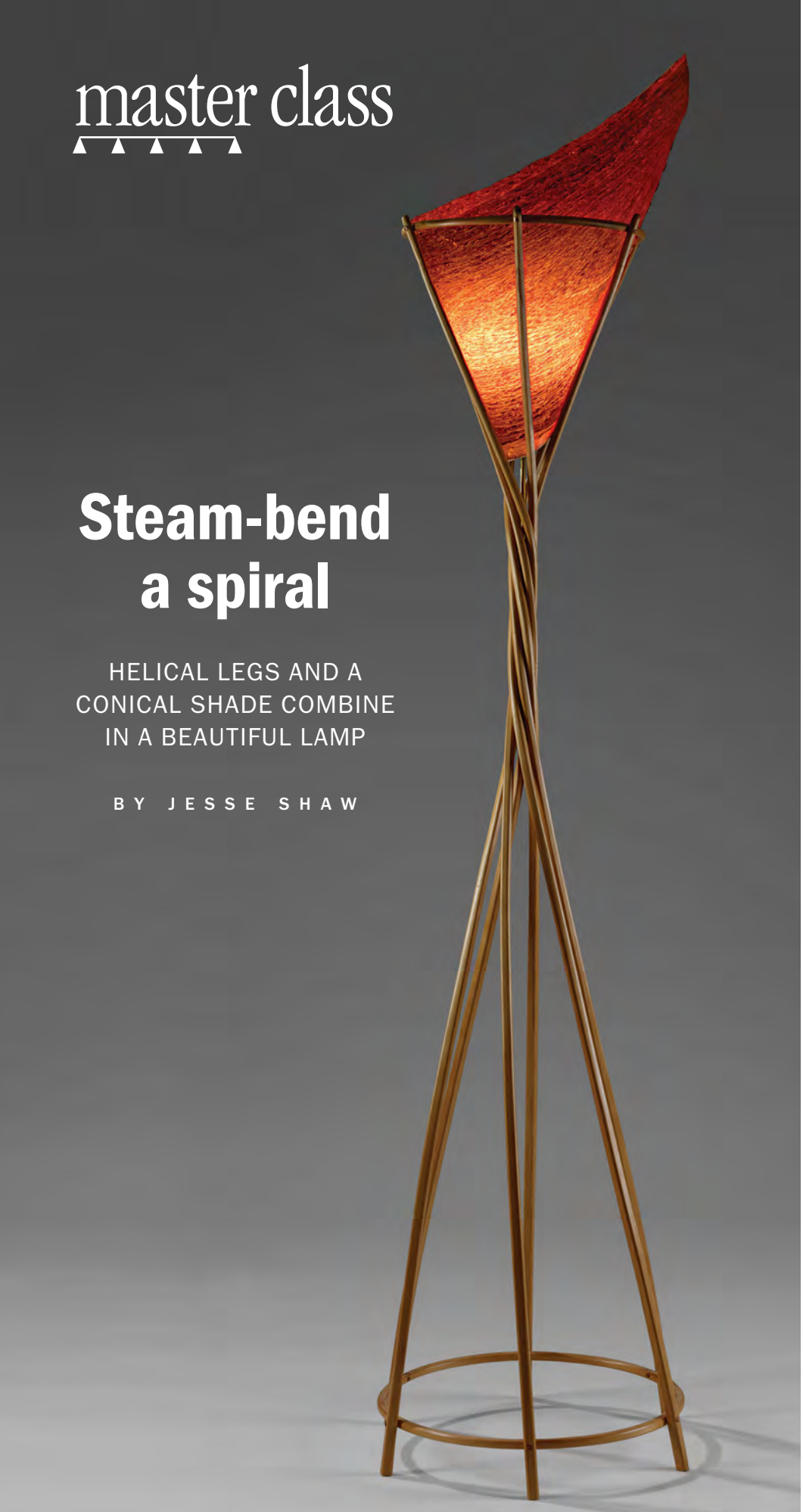
master class

Steam-bend a spiral

HELICAL LEGS AND A CONICAL SHADE COMBINE IN A BEAUTIFUL LAMP

BY JESSE SHAW



I discovered an appreciation for the interplay of wood and light years ago while I was sitting on the steps of the Center for Furniture Craftsmanship in Rockport, Maine. As I held a thin shaving of maple burl up to the sun, the grain glowed a rich amber-red hue with thin radiant circles outlining the cellular tubes of the wood. I was mesmerized by this effect. As I sat staring deeper into the grain, the sun continued to elicit previously untapped natural beauty in the raw material. The design for the shade of my Prometheus Lamp grew out of that experience. Building the lamp involves a process with many facets, detailed steps, and techniques.

