

By Willie Sandry

Multiple angles add visual appeal to this historically inspired piece.

I have seen this interesting little bench in antique catalogs and photographs, but it wasn't until I saw one in person at the 25th annual Craftsman Weekend in Pasadena, California, that I became truly intrigued. At first glance, you'll notice that the sides are angled, and there's some angled joinery involved. Upon further inspection, it becomes clear there's more going on here.

Looking at the legs, and how they relate to the side panels, becomes a bit of a head-scratcher. The inside edges of the legs are angled at $10\frac{1}{2}^\circ$. That part seems simple enough. However, the outside edge is also angled, and so are the side panels, and none of the three angles are the same. While this design adds some complexity to the construction, the angles add to the mystery of the piece and invite a second look.

My antiques dealer in Portland, Oregon, tells me any piece of Limbert furniture is a very hot item these days and sells quickly. I thought perhaps it was a sales pitch; however, the little window bench in the Pasadena show was listed for \$9,500. It sold the first day.

In the Limbert catalog, the #243 window bench came with a wooden seat, and the #243½ added a loose cushion. The originals were built with the side panel grain running horizontally. This created a wide cross-grain glue joint, and, indeed, many originals developed a telltale crack in the side panels. To avoid this problem in my reproduction, I oriented the side panels vertically.

Limbert Window Bench

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Building the Panels

To get started, it makes sense to mill up some stock for the side panels. Glue three boards together to yield the 17 $\frac{1}{8}$ "-wide x 20"-long panels. Another solid wood panel is required for the seat. If you plan to incorporate a loose cushion, the seat panel needn't be your finest figured lumber. With the three panels clamped up, take a moment to rough mill the remaining parts from the *Material List* on page 3. All parts are 7/8" thick, except the seat ledger strips, which are 1" thick.

A Little Jig for Your Legs

Don't worry too much about the angled legs with angled grooves. I'll fully boil it down for you with this simple little jig. Although the legs have three angles, we'll only concern ourselves with two: 10.5° on the inside edge of the leg, and 6.5° for the groove in the leg. The angle on the outer edge of the leg is inconsequential to the joinery.

To make the jig, cut a piece of 1/2" MDF to 36" long x 10" wide. Lay out the location of the 24"-long x 6"-wide leg blank on the template. Draw the groove location, and cut a 7/8"-wide x 19"-long slot in the template. If you don't have a 7/8"-diameter router bit, I recommend using a 1/2" bit for the first pass. Then you can add a 3/8" strip of wood against your straightedge and make a second pass to uniformly widen the groove.

If you elect to attach the legs to the template with double-sided tape, your template is now finished. I chose to capture the leg blank by attaching strips and blocks of 7/8"-thick stock to the back of the template. This essentially makes the template a one-sided jig, only capable of routing two of the legs. For this reason, I built a second jig to handle the other two legs. Once the first template is made, it's easy to recreate a mirror image with a router and template bit. This will ensure that both leg templates are identical mirror images.

Make up the four leg blanks and rout the angled groove with your template. You'll use a 1/2"-diameter router bit and a 5/8"-diameter guide bushing. Steer the router around the template in a clockwise direction to produce a nice and tidy 3/4"-wide groove. Cut the groove in multiple passes until you reach the finished depth of 7/16".

Once the groove is cut, you're all clear to cut the 10.5° angle on the inner edge of the legs. Leave the outer edge of the legs square for now, and head to the mortiser. Use a 3/8" hollow chisel to cut the 1 $\frac{1}{2}$ "-deep x 3"-wide mortises in the inner edge of each leg. Because you're mortising into an angled surface, the depth stop on your mortiser won't be of much use. Instead, use a strip of painter's tape to mark the correct depth directly on your hollow chisel, and control the mortise depth manually. Be sure to cut the mortises from both sides for a centered cut.

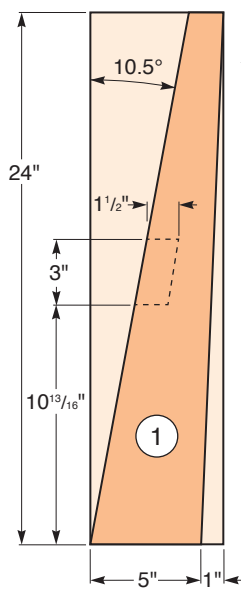
Once the four mortises are complete, the outer angle on the legs can be cut. Establish the cut line by marking from the top outer corner of the leg, to a point 1" in from the bottom corner. Save your offcuts, as they will make useful clamping cauls later.



