

Light, Strong, and Lively

Build a comfortable contemporary chair with traditional roots

BY TIM MANNEY

I've always admired the simplicity of the ladderback: It's a chair reduced to the minimum components necessary to hold up a human body, nothing extra. For years I devoured images of ladderbacks, hoping to be able to draw on a catalog of ideas to design a good chair of my own someday. Two of the chairs that most influenced me were a three-slat ladderback made by Dave Sawyer and an Italian Chiavari chair from the 1950s. The Italian chair had a bend in the rear leg below the seat and looked alive, like it might scamper off at any moment. Dave's chair had a warm, simple appeal that felt like you could live with it forever and grow to appreciate it more with each passing year. I wanted to combine some of the liveliness of the Italian chair with the sweet, understated subtlety of Dave's chair. The chair I'm building here is my latest effort toward that.

Material selection

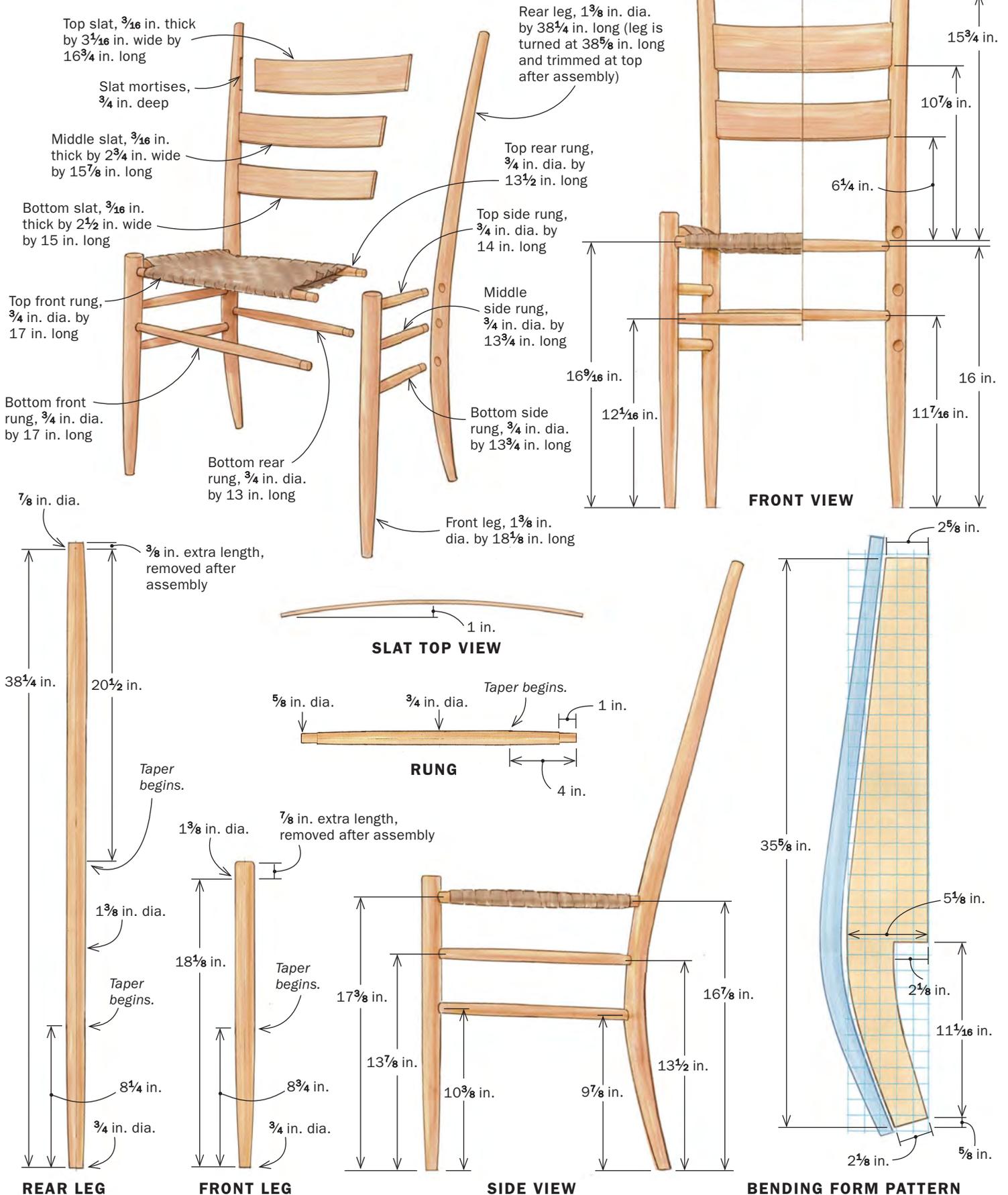
When I was learning to make chairs, I was taught to split out parts from logs with a wedge and froe. That's a great way to guarantee strong, straight grain for slender, bent parts. But now that I have less access to logs and less space to store them, most of my chairs begin with a trip to a well-



Weave a seat from a tree. Manney typically weaves the seats of his ladderback chairs with hickory bark, which is strong, comfortable and beautiful, but sometimes hard to come by. Shaker tape is another good option. To learn how to weave a hickory bark seat, see Peter Follansbee's Greenwood column in FWW #278.