Building the base

It begins with wood selection. The grain for the steam-bent legs must be very straight, with no knots, burls, or waviness. I try to get all of the legs (which I rough cut at 1 in. square and 76 in. long) from a single board, preferably air-dried. The species should be steam bendable: Ash, white oak, and beech are the easiest; with walnut it can be challenging to find straight grain in seven-foot lengths, but it's well worth the trouble.

Once the leg stock is sawn and then milled square, it goes through the planer on a tapering jig. The finished legs taper from ¾ in. square at the bottom to ⅜ in. square at the top. After the legs are tapered, I round over their long edges at the router table with a ¼-in. roundover bit. This leaves flats on all four faces for most of the leg, but at the top end the leg's cross-section is essentially a circle. At the tablesaw I give one of the legs a stopped groove to accept the cord for the light fixture. The groove needs to be deep enough for the cord and for a spline, which I'll glue in to hide the cord.

To do the twisting steam-bend, I built a jig that has a lower plate screwed to the floor with sockets around the perimeter for the legs and a threaded flange at the center to receive a ¾-in.-dia. steel pipe that is 7 ft. tall. An upper plate, with a hole in the middle for the pipe and slots around the edges for the legs, gets fitted

Photo, this page: Stewart Clements

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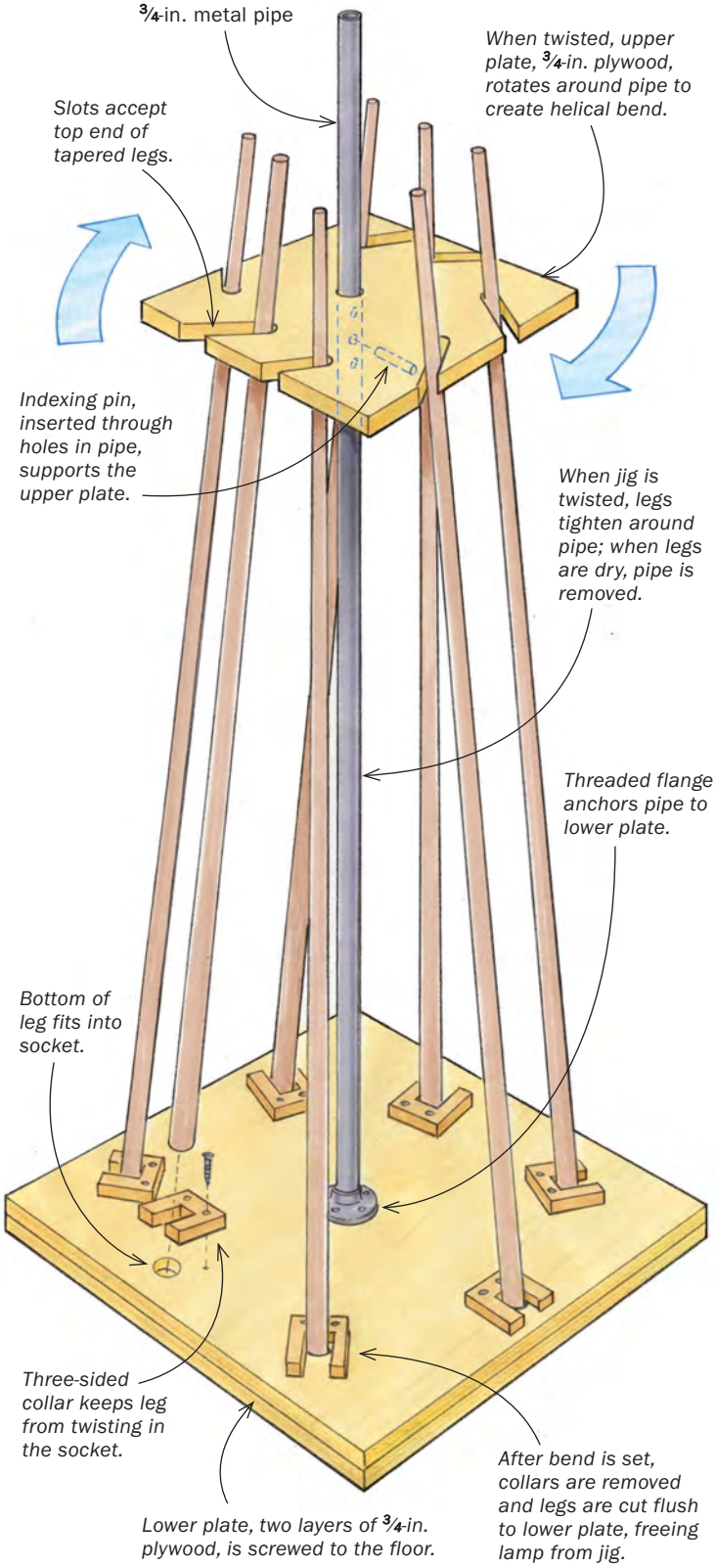
SPIRAL BENDING JIG

