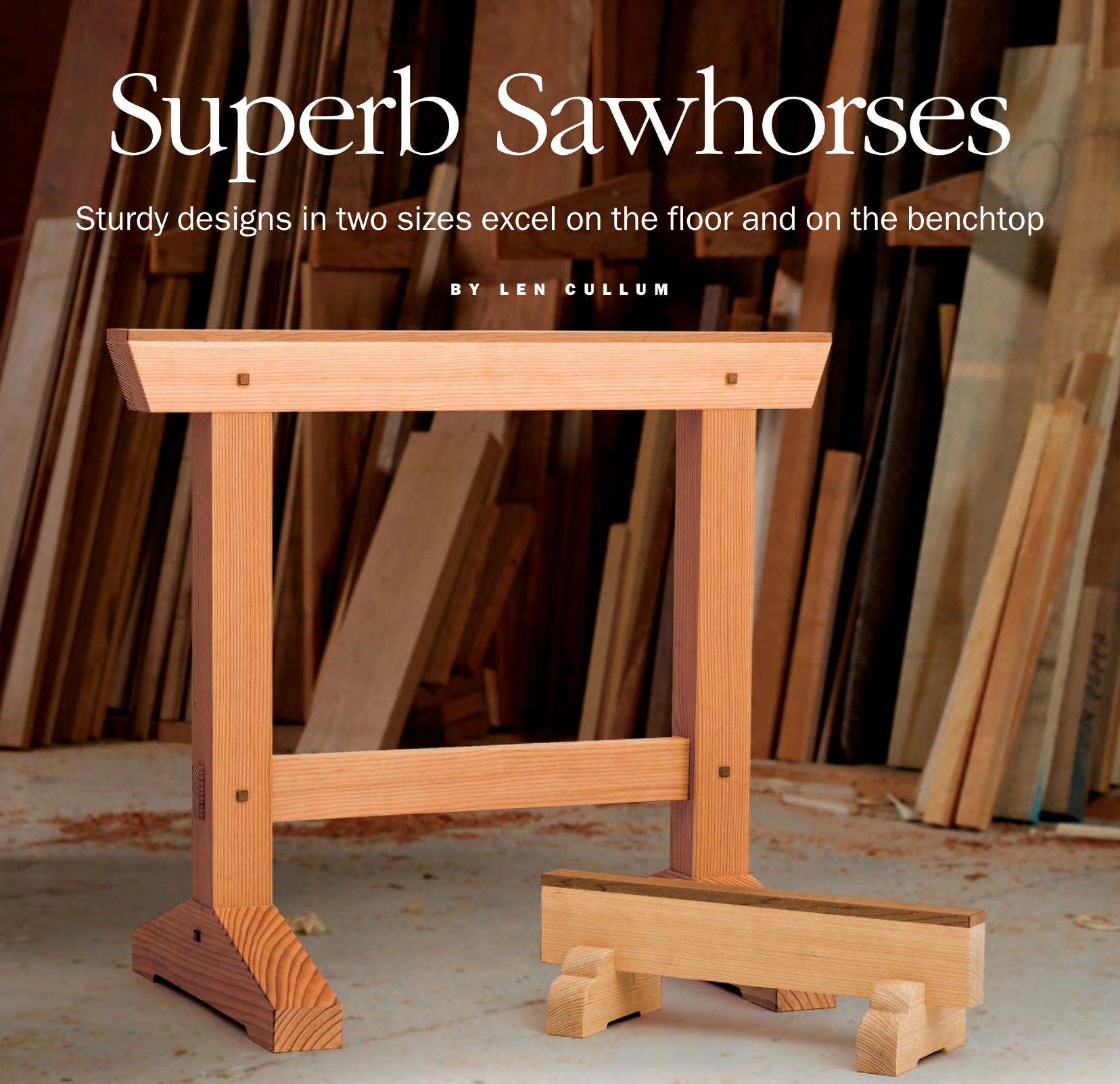
Superb Sawhorses

Sturdy designs in two sizes excel on the floor and on the benchtop

BY LEN CULLUM



I can't remember where I first saw a Japanese planing beam on trestle horses, but I do remember my first thought: "I gotta make a pair of those!" Having grown up around wobbly A-frame sawhorses made from 2x4s and festooned with paint spatters, bent nails, and errant sawkerfs, I thought those trestle horses seemed so sturdy, so clean, so intentional. I make them with drawbored mortise-and-tenons, which add another step to the build but provide extra solidity in joints that will see a lot of stress over the years. Because these heavy-duty horses have myriad uses, referring to them as sawhorses sells them short. I prefer to be more accurate: They are workhorses.