The author secures leg blanks in the routing jig with wedges. He's tacked the wedges to the jig with leather straps so they're always close at hand.

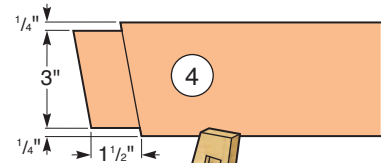


Clamp the jig in place and rout an angled groove in each leg. The jig fully supports the router for a predictable, accurate cut.

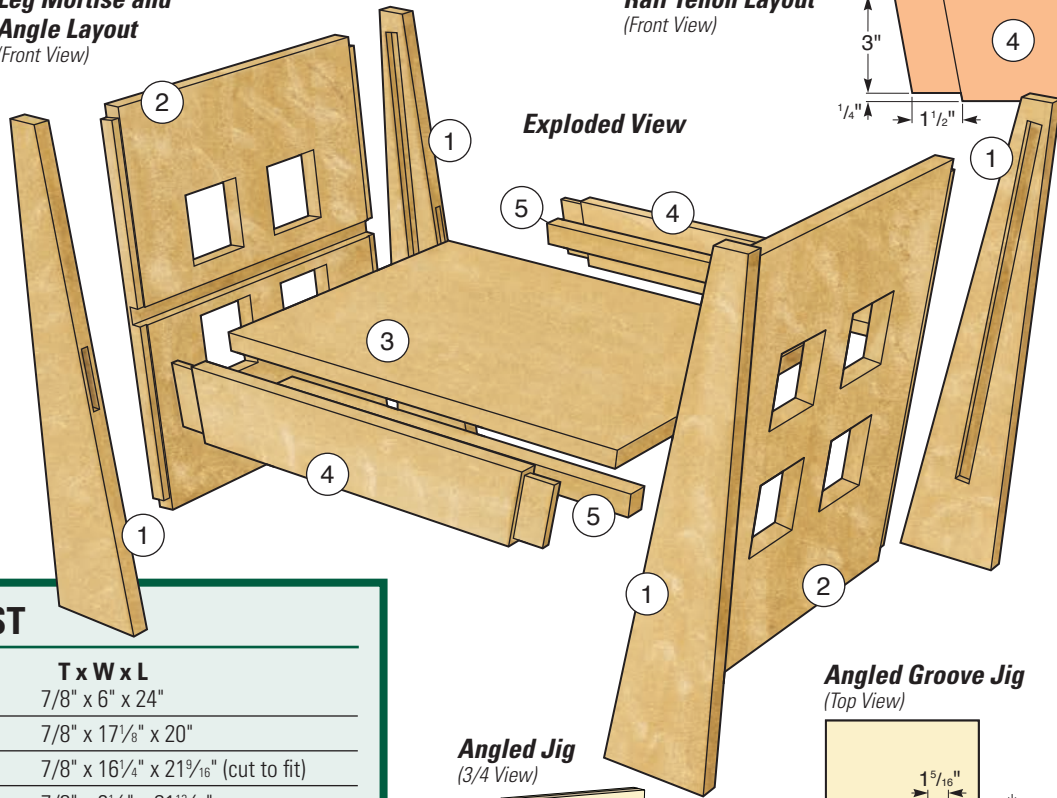


Leg Mortise and Angle Layout
(Front View)

Rail Tenon Layout
(Front View)



Exploded View



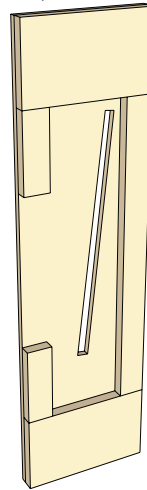
MATERIAL LIST

	T x W x L
1 Legs (4)	7/8" x 6" x 24"
2 Side Panels (2)	7/8" x 17 1/8" x 20"
3 Seat Panel (1)	7/8" x 16 1/4" x 21 3/16" (cut to fit)
4 Rails (2)	7/8" x 3 1/2" x 21 13/64"
5 Ledge Boards (2)	1" x 1 1/8" x 20" (there will be an intentional gap between the ledge board and the side panels)