Ladderback



Start with the rear legs

Begin by turning. Manney uses straight-grained maple. As he nears the final shape, he supports the leg with his left hand. After using the gouge he'll keep the workpiece spinning and use a block plane set very fine to produce a perfectly smooth and bump-free surface. Then he finishes with looped strips of 150-grit and 220-grit sandpaper.



stocked lumberyard. I generally select 8/4 boards because the quality is often higher than I find with 6/4 stock.

For this chair I chose hard maple, a wood I think is wildly underappreciated. I look for boards with perfectly straight grain, and for all parts of the chair except the slats I prefer flatsawn boards to quartersawn ones. A flatsawn board that looks like it has straight grain is generally sawn with the fibers of the tree; a quartersawn board may have straight lines on its face, but the edge will often reveal that the fibers have been sliced through at an angle. Bending parts from boards like that will increase the number of workpieces that end up in the woodstove.

Turn and bend the rear legs

After the parts have been sawn from the plank, I take the rear leg blanks to the lathe and begin turning with a gouge. An extralong tool rest for the lathe makes turning these legs far easier. I described how to make one, and how to add an extension bed to a benchtop lathe to handle these long legs, in *FWW* #279 (“Make a Long Tool Rest for Your Lathe”). After I finish with the gouge,

I do a final pass with a spokeshave or a block plane with the lathe spinning to eliminate any lumps and bumps before sanding.

Once the legs are turned, I steam them for three hours in a steambox made from a section of schedule 80 PVC pipe. Then I pull one out, put it on a felt-lined steel bending strap, and tighten the screw that applies end-to-end pressure. From there I move it quickly to the bending form. The form has a V-shaped channel that’s also lined with felt to prevent denting the soft, steamed wood. Using quick-grip clamps, I secure the leg at the foot end and then start levering downward, adding another clamp at the apex of the bend and others where necessary.

After the leg cools, generally overnight, I remove the bending strap but keep the leg on the bending form, replacing the unwieldy clamps with a couple of wedges. Then the leg and form go into my lightbulb kiln for two days to set the bend.

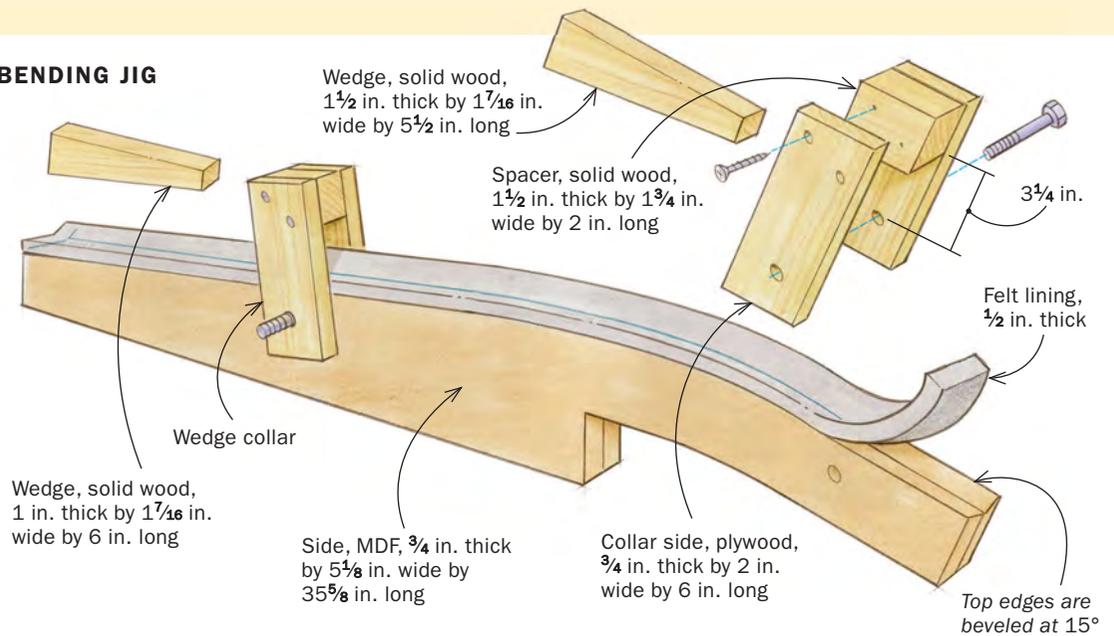
The rear legs get doubly drilled

When drilling the rear legs for the rungs, I use two jigs—one for the back rungs and one for the side rungs. Drill for the back rungs