The design of the low horses stems from the fact that most Japanese woodwork is done while sitting. I rarely work on the floor, but I use low horses all the time on the benchtop. They elevate whatever I am working on above the fray of tools and shavings that accumulate on my bench. In the years since I made my first pair, I've been recommending them to all of my woodworker friends. I'll tell them that these are essential, 'what-did-I-do-before-I-had-these?' tools; but it isn't until I make them a pair that they really see what I mean—and often go on to make more themselves.

Len Cullum builds furniture and Japanese-style garden structures in Seattle.

Photo, this page: Lincoln Potter

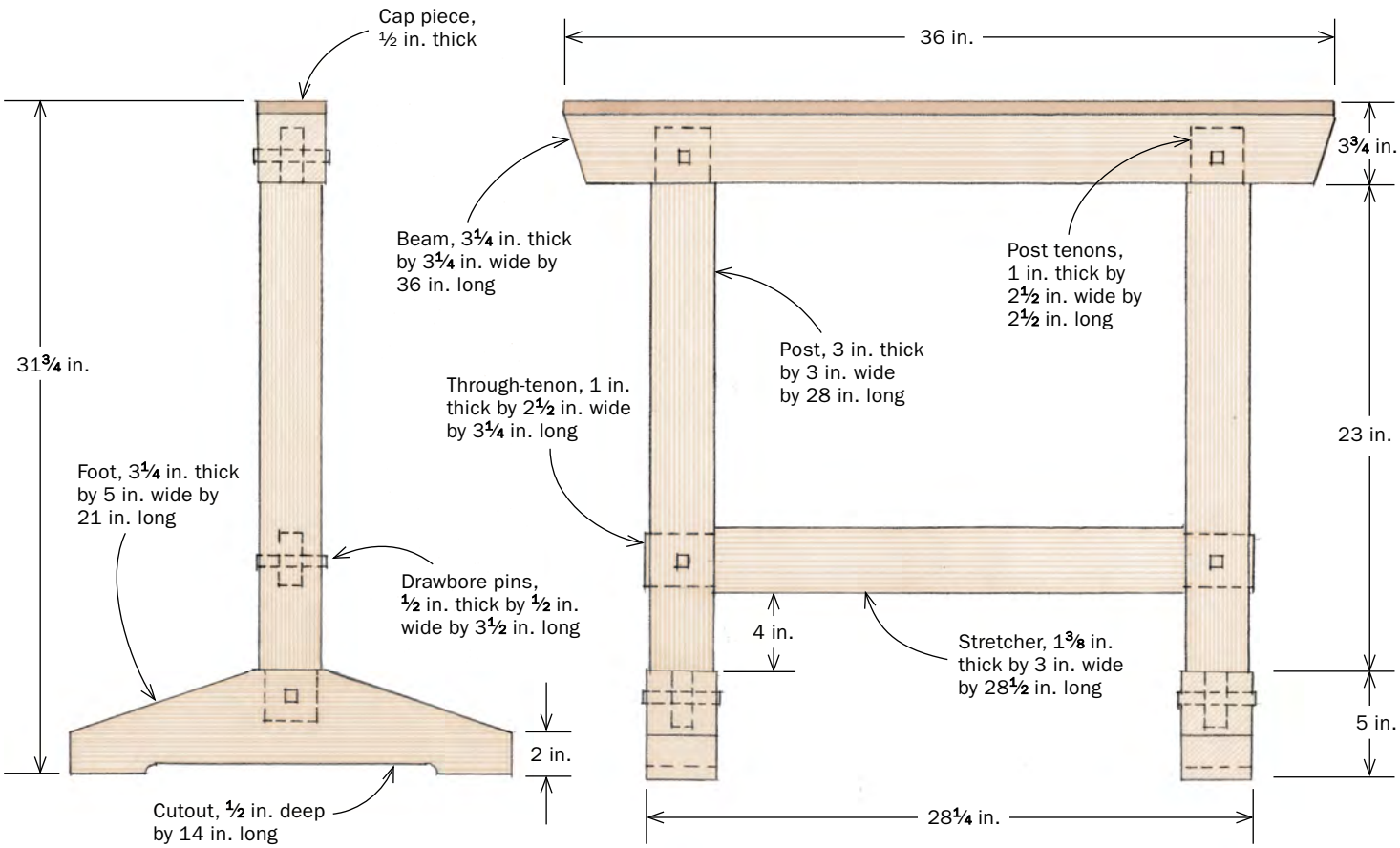
A true workhorse

When I made my first pair of workhorses, I built them with what I had lying around—Douglas fir construction lumber—figuring they would be the test run for a more serious pair made of oak or walnut. But I never looked back. Douglas fir's strength, weight, and sturdiness (not to mention low cost) made it ideal, and I've used it for every pair of full-size horses I've made since. But whatever wood you choose, they'll deliver a lifetime of use. To determine a comfortable work height for your horses, measure from the floor to the bottom of your closed fist. This gives you a good height for sawing, planing, and the like.

The feet and posts are first

I begin the horses by cutting the mortises in the foot blanks. Because the feet are too tall for my hollow-chisel mortiser, I rough out the mortises on a drill press and square them up with chisels. Then I move on to the posts, tenoning both ends with a dado head in the tablesaw. Although the two tenons are oriented in different planes, they are the same size, so they can be cut at the same time using the same stops and blade setup. I clean up the cheeks of the tenons with a rabbet plane and a wide chisel and chamfer the ends slightly to ease assembly.

Once I have those tenons fitted, I cut the through-mortises in the posts for the stretcher. Using my hollow-chisel mortiser,



Drawings: Michael Pekovich