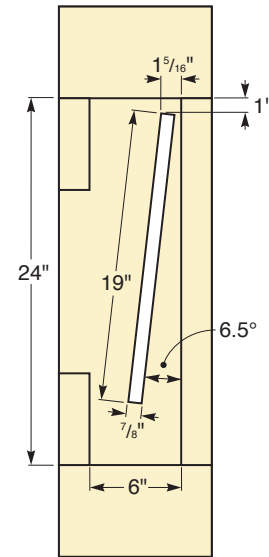
Template materials:

- 3/4" plywood, approx. 21" x 18" for initial square cutout jig
- 1/2" MDF 20"L x 17 1/8"W for one-piece square cutout jig (optional)
- 1/2" MDF 36"L x 10"W and some 7/8" thick wood cutoff scraps for the leg routing jig

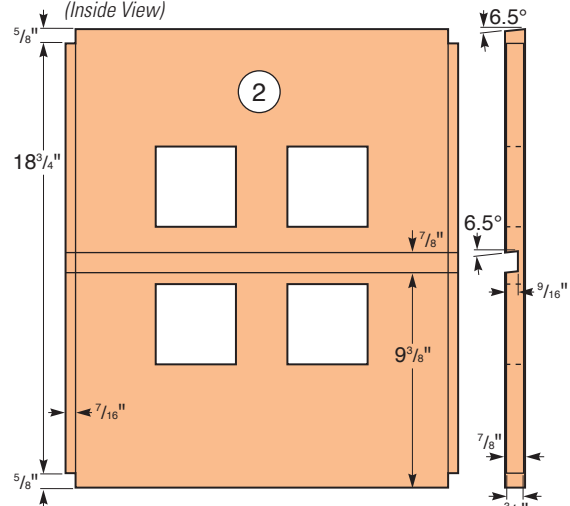
Angled Jig
(3/4 View)



Angled Groove Jig
(Top View)



Side Panel
(Inside View)



Dadoing the Side Panels

Rip, then crosscut the side panels to finished dimension. Raise stub tenons on the side panels until they fit snugly into the grooved legs, then turn the panel upright to create shoulders on the tenon at both the top and bottom. This will give a clean appearance to the finished joint, without having to square the mating grooves with a chisel.

The side panels are angled outward 6.5° from vertical. This means the dado across the side panels must be set to this angle as well. Mark the location of the $7/8$ "-wide x $9/16$ "-deep dado on the inside face of each panel. Extend angled lines to the edges of the panels to clearly indicate where the dado in each will be milled. Then load a $7/8$ "-wide dado stack onto the table saw, and tilt the blade to 6.5° — because of the angled cut, you can't make these dados in side-by-side passes with a narrower blade. If your dado stack doesn't include enough $1/8$ " chippers to cut a dado that wide, adding a $3/32$ " chipper and a few shims will suffice. Make test cuts in a scrap of plywood, and adjust the dado width until it fits the seat panel.

Now, adjust the rip fence to align the dado blade with your pencil marks and cut the dados in the side panels. These cuts need to be mirror opposites, so make them by feeding one panel with its front edge entering the blade first. On the other panel, present the back edge to the blade first. Be sure the same ends of the panels are against the rip fence for both cuts.



Secure the leg blanks to a tapering sled to rip their inside edges to 10.5° . A low profile featherboard can help hold the sled against the fence.



A $3/8$ " mortising chisel creates a mortise in each leg. Since the leg's reference edge on top is already angled, the depth stop won't work. Wrap a piece of painter's tape around the chisel to indicate the required depth.



Raise stub tenons on the side panels. Trim their end cheeks and shoulders until the tenons fit the leg grooves snugly.



Form an angled dado in the side panels with a single pass. Stack the dado to $7/8$ " wide, and tilt it to 6.5° for this cut.

“The greatest mistake you can make in life is continually fearing that you’ll make one.”

-Elbert Hubbard

Making Angled Tenons the Easy Way

You won’t need any expensive jigs to make the angled tenons on the rails, but it does require an accurate miter gauge and sharp dado set. Cut the front and back rails to size, and miter both ends to 10.5°. Then switch to a dado blade and cut the 1½"-long tenon cheeks. With the blade angle set at 90°, angle the miter gauge to 10.5° to the left. It’s easy to see when the angle is correct, because the end of the rail will sit flush against the rip fence, without any gaps. This setup will allow you to make two of the four cheek cuts on each rail.