Steam in a cylinder. Once turned, the rear legs get steamed for three hours. Schedule 80 PVC pipe stoppered with plugs cut from foam makes a fine steambox. A wallpaper steamer from Lowes powers the box and a shopmade rack elevates the legs.

BENDING JIG



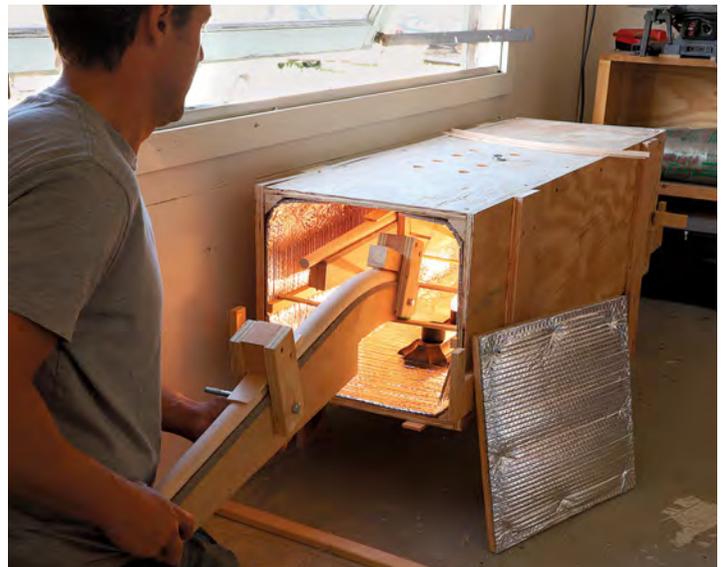
Beginning the bend. After fitting the steamed leg to a flexible steel bending strap and tightening the end block, Manney clamps the foot of the leg to the felt-lined bending form and levers downward.



Tighten the gaps. Anywhere the workpiece doesn't seat fully in the felt channel, clamp it tight. Manney uses a Veritas Strap Clamp for Steam Bending.



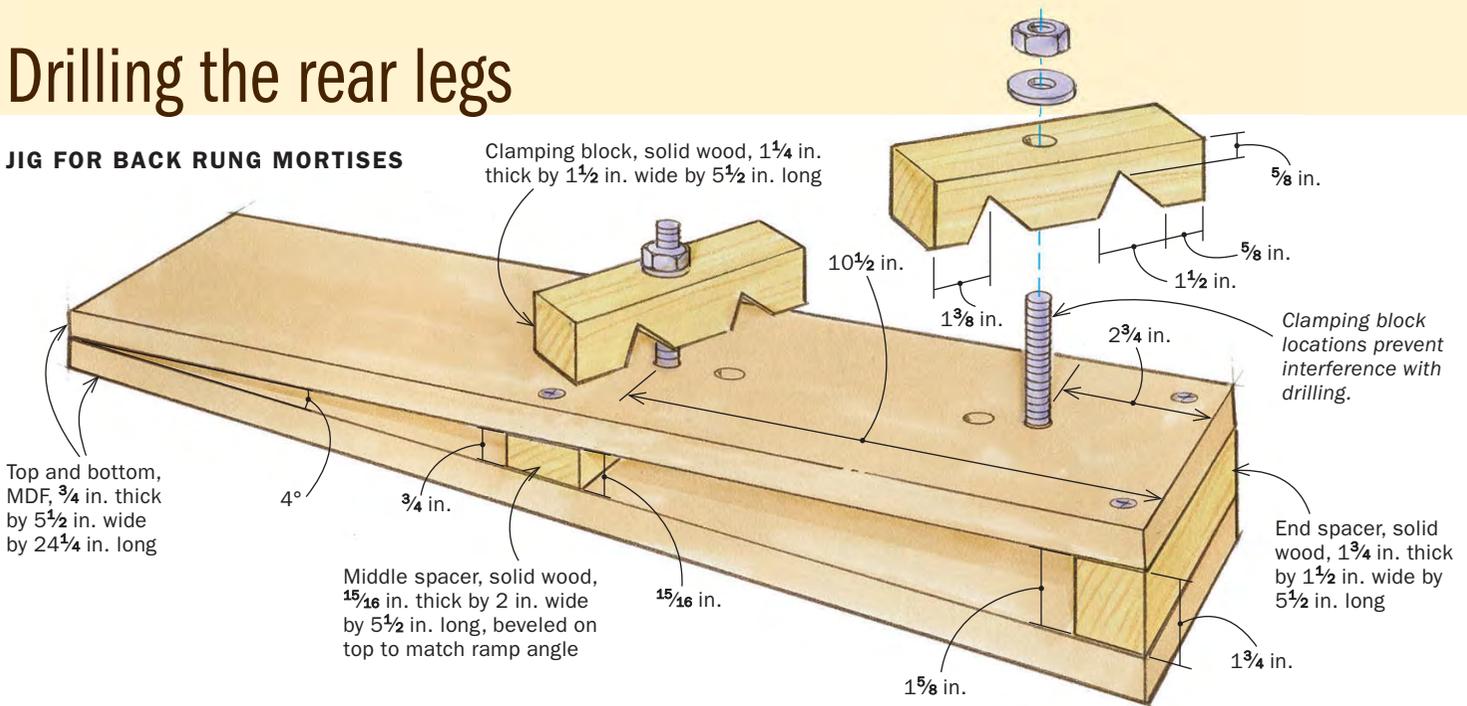
Trade clamps for wedges. Manney leaves the leg clamped overnight, then removes the bending strap and replaces the clamps with wedges.



