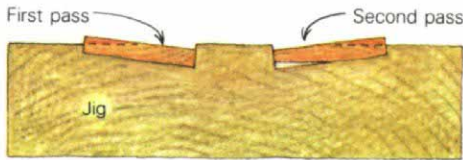
The vertical layout stick for these shutters is marked off to show the length of the stiles, the location of the rails, and the stile holes that accept the tenoned ends of the louvers.

The spacing of the louvers is determined by louver size and the degree of overlap desired, the overall height of the shutter and the width and number of rails per shutter. The shutters shown here are 79 3/4 in. high and have four rails. The top rail is 2 in. wide; the two center rails are 3 in. wide; the bottom rail is 5 1/2 in. wide. Measuring from the top and bottom rails gives us 72 1/4 in.; so to get three equal shutter bays and allow for the 3-in. wide central rails, each bay must be 22 1/16+ in. high (the plus means a heavy 1/16 in.).

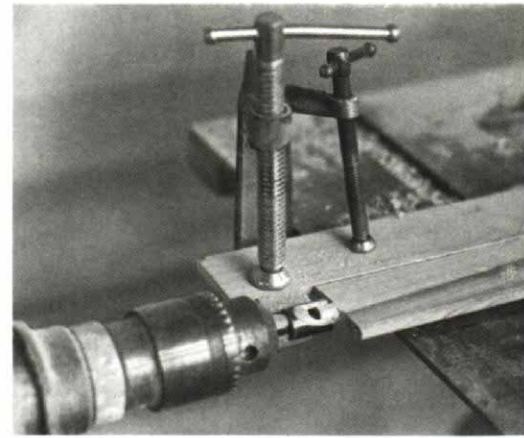
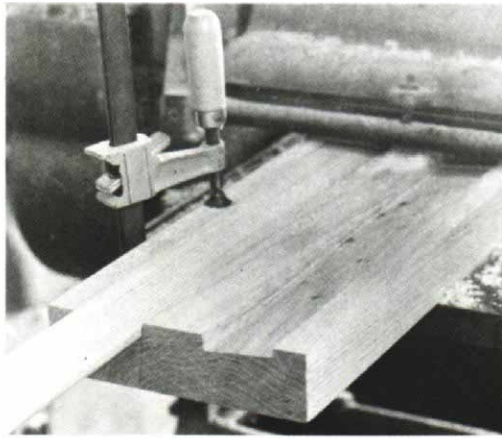
The next thing to figure out is the number of louvers you need, and the spacing between them (actually the spacing between bore centers for the holes in the stiles that receive the round tenons), so that the holes for the tenoned ends of the louvers can be marked on the stiles. Louvers on most Victorian shutters are 1 3/4 in. wide, and this is the width we used (Greek Revival style shutters have 2 1/4-in. wide louvers).

The top and bottom louvers in each section must be located first, since their positions determine how much the louvers can close. Closing the louvers onto the bead is best for shedding water, but if you want to shut out the light, you need more pivoting clearance at top and bottom, which will allow the louvers to seat against each other. We centered the holes for the top and bottom louvers 3/4 in. from the top and bottom rails, sacrificing complete closure for a 1/8-in. seat against the bead on the rail (top detail drawing).

Once the holes for the top and bottom louvers have been located, we can figure the spacing for the rest of them. We want the louvers to overlap about 1/4 in. when closed to block the light and shed water, so the tenon holes in the stiles should be approximately 1 1/2 in. apart, give or take a very small amount. The next thing that we do is to measure the distance between the top and bottom hole in each section (20 9/16+ in.). This we divide by 1 1/2 in., yielding (thanks to my calculator) 13.713 spaces per section. You can't have fractions of a louver, so I divide 20 9/16 in. by 14, and get 1.469, or 1 1/2 in. between louvers. This is the spacing that I check by locating



Shaping louvers. Slats of white pine or cypress are beveled by running them through a jig (drawing above and photo at right) that's clamped to the planer bed. Grooves in the jig are angled at 6° so that the planer removes a narrow wedge of wood to make the bevel. Flipping the slat and running it through the other groove completes the beveling job. A second jig, far right, acts as both fence and stop as the squared tenons of each louver are rounded with a plug cutter. The shoulders of the tenons have already been cut on the table saw.



the centers for the dowel holes on my vertical layout stick.