Now change the miter gauge angle so it reads 10.5° to the right and complete the remaining cheek cuts. At this point, only a small shoulder needs to be removed from the top and bottom edges of the tenons. This is pretty easy to do with a band saw or hand tools. After all, you’ve already got a nice reference for it — the previous cheek cuts will show you right where these shoulders on the edges of the tenons belong.

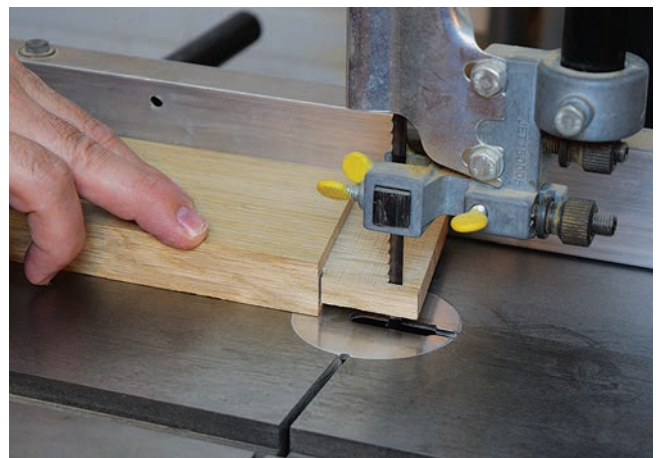
Dry-assemble the front and back rails with the side panels to check the fit. This will give you an opportunity to take an accurate measurement for the seat panel. Rip the seat panel to width with the table saw blade set at 90°. Then angle the blade to 6.5° and bevel both ends of the seat panel as you trim it to length. While the table saw blade is angled, take care of one final angled cut: trim just the top edge of the side panels to produce a visible edge on each that will be parallel to the floor when the bench is assembled.



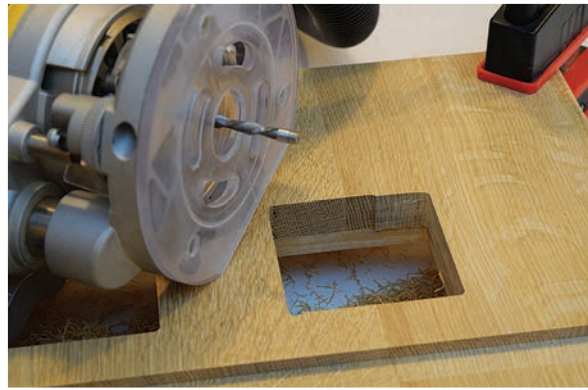
With a miter gauge locked at 10.5°, miter one end of the front and back rails. Then use a stop block clamped to an auxiliary fence to cut a matching angle on the other end.



Angle a miter gauge and cut the tenon cheeks with a dado blade. You’ll know the angle is correct when the rail ends sit flush against the rip fence. Sneak up on the blade height until the tenon fits into the mortise.



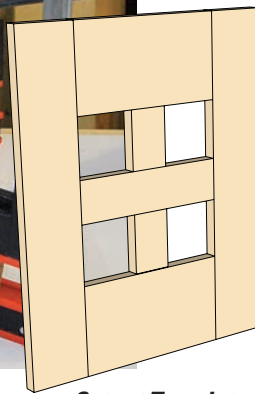
Trim the end shoulders and cheeks of the rails at the band saw, and pare them as needed with a chisel. Aim for a snug fit in the leg mortises.



After removing the bulk of the waste, trim the square cutouts to final shape with a flush-trimming router bit. Here, the pattern is clamped beneath the side panel to guide the cut.

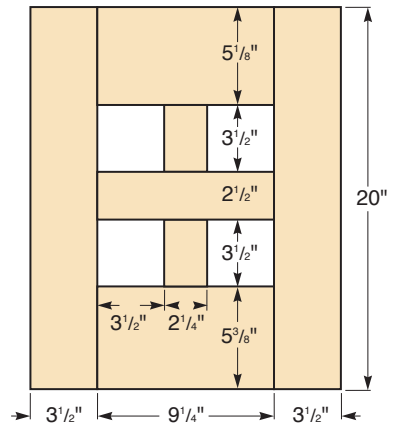


Clamp the template on top of the side panel, and rough out the squares with a router equipped with a guide bushing and spiral bit.