Kiln sets the bends. With the clamps removed, the leg and form fit into the light-bulb kiln, where they bask for two days at 140°.

Drilling the rear legs

JIG FOR BACK RUNG MORTISES



Careful calibration. When setting up to drill mortises for the back rungs, lay both legs in the jig with their curves in the horizontal plane and mark top dead center (below). Then rotate them so the centerpoints roll outward $\frac{1}{4}$ in. or so. Use winding sticks to be sure both legs rotate equally.



first. Put both legs into the jig and use winding sticks to ensure they are rotated equally. The amount of rotation here will control the amount of splay you'll see in the back of the chair. If you were to clamp the legs into the jig with their curves laid flat in the horizontal plane and then drill the back rung holes, then in the finished chair the rear legs, when seen from the front, would not splay out at the bottom. To make the legs splay outward, which looks better, start by laying the legs in the jig so their curves are in the horizontal plane; then mark the rung centerpoints with the pencil jig at the drill press. Next, rotate each leg so the foot drops and the centerpoint of the rung mortise moves $\frac{1}{4}$ in. or so. With the legs clamped there, drill the holes for the back rungs.

Next up is drilling holes in the rear legs for the side rungs. Setting a leg properly in the second jig is exacting work. I use



Finding the centerline. Having already transferred the height of the rung mortises from a story stick, Manney uses a notched pencil jig to help zero in on the centerline. To be sure the pencil is vertical, he aligns it with the shaft of the drill bit.



JIG FOR SIDE RUNG MORTISES

Base, MDF, $\frac{3}{4}$ in. thick by $5\frac{1}{2}$ in. wide by $24\frac{1}{2}$ in. long

Clamp block, top angled at 10°

Notch, $\frac{3}{4}$ in. deep by $1\frac{1}{2}$ in. wide

Sighting line, 8°

Top support block, solid wood, $1\frac{1}{2}$ in. wide by $2\frac{1}{2}$ in. tall by $5\frac{1}{2}$ in. long

Clamp block, top angled at 15°

MDF, $\frac{3}{4}$ in. thick

7° angle block, $\frac{3}{4}$ in. thick by 3 in tall by $11\frac{1}{2}$ in. long

Rib, $1\frac{1}{2}$ in. thick by $1\frac{1}{2}$ in. wide by $12\frac{7}{8}$ in. long

Bottom support block, solid wood, $1\frac{1}{2}$ in. wide by 3 in. tall by $5\frac{1}{2}$ in. long

two reference angles to guide me: The first is an angled line drawn on a piece of MDF; the second is an angle block—a piece of MDF cut to a wedge shape.

To establish the leg's end-to-end position on the jig, sight across the leg to the angled line on the piece of MDF. Then insert a dummy rung into one of the back rung mortises and rotate the leg until the dummy rung is parallel with the angle block. The dummy rungs should be sized to slip easily into and out of the rung mortises. Rotating the leg to the angle block gives the chair's seat its trapezoidal shape.



Two angles control the drilling. To position a leg for drilling the side rung mortises, Manney first aligns it parallel to a diagonal reference line drawn on a piece of MDF. Then he inserts a dummy rung in one of the back rung mortises and rotates the leg until the rung is parallel with a 7° angle block.

