

The Three-Legged Stool

Furniture turned on the lathe

by David W. Scott

The three-legged stool is the essence of casual furniture, good for a brief perch in the kitchen or shop or for a longer sit when the body is leaning forward and partly supported by a desk or counter. For a turner, the stool may serve as an introduction to joinery and a chance to go beyond the usual turned work.

The idea of individual turnings coming together to form a finished piece of furniture is fascinating. Building furniture and doing production lathe work in a small shop, I have long been intrigued with the structure of the three-legged stool—the variations on its simple theme seem endless. Free-form slab seats in the style of Wharton Esherick (*FWW* #19, pp. 50-57), seats that are turned and then carved, other rung configurations and legs at other angles, even different angles in the same stool, all open up new design possibilities.

I make stools between 25 in. and 28 in. high, a good size for general use. A 25-in. stool with legs angled at 78° has feet about 17 in. apart—graceful and stable in appearance and in use. I determine the placement of the rungs according to appearance, intended use of the stool, and the user's leg length. If the rungs are too low, the stool looks clumsy; if too high, it begins to look storky. Two-rung stools, like one of those in the photo at right, have the rungs' mortises all at the same height from the floor. Three-rung stools have rungs staggered in height 1 in. to 1¾ in. so as not to weaken the legs. In order to be able to choose the rung heights and lengths for each stool individually, I turn the seat first and then the legs. The legs join the underside of the seat in 1-in. diameter holes about 4 in. to 5 in. from the seat center. I mark and drill the holes in the legs for the rungs, test-assemble the legs and seat without glue, and measure the lengths of the rungs. Then I turn and finish the rungs, take care of details and glue the pieces together.

Making the seat—Usually, I turn the seat from 6/4 or 8/4 stock, 12 in. to 14 in. in diameter, mounted inboard on a Glaser center-screw chuck on the lathe (*FWW* #25, pp. 84-85). I bought the chuck, which lets me mount and unmount the seat blank quickly and precisely, for \$70 from Turnmaster Corp., 11665 Coley River Circle, Fountain Valley, Calif. 92708. My preference is seats made all from one board, but seats glued up to get that width look fine too. First I drill the hole for the center screw on the seat-blank underside, then, using a protractor, I mark three lines radiating out from the center at 120° intervals. Then I bandsaw the rough shape, mount the blank on the lathe, and pencil-mark a circle that sets the distance the legs will be from the center. This ensures that the legs will center up with the finished seat. The holes for the legs must be drilled before the seat is turned, because the top's final shape may not lie flat on the drill-press table without wobbling. I tilt the table to 78°, and drill 1-in. dia. holes in the bottom of the seat

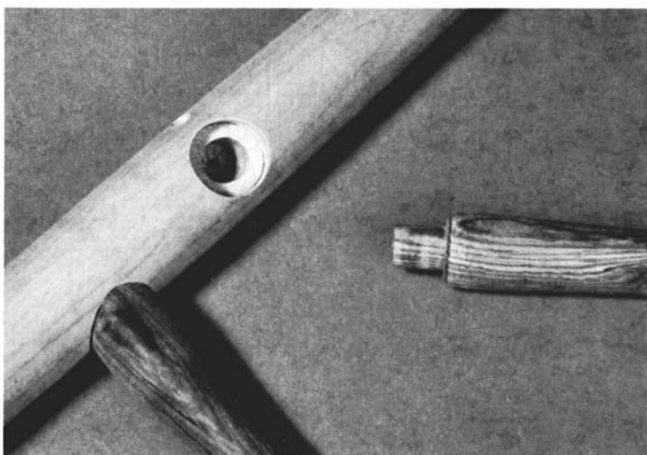


Two graceful and perky stools: turned furniture.