Another way to space your louvers is to adjust your rails so that 1½ in. will divide into the bay height equally. But for most of the shutters we've built, I've been matching existing shutters, so rail sizes and locations have been fixed.

Cutting louvers—With layout work done, it's time to make the parts. We start with the louvers. The completed louver needs to have two bevels on each side, and the long edges have to be rounded over. Each louver also has to be tenoned at each end to fit into the holes in the stiles.

To produce the slats for the louvers, we first take rough 8/4 stock—either white pine or cypress—and mill it down to a net thickness of 1¾ in. Then we rip strips ¾ in. thick by 1¾ in. wide and surface ½ in. off of each side.

To bevel the louvers, we use a special jig, sometimes called a slave board, that we clamp to our planer bed. It's made from a piece of 1¾-in. thick oak that's slightly longer than the planer bed and about 7 in. wide. Two shallow, 1¾-in. wide grooves in the top face of the slave board are what make the jig work. The groove bottoms are angled 6° off the horizontal, and this slightly angled running surface for the wood strips lets the planer waste a narrow triangular section from the strip to create the bevel (photo top left). Each strip of wood is fed through one groove, then flipped and fed through the other, giving you all four bevels with just two passes through the planer, as shown in the drawing above.

To round the edges, we run the beveled strips through a ¾-in. bead cutter on the shaper, using feather boards to hold them in place. Now all that remains is to cut the slats to length and cut round tenons on their ends. The shoulders of the louvers should clear the edges of the stiles by at least ½ in. or else they will bind when they are painted. We use a clearance of ⅛ in. to stay on the safe side.

We cut the louvers to a length that includes the ¾-in. long tenon on both ends. Then we cut to the shoulder lines of the tenons on the table saw, holding the louver on edge against the miter gauge and setting the blade height to leave a ¾-in. square tenon on both louver



With a hollow-chisel mortiser, the stiles are mortised to receive rail tenons. Holes have already been drilled to receive the louver tenons.

ends. The tenons get rounded with a ⅝-in. plug cutter chucked in a horizontal drill press (Shopsmith). As shown in the photo top right, we use a fence to guide the louver into the plug cutter and a stop to keep from cutting into the shoulder.

Stiles and rails—We start with rough 6/4 stock, joint one edge and one face, and then surface it to a net thickness of 1 ¼ in. (frames for some shutters may be as thin as 1 ⅛ in.). The stiles for these shutters are 2 in. wide, and they're mortised to house tenons on the rails. We cut the mortises with a hollow-chisel mortiser (large photo above) and the tenons on a small, single-end tenoner.

The holes in the stiles for the louvers get drilled at this time too. Rather than mark and

drill the stiles directly, we've found it more foolproof to make a drilling jig. It's the same length and width as the stile, and the hole centers are transferred onto it from the vertical layout stick and then drilled out on a drill press. We attach the template to the stile with C-clamps, then start drilling, making sure the depth of the stile holes is ⅛ in. deeper than the length of the tenons.

The lower edge of each rail on the inside face of the shutter is left square, while the upper edge needs to have a short notch in its center to accept the vertical dowel. The notch and the square edge allow the shutter to open and close securely.

The remaining inner edges of the frame get an ovolo bead. This means that the shoulders on the rails have to be coped where they meet



the molded edges of the stiles. Coping is tough to do by hand, so we use a shaper fitted out with a three-wing coping cutter (a Rockwell 09-128 male sash) on a stub spindle. The stub spindle allows the rail's tenon to pass over it, so we can cope one shoulder at a time.