Making slats: Mill, bend, and mortise

I use quartersawn stock for the slats and mill it slightly thick. Without shoulders to cover up errors, you need a perfect-fitting joint, and the extra thickness guarantees that.

Steam the slats for 30 minutes, then bend them in a two-part form. Leave each slat in the form for about one minute before releasing the clamp and fitting the slat into a drying form. The drying form is simply two parallel strips of wood screwed to a piece of plywood 20 in. apart. The slats are cut to 21 in. before bending, and that 1-in. differential holds the slat to its curve.

To figure out where to cut the mortises for the slats, assemble the back panel of the chair. Begin by connecting the rear legs with two dummy rungs. Set a story stick on the top of the top rung, and transfer the marks for the top and bottom of each slat mortise. Next clip the slats to the back of the legs with spring clamps, aligning them with the marks you just made. Then, sighting down from above the leg, draw the centerlines of the slat mortises.



Bend and size the back slats

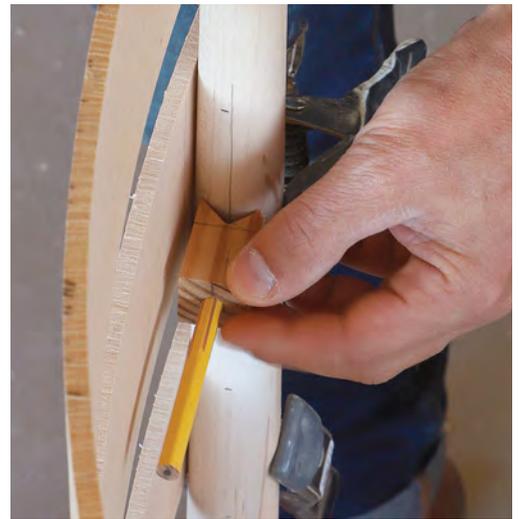
Steam-bent slats. After 30 minutes in the steambox, the slat blanks bend easily. They spend just one minute clamped in the two-part bending form.



Racked up. After a minute in the bending form, the slats are fitted into the drying rack and left overnight. The next morning, still on the drying rack, they go into the lightbulb kiln for two days. The slats are all 21 in. long at this stage; the span between the fences of the drying rack is 20 in.



Mock up the back to lay out the slats. With two dummy rungs clamped between the rear legs, Manney clips the slat blanks in place. To mark the top and bottom of each slat mortise, he uses a story stick, standing it on the top dummy rung.



Center finder. To locate the center of the slat mortise, Manney uses his bird's-mouth pencil jig, holding its inner face parallel to the arc of the slat.



Angle recorder. Using a pencil that's sanded flat on one side so it tracks tight to the leg, trace the leg's splay angle onto the face of the slat.



Measure precisely between the legs. Record the distance from leg to leg at the bottom of each slat mortise, and write those dimensions on the corresponding slats.

Determining the length and angle at which to crosscut the slats takes several steps. First, using a pencil, trace the angle of the legs onto the face of the slats. Then unclamp the slats and measure the distance between the legs at the bottom of each slat mortise. Write those numbers on the corresponding slats. Using those measurements, draw the slats' shoulder lines, keeping them parallel to the lines traced from the legs. Then draw the end lines: parallel to the shoulders but $\frac{3}{4}$ in. farther along the slat. Crosscut on those lines.

Now place a leg in the mortising jig and rout the mortises with a $\frac{3}{16}$ -in. spiral upcut bit and a $\frac{1}{2}$ -in. bushing. When finished routing, square the ends of the mortises with a $\frac{3}{16}$ -in. mortising chisel.

Now fit each slat to its mating mortise. After sanding the slats to remove any staining or raised grain from the steambox, test



Transfer with tick marks. Holding the slat bottom edge up, transfer the measurement you just made.



The angle at the end of the slat. Place a straightedge on the tick mark and parallel to the line showing the splay of the leg. Trace the straightedge to mark the shoulder, then make a second line $\frac{3}{4}$ in. away. Crosscut to that last line.



Bandsaw to length. Bring the slats to finished length with a careful crosscut at the bandsaw.

the fit and remove excess material from the back of the slat by working across the grain with a block plane. Because the rear legs are splayed, the tops of the mortises are slightly angled. To compensate for this, whittle off a small triangle from the top corner at the end of each slat. When the slats fit, dry-assemble the legs, dummy rungs, and slats to be sure they go together smoothly.