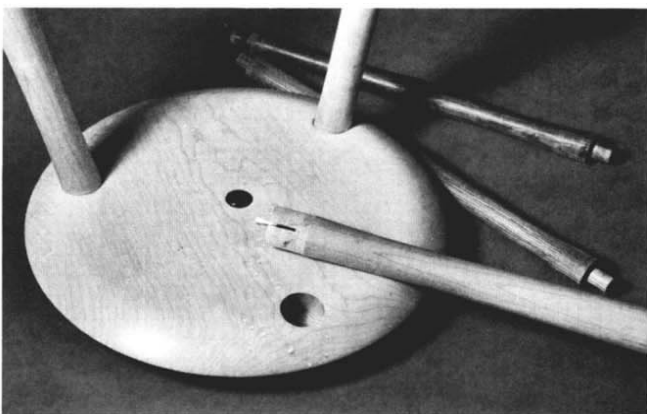
blank, making sure that the holes angle out from the center. Multi-spur bits make clean holes. You can make holes only 1 in. deep or so, if you don't want the legs to come up through the top of the seat.

Legs—I turn legs from 8/4 stock. With my production stools, particularly sets, I use a router and a homemade duplicator, a long, open-ended box that fits over the lathe. It's similar to one I saw in *FWW* #25, on p. 22. The router rides on the flat top of the box, and a ½-in. dia., 2½-in. long, double-fluted straight carbide bit makes a shearing cut on the side of the spindle as it turns. The router collar rides against a template of ⅛-in. hardboard cut to the final leg shape, and mounted just above the stock. I rip the leg blanks octagonal on the tablesaw before turning, to minimize stress on the router and bit, and I take a number of end-to-end passes to work down to template size, working from the tailstock to the headstock on each pass. The final pass leaves a rough surface, which I clean up later with a gouge or skew, when I turn the details of the feet and the top tenons.

Rungs—Because most stools have rungs at different heights from the floor, the rungs will vary in length. I turn rungs from 4/4 stock. Conventionally, rungs taper to ½ in. or ⅝ in. at the ends, and this diameter enters a mortise in the leg. This is the weakest link in the stool's structure, however, since the rung is vulnerable to the concentrated weight of a careless



To strengthen the stool's weakest joints, Scott turns shouldered, round tenons that will be pinned in the legs.



This fox-tailed wedge will lock the leg to the stool. The rosewood plug in the center of the seat fills the single hole left by the chuck's center screw.



When easing a stool together dry, Scott makes sure the joints all draw up at the same time, or the last pieces will be difficult to get into place.

person. To beef up this area without removing too much material from the leg, I turn each rung with a double-diameter end—in effect, a shouldered, round tenon. The larger diameter, $\frac{7}{8}$ in., penetrates only $\frac{1}{4}$ in. into the leg, while the $\frac{1}{2}$ -in. tenon goes a full 1 in. deep. Size the rung ends carefully and check them in a sample hole; they should fit snugly.

Assembly—The legs are now ready to be drilled for the rungs. The placement of these holes will determine the height of the rungs from the floor, the angle of the rungs to the legs (the same as the angle of the leg hole in the seat), and the relationship between adjacent rungs, which should be 60° .

Adjust the drill-press table to the same angle used for boring the leg holes in the underside of the seat. Then damp a long V-block to the drill-press table. Fix an adjustable stop-block at the lower end, at the distance one of the rungs should be from the foot of the leg. With the stop thus set for the proper hole height, drill one shouldered, round mortise in two of the legs for the lowest rung. You need to drill two holes in the same place, the larger, shallower one first and then the smaller, deeper one. Dry-assemble these two legs and one rung (the longest) with the seat to ensure that the angles are going in the right directions. Now move the stop block 1 in. farther from the drill bit to set the height of the next rung, and drill a hole in the remaining leg. Leave this stop block in place on the drill press. The next steps will determine the proper relationship of the remaining three holes to these first ones.

Dry-assemble the legs and seat with the lowest rung in its holes in the back legs. Placing your forehead against the front leg opposite the hole you have drilled in it, sight with one eye to either side of the leg directly across to the leg adjacent. This will locate the center point of that leg for the fourth hole to be drilled. This point could also be located by using a piece of dowel with a pencil lead in one end, but the eye produces an accurate result. After marking the point, drill it using the same setup as for the third hole.

