



Windsor Rocker

Without Special Tools

Part 2

CONTINUED
FROM FWW #218

THE PROGRESS SO FAR

Complete the top half of the chair, add the rockers, sit back, and relax

BY PETER GALBERT

You are halfway through the construction of this beautiful rocking chair, which combines Windsor-chair joinery with contemporary design. After all the hard work shaping and steam-bending the parts, drilling and sculpting the seat, and completing the leg joinery, the squat, four-legged stool you have at this point in the project may not seem worth the effort. But most of the hard work is behind you, and what lies ahead is the fun part.

Join the arms to the seat and back posts

The two frames formed by the seat, arms, arm posts, and back posts form a very strong connection between the chair's seat and back. Finish shaping the lower half of the back posts with a spokeshave, but leave the top portion until after you have chopped the mortises for the crest rail. Mark the location of the arm's mortise on each back post.

Select dry stock with matching grain for the arms. Transfer the pattern to the top and inside of each rectangular arm blank. Extend the center line down both ends of the arm and scribe a horizontal line $\frac{5}{8}$ in. from the top face all the way around the blank to create centers for turning. This is offset turning, so make sure that the piece doesn't strike the tool rest. Turn the tenon until the line on the inside of the curve nearly vanishes.

Dry-fit the arm and back post—Cut a test block roughly matching the length and thickness of the arm and drill a $\frac{1}{2}$ -in.-dia. hole

PARTS IN THE WORKS

In Part 1, we steam-bent the back posts, the spindles, and the crest rail. These parts remain rough-turned or shaped, but the back-post tenons have been finish-turned and fitted to the seat.

ASSEMBLED PARTS

Also in Part 1, we sculpted the seat, then drilled and reamed the tapered holes in it. We also turned the legs and stretchers, cut slots for the rockers, and then glued and wedged the legs into the seat.

PARTS TO BE MADE

The only major parts still to be made are the two arms, made from blanks with matching grain, and the rockers, which are cut from quartersawn stock.



Make and fit the arms



1. ROUGH THEM OUT FIRST

Rough-turn the tenon. Bandsaw the top profile for each arm, mount it on the lathe using the center points at each end, then mark the centerline of the tenon (above). Turn the tenon (right) until the line drawn on the inside almost disappears.



2. DRILL THE ARM-POST MORTISE

Check the angle. The mortise in the arm needs to be angled so that the arm tenon is at the correct height on the back post. Start with a test block drilled at 62°. Adjust the angle from there.



Drill the arm-post mortise. In the same way that you drilled the leg mortises in Part 1, drill into the arm for the arm post with the bevel gauge set to the test-block angle.



at 62° for the arm post. Ream the test block until the underside of the block is aligned with the baseline of the arm tenon on the arm post. The reamer used for the seat mortises may not fit this smaller hole, but a plumber's 6° reamer used to de-burr pipes (available at hardware stores) works fine. Now see if the other end of the test block centers on the location of the mortise in the back post. If you're close, you can tweak the angle when you drill the arm. If not, make another test block and try again.

Drill the mortise at 62° (or whatever angle worked on the test block), using the centerline as a sightline. Cut away a section of the underside of the arm down to the layout line on either side of the arm-post hole. This will enable you to ream the hole until the bottom of the arm just touches the arm post's baseline. Ream both arms at the same time to ensure matching angles. Once both arms are seated, note the actual height of the mortises on the back posts.

The mortises in the back posts directly face the arm posts. To find this point, place a large rubber band around the back post at the height of the mortise and stretch it across to the point you reamed down on the arm post. Measure halfway across the gap at the back post end of the rubber band to find the center, and check the alignment by visually centering the arm post on the back post. To find the correct angle of the mortise in the back post, use the same block with a 85° angle cut on one end. Set the block on the arm and mark the angle on the outside of each back post. Place the roughed-out arm tenons into the top of the shopmade kiln (see plans in Part 1) and let them dry for at least 24 hours.

Drill the mortise in the same way you drilled the mortises in the legs, using the V block holder and keeping the line marked on the posts parallel to the benchtop with the mortise location pointing straight up. Drill the mortise with a 7/8-in. to 3/8-in. stepped bit (morriswoodtool.com/Counterbores) until the shoulder is about 1/8 in. below the surface of the post. It's important to note that the obtuse, or larger of the two angles, is toward the top of the



Ream to fit. Bandsaw down to the layout line on the underside of the arm so you can see when the arm post is home. That way, when you ream the mortise, you can be sure that the arm will enter the post at the right spot.