After steaming the solid-wood legs for an hour, Shaw bends them into a helical twist with this jig. They remain in the jig for a week or so until they are fully cured, and then hoops are added at the top and bottom.



Shape the legs

Time to taper. *The legs are first milled 1 in. square, then they are tapered by passing them through the planer on a ramped jig.*

Round the corners. *Using a ¼-in. roundover bit in the router table, radius the four corners of the leg.*

A slot for the cord. *Run a groove halfway up one face of one of the legs. The lamp cord will lie in the groove, hidden by a snug-fitting spline.*

Get ready to bend

Well-cooked walnut. *The legs spend an hour together in the steambox. Shaw pulls one of them partway out and bends it to check its flexibility.*

Photos, except where noted: Jonathan Binzen; drawings: Dan Thornton

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Leg twisting

Seven legs, set at speed. *Shaw and his assistant, Matthew Dinneen, bring the legs out of the steambox in quick succession. They socket a leg's bottom end into the jig's lower plate and slot its top end into the upper plate.*

Do the twist. *Rotating the upper plate causes all the legs to twist together. The upper plate spins around the metal pipe at the center and is held at the right height by a pin that runs crosswise through holes in the pipe.*

Wrap the twist to keep it tight. *With the upper plate rotated as far as he wants it, Shaw wraps the central portion of the twist with packing tape to keep it tight as it dries.*

over the top end of the pipe. A series of holes drilled crosswise through the upper section of the pipe lets me insert a dowel to support the upper plate at various heights. When I bend the legs they wrap around the pipe, and after they cure I pull out the pipe and replace it with a 1-ft.-long dowel made from the same species as the legs and drilled out to accept the cord.

The legs all go into the steambox together to be cooked for an hour plus. When I think they're adequately steamed, I pull one leg partway out and bend it a bit by hand to test its flexibility. If it's ready, all the legs come out in quick succession. With the help of an assistant, I place the legs' bottom ends in the lower plate and top ends into the upper plate, and we start twisting the upper plate. There's no time for conversation; we have a total of about 30 to 60 seconds to do the bend. When the legs are wrapped tight around the pipe, we clamp a board from the upper plate to a bracket on the wall. This keeps the upper plate from turning and thus keeps the legs from untwisting. For extra insurance I wind packing tape around the tightly twisted central section of the bend. I leave the legs in the bending jig for a week or so to let them fully cure.

After the legs have dried, I remove the central pipe and epoxy the filler dowel in its place. I first drill out the dowel with a ¼-in.-dia. by 13-in.-long bit. I also run the cord for the lamp, threading it through the dowel and pressing it into the stopped groove in the leg. And I glue in the spline to hide the cord.