Cutout Template
(3/4 View)

Cutout Template
(Top View)



Forming Square Cutouts

Now make a full-sized template for the side panel cutouts. If there's one hallmark of a Limbert piece, it's the use of negative space. This quite often takes the form of two or four square cutouts in his furniture panels. The template is easy to construct with strips of 3/4" plywood and pocket-hole joints. This method lets you quickly build a template without any jigsaw work or unnecessary sanding. The plywood template can be used as-is to shape the side panels, or you can use it to create a one-piece MDF template for repeated use.

Instead of using a jigsaw, I chose a router to rough out the square openings. Clamp the template on top of the side panel in such a way that it's elevated off your workbench — the heads of my F-style clamps did this automatically. I equipped the router with a 1/4" spiral bit and 3/8" O.D. guide bushing to rough out the squares in several passes. Then I flipped the side panel over so the template was on the bottom, removed the guide bushing and switched to a bearing-guided flush trim bit. I prefer a 1/4"-diameter spiral flush-trim bit, because it creates a tight inside radius and cuts end grain cleanly.

Sand all the parts, and ease their edges where appropriate. Then glue a pair of legs to each side panel, and set these two side assemblies out of the way to dry. As you're tightening the clamps, make sure the legs project 1/2" above the side panels.

Ledger Boards and Final Assembly

A pair of ledger boards support the seat. Cut the ledger boards slightly short so they won't prevent the mortise-and-tenon joints from closing fully. Check them for accuracy by doing a complete dry assembly with the seatboard in place. Now, carefully glue the ledger boards to the rails, only.

For the final assembly, apply glue to the mortises, rail tenons and dadoes, and clamp the rails and seat board between the side assemblies. Use the angled offcuts you saved to direct clamping pressure horizontally. Apply additional clamps front-to-back to close any gaps around the seat board.

Final Cleanup Before Applying Finish

Shine a worklight with a raking angle to spot any blemishes or glue spots that might remain, and remove them. Although this is Arts and Crafts style furniture, the edges and corners on Limbert pieces are rounded and softened, never sharp. So ease those now, too. Then apply your stain or dye and the topcoat of your choice. Wet-sand the final coat to remove any dust nibs or imperfections with an ultra-fine grit sanding sponge and a spray bottle of tap water.

If you choose to add an upholstered cushion to the bench, your next step is to acquire or make one — I describe my method in this article's online extra for *Woodworker's Journal* subscribers. Or, you could keep the bare-bones look for your bench. It was originally designed to sit near a window, offering you a perch with a great view.



Limbert Window Bench Upholstery

Now comes the time to decide if your Limbert reproduction will remain just the #243, or if you'll be adding the "1/2" to your new #243 Window Bench. That, of course, means adding the loose cushion that sits atop the seat board. I have a room above my shop that contains only exercise equipment and sewing machines, which has been affectionately dubbed "The Sweatshop." If you don't happen to have a walking foot leather sewing machine, that's OK. You'll still need to know what to ask for when you hire a local upholsterer.

For this simple box cushion, I'm using some black leather that I purchased at a motorcycle apparel shop. It's soft, supple material that is 3 to 3.5 oz. thickness ($3/64$ " to $1/16$ " thick). The foam is 3" deep with a density rating of 2.6 pounds per cubic foot. I cut the foam to size with a band saw (an electric turkey knife works, too). The foam is just a simple rectangle, so you don't need any fancy angles here. Size the foam $1/2$ " larger than your desired finished cushion dimensions. The available space for the cushion is $20\frac{5}{8}$ " x $16\frac{1}{4}$ ", so I cut the foam $21\frac{1}{8}$ " x $16\frac{3}{4}$ ". Then use the foam to mark for the top and bottom "plates" of the cushion.

Box cushions are usually not tightly stuffed, so I only factor in $1/2$ " total for potential stretching of the leather. Lay the foam on the leather and trace a line around it, then draw another line $1/4$ " larger in each direction. This second line is the cut line, and gives me the proper dimensions for my top and bottom plate. Basically, the leather needs to be cut a total of $1/2$ " wider and $1/2$ " longer than the foam. Leather cuts well with a rotary cutter or leather shears. Household scissors won't make a straight cut in leather.

I think upholstery welting or "piping" is appropriate here, so I made some with strips of my project leather. The strips are cut $1\frac{3}{4}$ " wide with a rotary cutter and straightedge. You'll often hear upholstery professionals talk about cutting welting strips "on the bias" or diagonally. This is important with some fabric and generally a good practice; however, it's unnecessary with leather.