Front legs follow

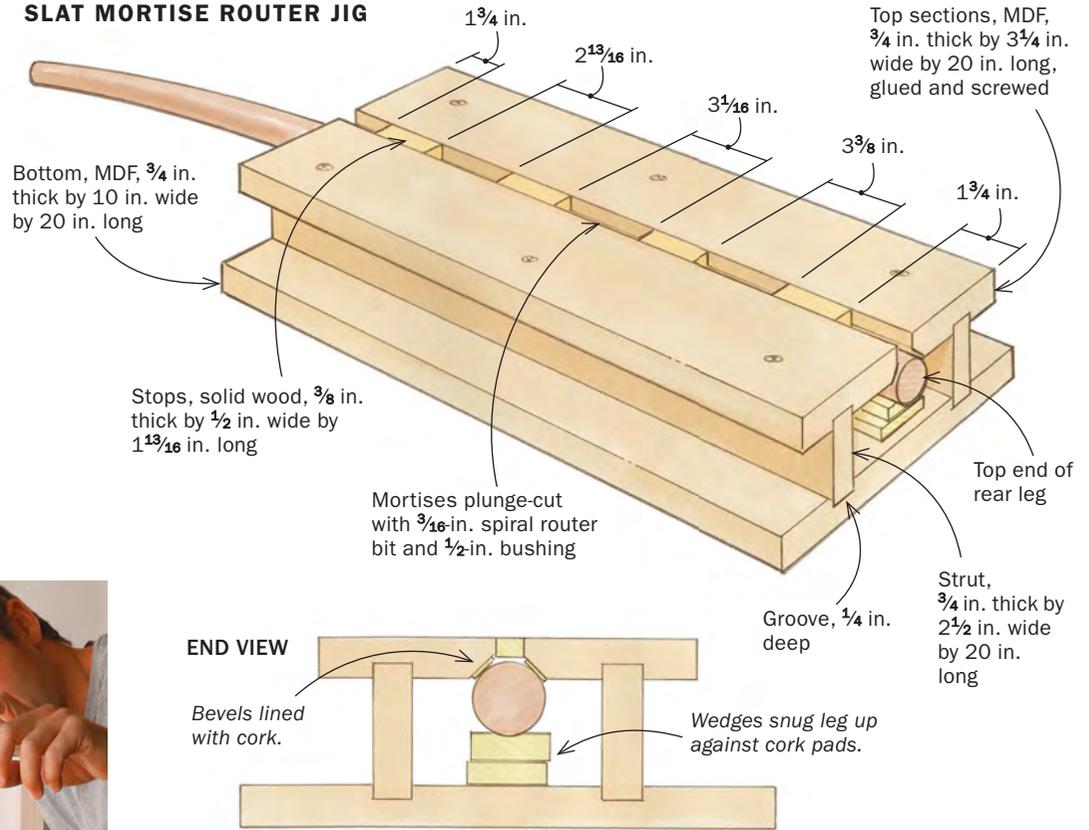
Next are the front legs. After turning them, place them in the drilling jig and use a story stick to mark the rung positions along their length. Then move the jig to the drill press and use a center-finding gauge to mark the centers at those points. With the centers marked and the legs held securely in the jig, drill the front mortises.

Slat mortising



Define the mortise angle. With the slats cut to length, use an MDF scrap with a square corner to set a bevel gauge.

SLAT MORTISE ROUTER JIG



Apply the angle to the leg. After setting a rear leg in the mortising jig, insert a dummy rung and rotate the leg until the rung angle matches the bevel gauge. Now you're ready to cut the slat mortises.



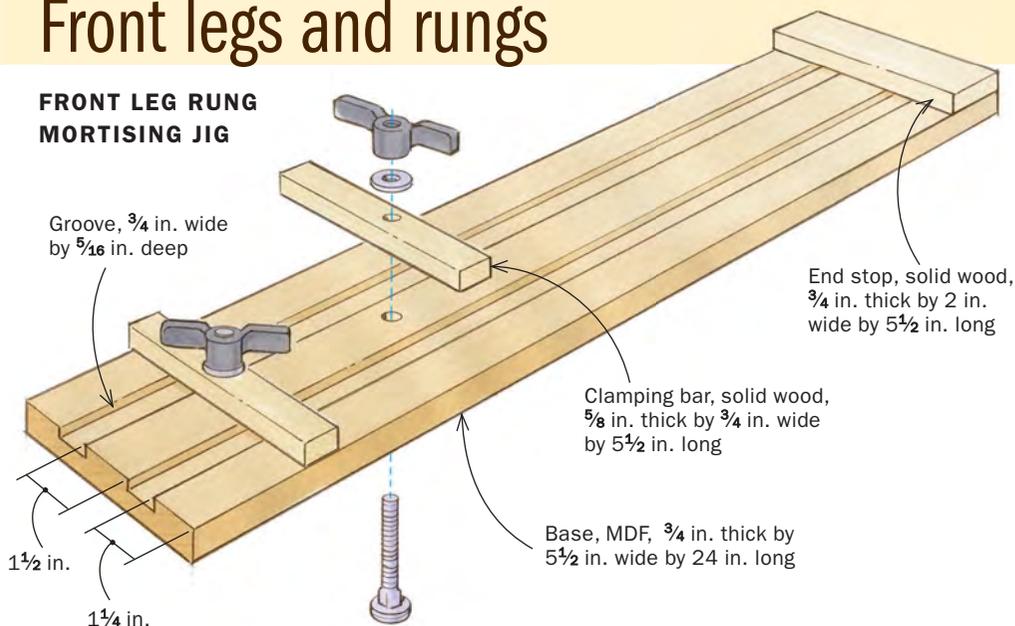
Making slat mortises. With the leg wedged in position in the jig, use a plunge router with a bushing to cut the three slat mortises. Afterward, square up the rounded ends of the mortises with a chisel.