Two-step mortise for the feet. *Because the foot blanks are too tall for his hollow-chisel mortiser, Cullum roughs out the mortises with a Forstner bit, then refines them with chisels.*

Make and fit the post tenons. *The tenons at the ends of the post are not in the same plane, but they are the same size, so Cullum can cut them using the same stops and setup. He cleans the cheeks and chamfers the ends with hand tools, then tests the fit (right).*

I chop from both faces toward the middle, then clean up with chisels.

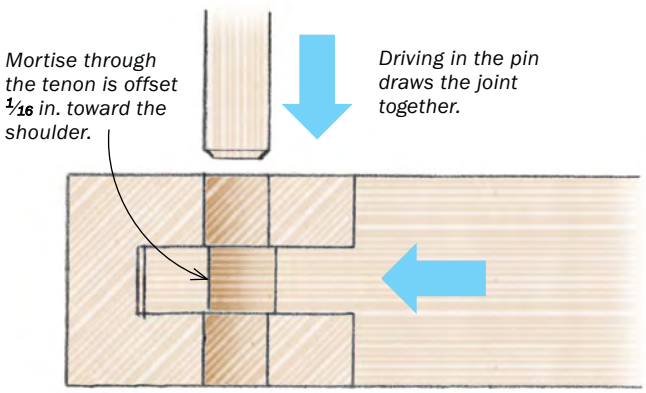
Time for the drawbore pins

You often see round drawbore pins, but I like the look of square ones. I cut the holes for them at the hollow-chisel mortiser. First I cut through all the mortised parts. To keep from producing a splintery mess inside the mortise, you can fill it with a scrapwood spacer. With the pin mortises chopped, dry-assemble all the joints and, using a sharp pencil, trace the pin mortises onto the tenons. Then disassemble the parts and chop pin mortises through the tenons. Cut the mortises 1/16 in. closer to the tenon's shoulder than the pencil marks would indicate; this offset will draw the joint tight when you drive the pins.

Photos, except where noted: Jonathan Binzen

PREPARING FOR DRAWBORE PINS

Both sides now. *Cullum cuts the through-mortises for the stretcher tenons at his mortiser, chopping from both faces to the middle.*



Footwork

I shape the feet at this point, just before assembly. The first step is to make the long cutout at the bottom, which makes them more stable on uneven surfaces. You can saw this out, but I did it by drilling and chiseling. First, clamp the two feet together bottom to bottom and drill a line of overlapping, half-depth holes with a Forstner bit. Then flip the clamped feet and repeat the drilling from the other side. When the drilling is done, unclamp the feet and clean them up with a wide chisel, leaving the ends of the cutout rounded. To create the sloping top surfaces of the foot, bandsaw just shy of your layout lines and clean up with a few passes over the jointer. Now you can also cut the angled ends of the beam.