I use a zipper foot on my old walking foot upholstery machine to sew the piping into the leather strip. If the strips aren't long enough to go around the cushion, sew strips together (See photo at right). I chose $5/32$ " firm piping, which is pretty standard for upholstery. Sew the piping into the folded strip of leather, taking care to keep the edges aligned. As you approach seams where your strips were sewn together, fold the seam allowance open so the joint will lay flat.

Next you can make a zipper panel, as seen in the photo series on



The author joined leather strips together to achieve the required length of piping. Open the seams and lay them flat before sewing.



If you're a beginner behind a sewing machine, use a stapler to wrap the leather strips around the cording. With a zipper foot on the sewing machine, sew right next to the cord.

page 9, and boxing strips. These will cover the sides of the foam cushion, and you can measure the foam for dimensions. I'm using 3" foam, so my boxing strips are 4" wide and my zipper panel is made from two 2⁵/₈"-wide leather strips (foam width of 3" + [2 x 1/2" seam allowance] + 1/4" zipper width = 5¹/₄"). I selected a #4.5 metal coil zipper. You can purchase zippers by the yard and cut them to fit, or you can buy them in a predetermined length. There is a wealth of information on making zipper panels in textbooks and online resources.

The leather parts are stapled together to keep them aligned while they're sewn. I switch to a 1/4" cording foot on my sewing machine to sew the piping between the top plate and boxing strip. Then I blind stitch the assembly I just made to the bottom piping and bottom plate. A trick I learned from an upholstery instructor I studied with (who used a Bostitch P3 hand stapler) is to staple the leather pieces in position so nothing shifts out of place when you sew. The staples must eventually be removed, but that's the only drawback I've found.

Wrap the foam with one layer of high-loft batting such as Dacron. This softens the square edges of the foam, and it adds a little more comfort. I usually make a slip cover for the foam, so it slides easily into the zipper opening. Otherwise, you can make it fit with a little wrangling. Now toss the cushion on your new bench and see how it sits.



Zipper panel in three easy steps. Cut a length of zipper a little longer than needed, and blind sew it to one of the zipper panel strips. For this first step, you'll be sewing right along the zipper teeth.



Then sew the second zipper panel strip to the other side of the zipper.



Finally, topstitch on each side of the zipper. Slightly close the leather gap to conceal the zipper for a clean appearance.

A Brief Glossary of Sewing Terms

Blind Stitch: A method of sewing so that the stitch thread is invisible, or nearly invisible, particularly on the right side of the item

Cording Foot: A sewing machine attachment used to install one to three cord lengths in place for cording. Replaces the standard Presser Foot.

Rotary Cutter: A tool generally used by quilters to cut fabric, consisting of a handle with a circular blade that rotates

On the Bias: Diagonally across the grain of a fabric

Piping: A narrow tube of fabric, sometimes enclosing a cord, used for trimming seams and edges

Presser Foot: Standard sewing machine attachment used to hold fabric flat as it is fed through the machine and stitched. Can be replaced with other specialized feet accessories for different applications.

Seam: A line of stitches that joins two pieces of cloth

Seam Allowance: Area between the fabric edge and the stitching line on two or more pieces of fabric joined together by a seam

Topstitch: Sew a line of stitches on the top, or right, side of an item, near a seam, generally done for decorative purposes

Walking Foot (Also known as Dual Feed Foot or even Feed Foot): A specialized type of sewing machine (or sewing machine attachment) designed to feed several layers of fabric evenly through the machine. It does this through a two-part mechanical action that makes the foot look like it “walks” as it steps up over the fabric. A Walking Foot attachment replaces the standard Presser Foot.

Zipper Foot: Sewing machine attachment designed for use when attaching zippers; can also be used to sew trim that will not fit under the standard Presser Foot. Zipper Foot is adjustable to right or left side of the sewing machine needle. Replaces the standard Presser Foot.

Willie Sandry is a woodworking enthusiast who enjoys dabbling in other mediums such as leaded glass and leatherwork. He can frequently be found in his backyard lumber kiln drying his next load.



Build the cushion piece by piece. Attach the boxing strip to the zipper panel with a blind stitch.



Cut nicks in the piping for smoother corners. Then staple the piping between the top plate and boxing strip.



With a 1/4" cording foot installed on the sewing machine, stitch the top plate to the boxing strip. The cording foot follows the piping like a train on tracks. Then repeat this stapling and sewing process for the bottom plate.