The last pieces to make are the dowels that will be attached vertically to each bank of louvers. We make these on a shaper with a 1/2-in. beading bit.

Assembly—Before putting everything together, we need to make the jigs that will hold the louvers in uniform position. The drilling template for the stiles can be converted to a louver jig by cutting 1/4-in. grooves across the center of the holes. We make another jig just like this one and use the pair to hold the louvers. In the photo above left, both jigs are lying on the table while I test-fit stiles to rails.

Assembly isn't really that tricky when you use these jigs, though you have to work faster than the glue that's used on the mortise-and-tenon joints (we use West Systems Epoxy, made by Gougeon Co., 706 Martin St., Bay City, Mich. 48706). We first glue and assemble one side of the shutter completely, pressing all stile-to-rail joints home. Then we lay this sub-assembly on top of the jigs, apply glue to the exposed rail tenons, and engage them in their mortises. The trick here is to leave just enough clearance for the dowels at the ends of the louvers, as shown in the photo below left. Here's where fast work is important. Have your louvers ready, get them all engaged in their holes and set in the jig, then close the joints between stile and rails.

You can cut the dowel to length after stapling it to the louvers, or you can cut before stapling. The length of the dowel is the distance between the rails plus the length of the groove in the rail at the top of the section. Round the top of each dowel so that it will fit into the groove when the louvers close.

The dowel receives staples at intervals equal to the distance between louvers; and the uppermost staple on each dowel should be located far enough down the dowel so that the dowel fits into its groove in the upper rail when the louvers are closed. We use an Arrow T25 stapler with 3/16-in. staples. It's a stapler that is used for putting up small wire, so the staples don't sink all the way in.

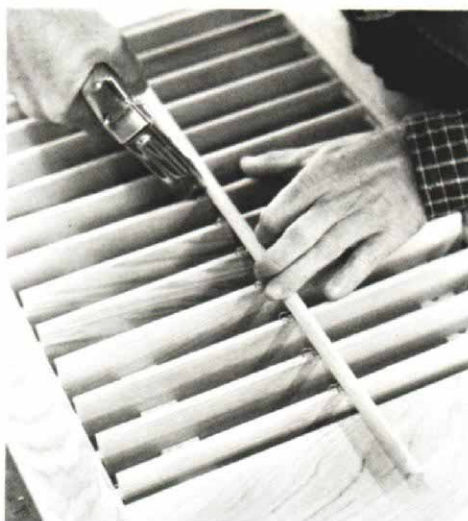
Next we attach each dowel to its section of louvers by shooting staples into the louvers through the staples already in the rod (photo below right). We learned, after some mishaps, that grinding the bevel off the staple points made them shoot straight in, with a minimum of splitting.

We usually leave painting the shutters to someone else, but it's important to seal the wood with a wood preservative before the finish coats are applied. Spray application is far better than brush-on because of the shutters' many movable parts. □

Rob Hunt is a partner in Water St. Millworks and a cabinetmaking instructor at Austin (Tex.) Community College.



Assembling the shutters. Above, test-fitting the mortise-and-tenon joints between stiles and rails before final assembly. The grooved jigs on the table will hold the louvers as the shutter is assembled, as shown at left. Rails are joined tightly to the right stile, but loosely to the left one, providing clearance so the tenoned louvers can be inserted in the stile holes. The final step, below, is stapling the vertical rod to each louver section. Double-stapling keeps louvers aligned with each other, so they can be opened and closed as a unit.



Shutters from central Texas

Bright sunlight, long days and humid, hot weather made operable louvered shutters necessities for 19th and early 20th-century Texas houses in the San Antonio and Austin areas. The louvers let air in and kept rain out even on the foulest days, and on clear, warm days, they screened interior spaces from direct sunlight, while allowing for cross ventilation and natural convective cooling. Both air flow and ambient light levels can be regulated by adjusting the louvers. As the examples here show, shutters can enhance various architectural styles.

The photo directly below is a view from inside the window bay that's seen from the outside in the photo at bottom left