How to assemble a horse

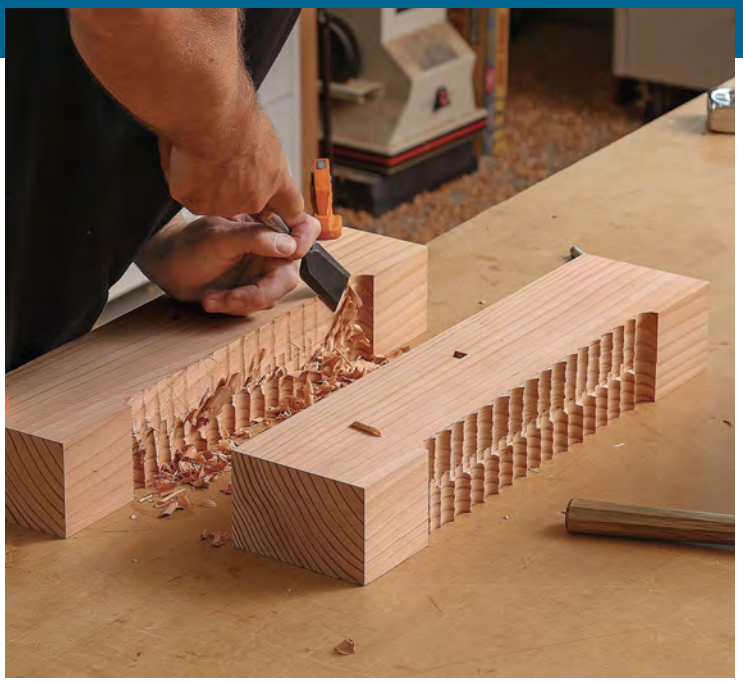
Start with the stretchers, slipping their through-tenons into the post mortises. Then carefully drive the pins all the way through the joint. You should see the joint tighten as the pin goes in. Drive the pins until they stick out equally on both sides. With the stretcher pegged, add the beam. Attach the

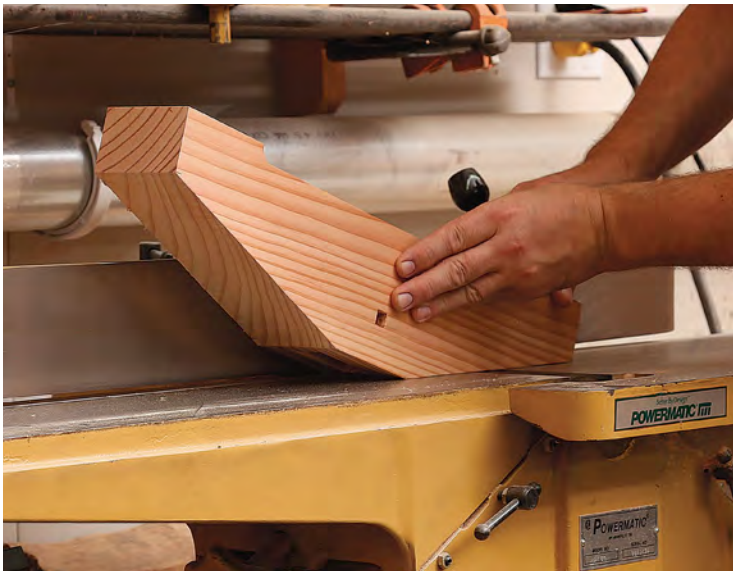
Make way for the pins. *With a sacrificial spacer inserted in the through-mortise, Cullum chops a hole for the drawbore pin.*

Mark and move. *After assembling the post-to-foot joint and marking the location of the drawbore hole, Cullum chops the mating mortise 1/16 in. closer to the tenon shoulder.*

SHAPE THE FEET, THEN ASSEMBLE

Great relief. *With the foot blanks clamped together bottom-to-bottom, Cullum drills a row of holes with a Forstner bit, then quickly chisels the washboard flat. Alternately, the relief could be bandsawn.*