3. DRILL THE POST AND SHAPE THE ARM

Lay out the back-post mortise. Place the same board used to lay out the leg stretchers onto the arm and trace a line on a piece of tape on the back post.

Drill the mortise. Angle the post until the line you just drew is parallel to the benchtop. Using the angled board and a mirror, drill a stepped mortise through the post with two brad-point bits.



At arm's length. With the stepped mortise drilled, measure from the bottom of the wide part of the mortise to the midpoint of the arm post.



Two-step tenon. Mark the location where the tenon steps down and then turn it on the lathe. A shopmade gauge aids accuracy.

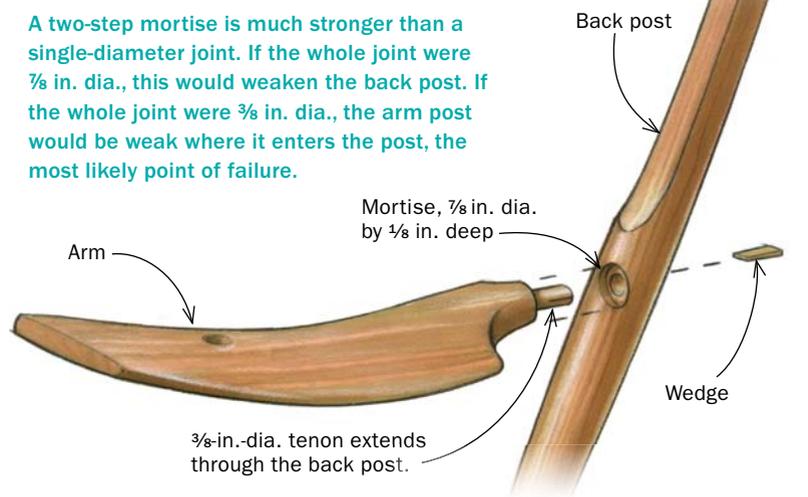


Shave your arms. Mark the centerline of the arm. With the joinery complete, sculpt the arms using a drawknife, spokeshave, files, and sandpaper.



THE TWO-STEP MORTISE

A two-step mortise is much stronger than a single-diameter joint. If the whole joint were $\frac{7}{8}$ in. dia., this would weaken the back post. If the whole joint were $\frac{3}{8}$ in. dia., the arm post would be weak where it enters the post, the most likely point of failure.



Four-way glue up. The back post, arm post, and arm need to be glued and wedged all at one time. Use a clamp to ensure the stepped arm-to-back-post joint fully closes.

Add the crest rail and shape the spindles



Fit the crest rail to the chair. With the back posts glued in, clamp the crest rail to them in line with the mortises. Slide the rail back and forth to find the best fit and then mark out the tenons (left). The scalloped ends of the crest rail transition into tenons that enter the back posts (right). Because the posts need to be splayed later when inserting the crest rail, having a tenon that fits tight on four sides is awkward. So leave a slight gap above the tenon.

Start on the spindles. Use a template to lay out and then bandsaw the profiles on the bottom of each spindle. Then use a spokeshave to create round tenons.



chair. This mortise also can be drilled with the combination of a 7/8-in.-dia. Forstner bit for the shoulder and a 3/8-in.-dia. brad-point bit for the mortise, as long as the tip on the brad-point is long enough to correctly center in the dimple left by the Forstner.

Place the back post in the seat and measure the distance between where the arm-post tenon exits the arm and the shoulder of the rear-post mortise. Use this distance to mark the shoulder on the arm's super-dry tenon. Finish-turn the shoulder and tenon.

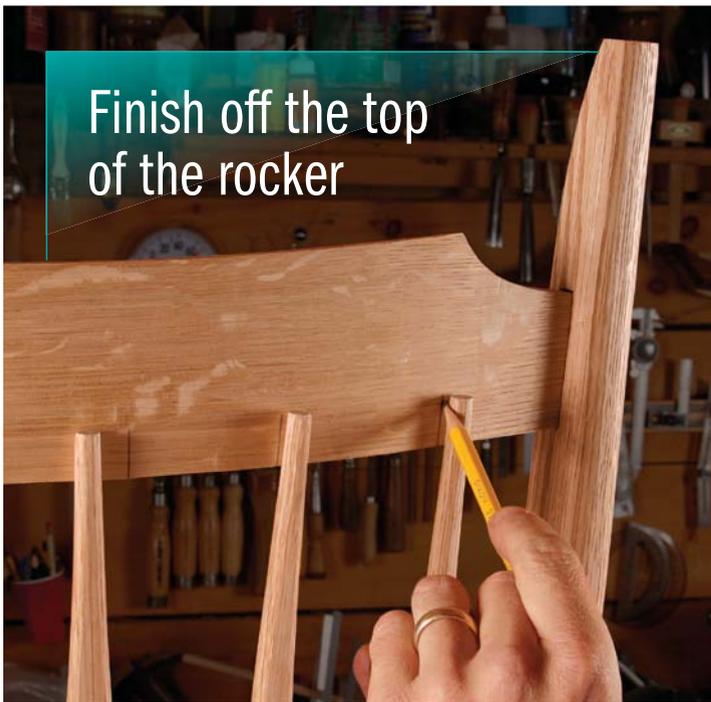
Shaping the arms and the back posts—Bandsaw the side profile on each arm, then tape the waste back on and cut the top profile. Draw a midpoint line around the sides of the arm to give a reference point for shaping. I shape the arms with drawknives and