Fit the slats. Milled slightly over thickness, the slats are fitted to their mortises with a few passes from a block plane on the back face. To account for the legs' splay angle, clip a little off the top corner at each end of the slat.

Front legs and rungs

FRONT LEG RUNG MORTISING JIG



Front rungs first. After rotating the front legs so the growth rings on the end are angled 45°, tighten the clamps and drill for the front rungs.



Ascertaining the side angle. When drilling for the side rungs, find the correct rotation by using a dummy rung and a 7° angle block. With the dummy rung in one of the front rung mortises, rotate the leg until the rung is parallel to the angle block.

Turn the rungs

I keep the rung blanks in my lightbulb kiln for a few days before turning the tenons. If the rung tenons are sized when the wood is in this state, they will swell slightly after the chair is assembled and the joinery will stay tight for decades. Remove a rung blank from the kiln and turn it round, a bit oversize. Then form the tenons. I use a bedan with a sizing accessory. For a 1-in.-long tenon, I cut $\frac{7}{8}$ in. of it with the bedan. Next I pencil a line 4 in. from the end of the rung and turn a taper to the tenon, leaving a tiny shoulder at the transition point. I blend the straight center section of the rung into the tapered section and then sand. As I finish a rung, I return it to the kiln and bring out the next one.

Assemble the chair

Before assembly I go over the rear legs with a finely set, convex-soled spokeshave and 220-grit sandpaper to remove any discoloration caused by steaming.

I start assembly with the back panel, applying glue to the rung mortises in one leg and driving the rungs home with a steel hammer. Then I glue and push in all three slats. Next, I glue the



Turn the rung tenons with care. After turning the rungs round and a bit oversize, Manney uses a bedan with a sizing accessory (left) to size the tenons. Then, with a gouge, he gently blends the tapering rung into the tenon, leaving just a very slight shoulder to ensure the tenon will have no visible gaps.



Glue-up and finishing

The back is first. Using Old Brown Glue, which he favors for its reversibility and long open time, Manney begins assembly with the back panel. He first glues the rungs, then the slats. For the slat mortises, a pipe cleaner is a nice and skinny glue applicator.



Coax on the second leg. After pulling the back panel together by hand, tighten the joints with quick-grip clamps. Then sight down the back to be sure it is not twisted.



Fitting the front legs. With the back assembled and set aside, insert the front rungs into the front legs; then tap in the side rungs.