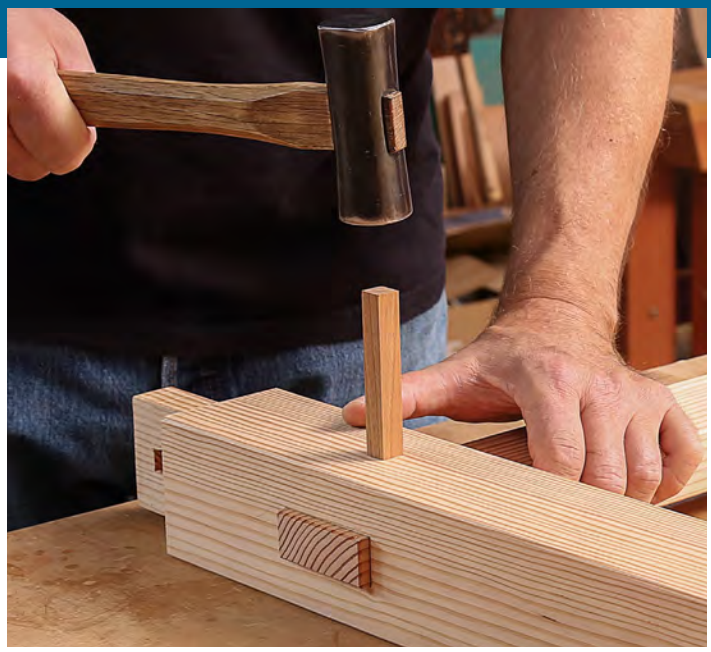


Quick slant. *Cutting close to his layout lines, Cullum bandsaws the foot's diagonals, then smooths out the sawcut with a few passes on the jointer.*

feet last. You can cut the pins flush, but I like to leave them a little proud. The easiest way to do this is to drill a hole in a scrap of wood (about ⅛ in. thick), slip it over the pin, and saw against it.

Finishing up

The horses are now ready for the finish of your choice. I typically use Danish oil, but anything will do, or nothing at all. Once the finish is dry, the last step is to attach the sacrificial cap piece to the top. Because I work with a lot of softer woods, I use clear cedar for this. That way not only is the horse protected from errant sawcuts and the like, but the work I place on the horses is protected from the harder fir. To make these caps easy to replace—and free of metal fasteners—I attach them with double-sided tape.



Assemble in stages. *Cullum first drives the pins connecting the stretcher to the posts, then fits the posts into the beam (right).*

On with its feet. *Last, the upper frame is fitted to the feet and cinched with pins. Cullum makes the pins overlong and trims them off about ⅛ in. proud. A thin scrap drilled out at the center protects the horse and determines the length of the pin.*

Protect the top. *A couple of strips of double-sided tape hold a sacrificial cap piece in place on the beam. The softwood cap protects both the beam and the workpiece from damage.*

Pony up. *Japanese woodworkers use small sawhorses while working on the floor, but for Cullum they serve to elevate the workpiece off the bench.*