Next I make the two hoops that will link the legs together at the top and bottom. Using the same species I used for the legs, I mill up a rounded stick about 1 ft. longer than the

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A brake for the upper plate. *To keep the helical bend from untwisting, Shaw and Dinneen clamp one end of a long stick across the upper plate and brace its other end against a bracket on the wall.*

Inserting the center stick. *After giving the legs a week to dry, Shaw removes the metal pipe and replaces it with a wooden dowel made from leg scrap. He drills out the dowel, threads the cord through it, and glues it in place with epoxy.*

A covert cord. *The lamp cord travels down the groove cut in one leg. Shaw here epoxies a spline into the groove to hide the cord.*

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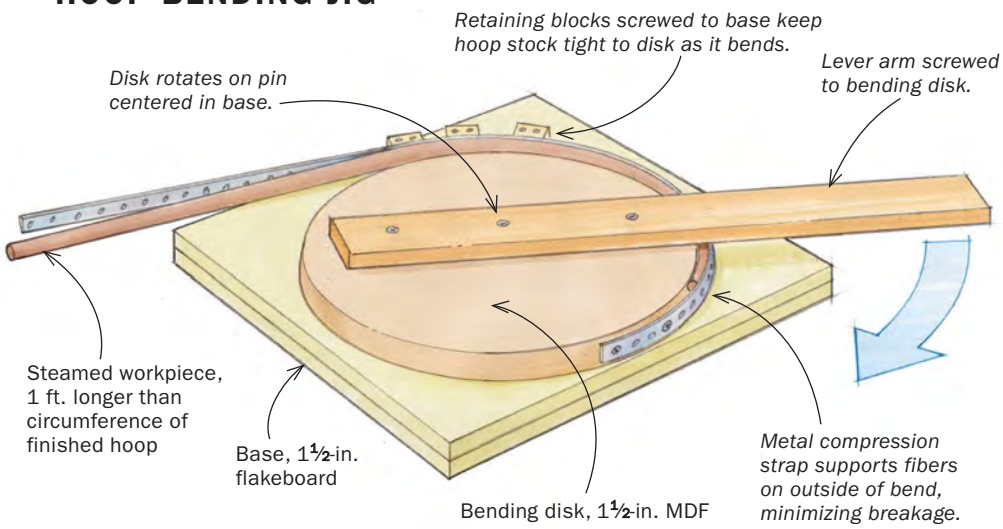
Two hoops

Circular steam-bend. *Using a lazy-Susan-like jig, Shaw and Dinneen bend a 6-ft.-long stick into a circle with overlapping ends. A metal bending strap supports the stock as it bends to minimize breakage.*

HOOP BENDING JIG



circumference of the finished hoop. I steam it, and again with help, bend it on a shopmade jig. The jig has a perforated metal bending strap that helps prevent failures on the outside of the hoop stock. The top and bottom hoops are different diameters, and I bend them on two different circle jigs. When the hoop has dried, I join its ends with a scarf joint. Then I smooth the hoop with a spokeshave and sand the surface.

The hoops are attached to the legs with copper rivets. I clamp the hoop in place while the legs are still in the bending jig. After drilling through the leg and the hoop, I insert a long boatmaker's rivet, add a copper washer, and snip the rivet to length. I wait to peen over the end of the rivet until I've removed the legs from

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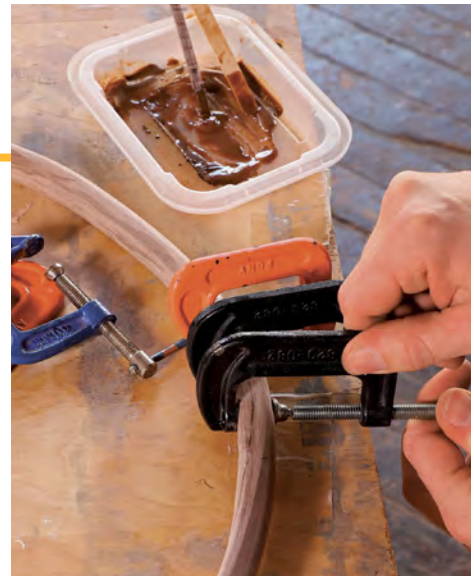
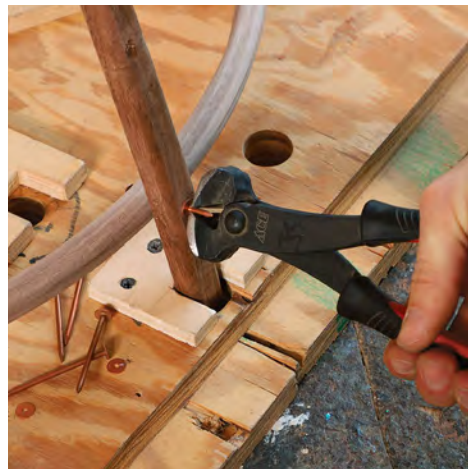
Use a scarf joint to close the hoop. *After bandsawing one side of the joint and sanding it smooth, Shaw traces it onto the other end of the hoop. Then he cuts and smooths the second scarf and glues the two together with tinted epoxy.*