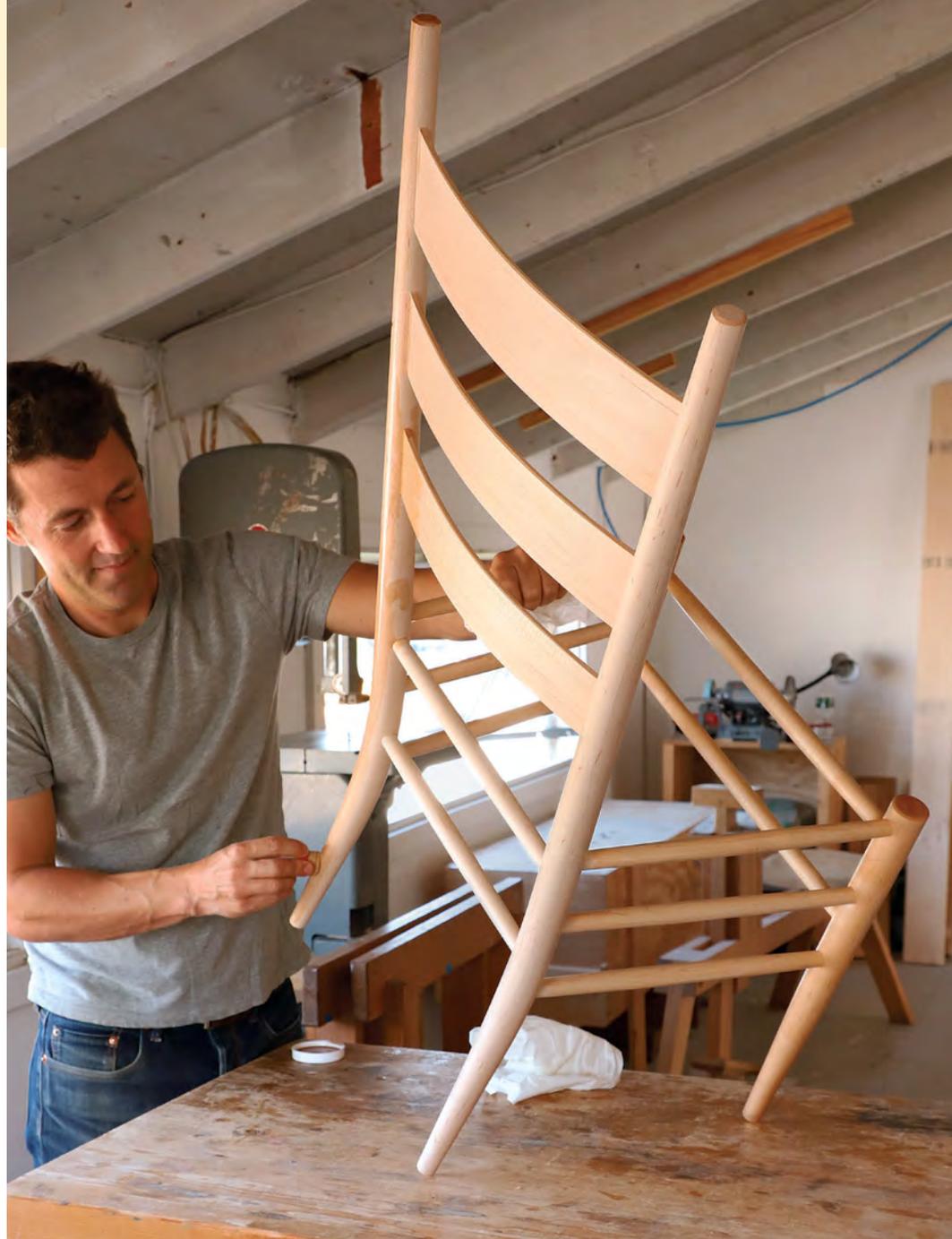
Bring the front and back together. For the last phase of assembly, after elevating the back on spacers, nudge the side rungs into their mortises and then bring the joints home with clamps.



Lop off the top. The rear legs are left 1 in. long at the top to prevent problems when bending. Cutting them to final length is one of the last acts in building the chair.



Choice chamfer. After the legs are cut to length, Manney gives them a scalloped chamfer with a knife.



Finishing touch. After carefully cleaning the chair of glue, then sanding and rubbing with a fine Scotch-Brite pad, Manney dabs on two or three coats of Tru-Oil with a small applicator made by rolling up a strip of cotton (left). Finally, he applies paste wax with a fine Scotch-Brite pad.

rung and slat mortises on the second rear leg and use quick-grip clamps to pull the panel together. I sight down the panel to check for twist and to make sure everything has come together nicely.

Glue the front rungs to both front legs next, bringing them home with a clamp. Then glue and drive in the side rungs. Set the back panel on the bench, elevating it on spacers, and glue and insert the side rungs. Finally, bring the complete chair home with clamps.

Finishing up

After the glue cures, if everything has gone well, when I set the chair on a flat surface it will be level from side to side and the seat will have roughly a $\frac{3}{4}$ -in. drop from front to back. I use a framing square registered on the bench to check that the side rungs

match in height, and to make sure that the drop from the front rung to the back one is correct. If anything needs adjusting, I shim beneath the feet with wedges to correct it, and then mark all four legs at the same height off the bench and trim them to length.

When the chair has been sanded, I do a final pass with a fine white Scotch-Brite pad. It does a wonderful job of removing any slight imperfections, while bringing a fine polish to the surface without rounding over any of the crisp details. I apply two or three layers of Tru-oil and then wipe on a thin layer of paste wax with a fine Scotch-Brite pad. After the wax dries, I buff it off with a clean rag. The result is a buttery smooth finish that begs to be touched and brings out the warmth and beauty of the wood. □

Tim Manney makes chairs and chairmaking tools in South Portland, Maine.