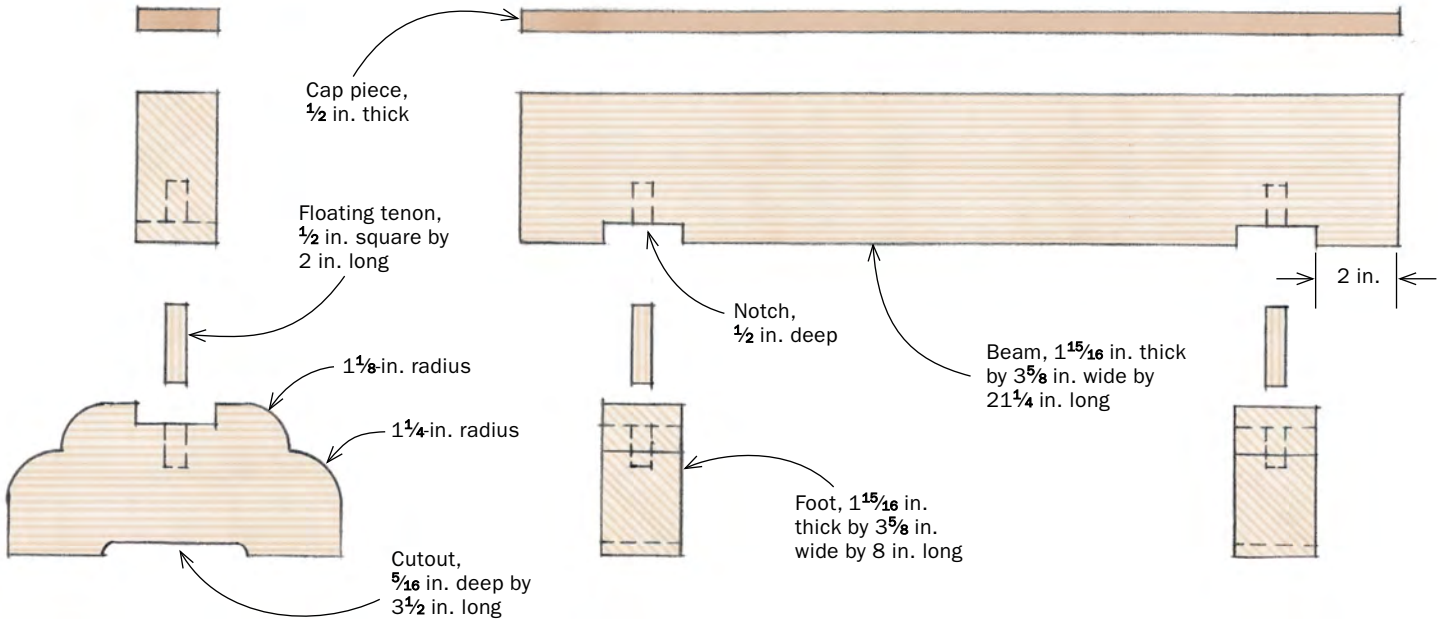
Strength in a small package

The low horses are a design I continually fiddle with. I have five pairs now, and they're constantly in use. I've made them from different woods, in several sizes, always making tweaks to the design in a quest to find the mythical sweet spot. I built this pair with a full-sawn Port Orford cedar 2x4, which gave me a stouter, taller set than the others.

Half-lap joinery

The feet are joined to the beam with half-lap joints. They are simple to cut, but the layout and fit has to be right on, so take your time and be precise. After cutting all of the parts to the same length, I mark layout lines on one foot. Then I set a stop on the miter gauge, and using a dado head in the tablesaw, cut and test the joint. When I'm happy with the fit, I cut the other three, and then move on to the beams. To lay out the joints on the beam, I fit a foot to its location and mark lines. Using those lines I set stop blocks on the miter gauge, starting with a fit that's a bit too tight, and adjusting one stop until the fit is right on. Then I cut the other notches with that setup. The fit should be snug but shouldn't require more than a couple of light taps with a hammer to seat.

I generally build low horses with simple, glued half-laps, but I decided to reinforce these joints with floating tenons. If you do the



CREATE THE HALF-LAPS

Notch the feet. *Cullum uses a dado head, flipping the workpiece and using the same stop block for both end cuts. Afterward, he fits the notched foot blank on a beam and marks for the mating notch.*

Twin stop blocks for the beam. *Cullum cuts the two shoulders of a notch in successive passes using a stop block at either end of the miter-gauge fence. Then he checks the fit.*

SHAPE THE FEET

Make way for the internal tenon. *To reinforce the half-lap joint, Cullum adds a floating tenon between the foot and the beam. Here he cuts the mortise for it.*

Forming the foot. *A piece of card stock makes a good template for laying out the curves of the foot. With the foot blanks clamped together (left), the relief cuts begin with holes drilled at each end. Then it's on to the bandsaw (below), where the cloud-lift curves and the rest of the relief are cut.*

same, now is the time to lay them out precisely and cut them with a hollow-chisel mortiser or drill press and chisels.

Make 'em pretty

As far as function goes, these little guys are pretty much done. I could just glue them up and call it a day. But since the cedar is so nice and they'll be around my shop for years, I want to take them further. I have seen examples with feet ranging from simple 45° slopes to curly carved temple brackets. The ones I make fall somewhere in between. I begin by making a pattern from a piece of card stock and tracing it onto each foot. Then I bandsaw it to shape. Just before assembly, I chamfer all the edges with a chisel or a knife, avoiding the areas near the joints.

The glue-up

It's time to apply some glue and knock the little horses together. I don't bother with clamps, but after hammering them together it's a good idea to place them on a flat surface and put some weight on them while they dry. As with the larger horses, I add a sacrificial softwood cap piece to the beam using double-sided tape. Then all that's left is to put them to use.

Pare the pegs. *Using a knife, Cullum chamfers the ends of the floating tenons to be sure they enter their mortises cleanly. He begins the assembly by gluing the pegs into the feet (right).*

No clamps. *After he drives the joints home with a hammer (left), Cullum will place weights on the beam while the glue sets. To protect the beam—and his workpieces—Cullum adds a sacrificial cap piece to the beam, adhering it with double-sided tape. Here he uses a Japanese chamfer plane to produce just the right finishing touch on the edges (above).*