Point of contact. Number and dry-fit the spindles into the seat. Draw an oval (above) across all the spindles where the sitter's back will make contact (have someone sit on it to lay out the oval). Narrow the spindles above and below the oval and smooth the fronts and backs using a drawknife (right), a spokeshave, and a scraper.



Finish off the top of the rocker



Space the spindles. Because the spindles splay outward from the center, mark the location and angle where they enter the crest rail.

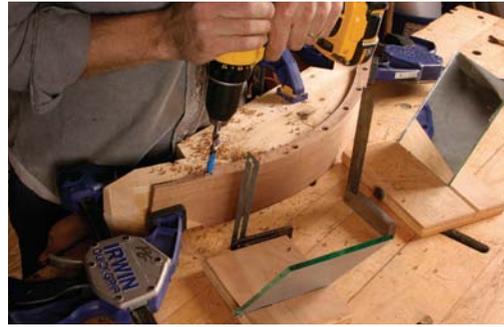
spokeshaves while holding them in a shave horse, but you also can secure the arm in a vise or with clamps. While the tops of the arms will be sanded smooth, I leave clean spokeshave facets on the underside for the sitter to discover.

While the tops of the back posts still have flat sides, cut the mortises near the top for the crest rail. Now you can round the rear of each back post and start to taper the tops. Leave a 1/4-in.-wide flat section on each top, as it helps to rest the chair on these points when assembling the rockers.

To dry-fit the arm/posts assembly, place the arm post in the seat and slide the back post onto the arm while dropping the arm and back post into position. To disassemble the joint, twist the arm post in the seat, and lift up the back post and arm. If all the joints look good, go ahead and glue both assemblies, adding wedges to each joint. I use a clamp to draw the arm all the way into the joint.

Shape and fit the crest rail and the spindles

Once the crest rail has been set in the final form and has spent a couple of days in the kiln, you can begin shaping it and making the tenons. Clamp the crest rail across the front of the back posts in line with the mortises. If there is any twist or misalignment, shave the crest



Drill the crest rail. For stability, clamp the crest rail to the angled bending form. Drill each angled hole for the spindles, starting nearer to the back of the rail to avoid breaking through the tapered front.



Back support. Dry-fit the spindles, then bend a thin strip of wood against their widest part. Alter the angle of individual spindles until you get a smooth, flowing curve.



Mark the location. Place masking tape on the top and base of the spindles to show the correct depth of each tenon. Then mark the orientation of each spindle so that you keep the flowing curve after glue-up.



All together now. Glue the spindles into the seat, glue in one end of the crest rail, then glue the spindles into the rail (left). Then splay the back posts and glue in the other end of the crest rail. Install a small wedge (above) to close the gap above each tenon, and trim it flush later.



Ready to rock

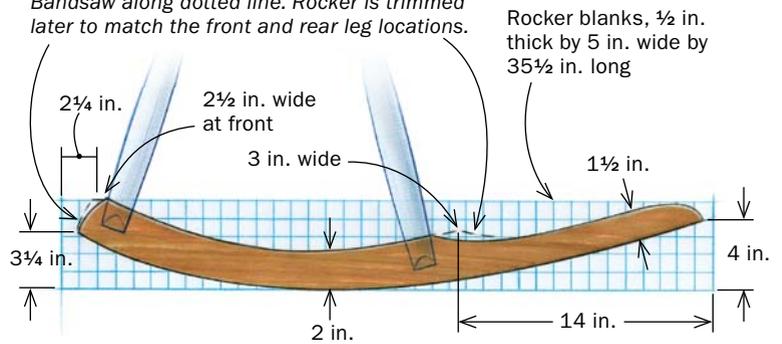
How splayed are the legs? Use a bevel gauge to discover the angle of the rocker slots versus the ground. If the front and back legs on the same side have different angles, average the readings.