Finally, drill the holes for the third rung, using the same procedures as before, with the stop blocks moved to allow for the new distance from the floor.

Dry-assemble the entire stool to get the feel of how it must go together during glue-up—you must ease all the joints together simultaneously, or you won't be able to get the last pieces into place. You will have to flex the rungs into place in any case—and a rubber mallet will help drive them home—but be sensitive to their breaking points. While the stool is still dry-assembled, wax around all the joints to protect the wood against glue squeeze-out.

The wedges that hold the legs in the seat should be perpendicular to the grain line of the seat. For further security, the rungs should be wedged too, or else cross-pinned. If you use wedges in the ends of the rungs, orient them perpendicular to the leg grain. I cross-pin the rungs into the legs using a small finishing nail set in a shallow $\frac{1}{4}$ -in. dia. counterbore. I then cut $\frac{1}{4}$ -in. decorative plugs with a plug cutter, turn their ends while I hold them in a drill chuck on the lathe, and leave them proud to cover the pins. To cover the screw-chuck hole in the seat bottom, I turn a rosewood plug. □

David Scott is a full-time woodworker. He and his wife, Kathy, are also caretakers of the Museum of North Carolina Handicrafts, in Waynesville. Photos by the author.

Stools: A slightly different angle

by Jim Cummins

Ron Curtis doesn't "relate" to his table-saw, a 16-in., 5-HP beauty, though he respects it. "You just can't slow it down," he says. He's an established woodworker in Bloomfield, Conn., with a one-man shop full of good equipment. Curtis has been building furniture and stools he describes as "free-form construction with sound joinery" since 1968, and these days he's able to make his living from his work.

But he's not a table-saw type of woodworker, the kind he defines as thinking square and parallel all the time. Not that he doesn't build square himself, when that's his intention, but he usually feels a little looser than that. He'll use any jig that makes his work easier or better, but he'll eyeball everything he can.

Mostly with power sanding equipment, Curtis shapes the top of his stool seats freely. But he leaves at least the middle of the bottom flat, so it will bear against his leg-angle jig: a tapered piece of wood about 8 in. long made from a 2x4 that he clamps to the drill-press ta-

ble. He drills clear through from the top at locations he works out with a compass—he'll wedge the tenons later. The jig for the stool in the photos is 17°, but he uses 15° as well.

Curtis takes leg blanks that he has pre-cut with a taper jig on the table-saw, and makes the tenons with an adjustable hollow auger that he bought at a garage sale. With the three legs stuck in the seat, he stands the stool up on an assembly table and proceeds to his other jig: a plain board with drilled holes for the feet of the stool. With all three legs locked into the seat at the top, and two legs fixed at the bottom by the jig, he measures the height for the first rung, then eyeballs the direction for the holes.

With a Stanley ½-in. Powerbore bit, shortened so the electric drill can fit between the legs, Curtis drills from the outside until he feels the point of the bit coming through. Then he drills back through the hole from the other side, so as not to tear out chunks at the exit hole. He drills the second leg like the first. If the holes do not line up perfect-

ly, he says it just puts a little tension on the rung and helps tie the stool together.

For stretchers, he makes up octagons (he likes the way they catch the light in the finished stool), gauges them by eye for length against the legs while they are still in the foot jig, and then uses the hollow auger to make long tenons. He bandsaws the rung to a taper that will meet the tenon smoothly, then removes the marks with a drum sander.

Curtis is quick to give Wharton Esherick credit for the inspiration behind his type of stool, and Sam Maloof credit for the finish: beeswax and oil over a sealer that's part polyurethane. But when it comes right down to it, Curtis's eye makes each stool. □



Instead of tilting the table, Curtis uses this angled block. He sets the seat blank on it when he drills the holes for the legs.



Ron Curtis eyeballs a mortise as his foot jig steadies the work, left. The stool has an elm top and legs, and is about to be fitted with ash rungs. Curtis prefers native woods and will go out of his way to get them, but admits, 'I usually cut up some South American stuff for the wedges.'



Pat Pollard

The stools sell for \$195 at Pritam and Eames Gallery in East Hampton, N.Y.