Bevel the rockers. Set the bandsaw table at the angle of the rocker slots and bevel the bottom edge of each rocker. Bandsaw the top edge square.



ROCKERS

Bandsaw along dotted line. Rocker is trimmed later to match the front and rear leg locations.



Rocker blanks, 1/2 in. thick by 5 in. wide by 35 1/2 in. long

until it sits flat against the back posts. Mark the back of the rail where it meets the outside of the posts to get the location and angle of the tenons. Even though the crest mortises don't go all the way through, the extra length is easily taken up by the flexibility of the posts, and the extra splay looks good in the final piece.

Lay out the cove and recessed area on each end. Bandsaw the cove and then use a drawknife and spokeshave to remove the bulk of the recessed area. Leave the tenon parts a little thick and scrape them to final thickness when smoothing the crest. Cut the tenons about 1/16 in. shorter than the mortises to ease installation.

It is now time to work on the spindles. Lay out and then bandsaw the recesses on the bottom ends, then shave the tenons round. Once all of the spindles are dry-fitted into the seat, number the sequence and then draw an oval on them that roughly encloses where the sitter's back will make the most contact. Shave from these marks to the ends and facet the edges. Then shave, scrape, and sand the fronts and backs. Dry-fit the crest rail and mark the spindles where they intercept it. Cut the spindles to length including 7/8 in. for the top tenons, and then finish shaping them.



A rocker that rolls. Use a pair of straightedges to align the rockers and set them at the correct depth in each slot.



Measure the gap and deepen the slots. Discover which rocker is farthest from the bottom of the slot and measure the distance (left). Mark this distance on either side of the other three legs, remove the rockers, and then chop down to the line (right) to bring all four slots level.

The spindles splay out from the center, so they require angled mortises in the crest rail. Evenly space the spindles and then mark their angle in the back of the crest rail. To keep the crest rail vertical and stable, clamp it to the final bending form and use the mirror technique (see Part 1) to drill each hole at the required angle.

To orient the spindles in their holes, hold a thin strip of wood along the curve at the mid-back region to make sure that they align smoothly where the greatest body contact and weight will be. Mark this alignment on masking tape attached to the bottom of the spindles and the chair seat.

Glue the spindles into the seat and let them dry. Then, in quick succession, glue them into the crest rail, glue one end of the crest rail into a back post, and finally spread the back posts to seat the other end of the crest rail. Glue a wedge into the gap above each crest-rail tenon and peg the crest-rail-to-back-post joints.

It don't mean a thing if it ain't got that swing

Balancing the rockers for the smoothest motion is vital to the success of the chair. Being pulled too far back or pitched forward will leave the sitter struggling to stay in the chair.

The bottom of each rocker is beveled to match the splay of the legs. Measure the rocker slots with a bevel gauge and then tilt the bandsaw table to this angle. Lay out one rocker using the design provided and then cut it on the bandsaw, beveling just the bottom curve. Fair the curve using coarse sandpaper on a curved block of wood and plane or scrape the sides until it slides into the slots. Trace this rocker onto the other blank and repeat the process.

Turn the chair upside down and line up the front of each rocker with the front legs. Use winding sticks to see if the rockers are in the same plane. They almost never are, so tap a rocker out of the slot until they are in plane. Tap a wedge in from both ends of the gap, tape the rockers to the chair legs, then turn the chair

over and see how it feels to sit in. If the rocker needs to rock back more, simply tap the rockers out of the front slots. Once you're happy, mark where the rockers enter the legs. Remove the wedges, measure the largest gap between the rocker and the bottom of the mortise, scribe the distance on all sides of the other legs, and pare to the line. Once the joints are set, shape the rest of the rocker tops, bevel the ends of the legs, and then glue and peg the rockers.

A fumed finish

Before applying a finish, fine-tune the shape.

I fume the chair with janitorial-strength ammonia (see "Fumed finish made easy," *FWW* #211), followed by four coats of an oil/varnish mix. □

Peter Galbert makes Windsor chairs in upstate New York.



To purchase digital plans and a complete cutlist for this chair and other projects, go to FineWoodworking.com/PlanStore.



A smooth transition. Now you can dry-fit the rockers and fair the curves on the top edge so that they terminate at the legs.



Final details. Bevel the ends of the legs, then glue in the rockers and peg the joints.