Cinch the hoop to the legs. *Extralong copper boatmaker's rivets link the hoop and legs. With the legs in the jig and the hoop clamped in place, drill for the rivets and push them in.*



Custom rivet gun. *Shaw uses a quick-release clamp and a length of copper tubing to drive the washer down the shaft of the rivet. Then he snips the rivet just proud of the washer.*

the jig, so I can back up the peening with a vise or an anvil.

Once the hoops are riveted, I remove the collars from the lower plate and use a flush-cutting saw, its blade laid flat on the plate, to cut through the legs and liberate the lamp base from the jig.

Mushroom the rivet. *After cutting the lamp free from the jig, peen the rivets with a solid surface backing up the hammer blows.*

Wrapping a conical shade

When I'm ready to make the shade, I start by examining a variety of 1/32-in.-thick veneers, holding them up to the sun to evaluate their translucence. As woodworkers we're all intimately familiar with the appearance of many wood species. But with light pouring through a sheet of veneer, suddenly you see its cellular structure revealed, and even common woods can look exotic. Each species has its own distinct hue when illuminated this way. Certain woods are quite translucent, others are not. Some grain patterns look dramatic, others drab. I find rotary-cut burls ideal because the grain spreads out in multiple directions. When someone switches on one of my lamps, I want the grain to be magnificent, to give a warm glow like that of a fireplace.

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A conical shade

Test shade. *Shaw uses kraft paper as a template for the real shade. He rolls it into a cone and fits it into the basket of the lamp to establish the size of the shade.*

Find the right veneer. *Held up to daylight, a sheet of tulip burl veneer reveals the colors it will display when it's a lampshade lit from within.*

Impregnate the veneer with epoxy. *To strengthen the delicate sheet of 1/32-in. veneer, Shaw coats it with epoxy.*

Pressed between platens. *Shaw sprays the platens thoroughly with silicone, then slips the package into his vacuum bag until the epoxy cures.*

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A conical shade continued

First fitting. *Having cut the veneer to the size of the kraft paper template, Shaw slices out an arc shape on the bottom edge to facilitate rolling the veneer into a cone. Then he places the veneer into the basket and marks where its ends overlap.*

Once I've selected my veneer, I determine the size of the shade by rolling a piece of kraft paper into a cone and fitting it into the basket formed by the top of the lamp. This becomes the template for the shade. I cut a piece of veneer to that size, and then impregnate the veneer with epoxy and put it between platens in a vacuum bag. After the epoxy cures, the veneer remains flexible but is far less fragile.

I roll the veneer into a cone and gently clamp it in place in the basket. Then I mark the veneer so I can cut it to limit its overlap to a 1-in.-wide strip. I'll cut along the line with a scalpel or a veneer saw, then glue along the seam with epoxy putty.

After the glue cures, I place the shade in the basket, where it rests without fasteners. With the light fixture connected, I screw in an incandescent bulb and wait for nightfall. □

Jesse Shaw makes furniture in Stow, Mass.

Angle cut the overlap. *Using marks he made at the fitting, Shaw cuts one side of the shade to produce a 1-in. overlap when it is rolled again.*

Close the seam. *After applying epoxy along the overlap and rolling the veneer into a cone again, Shaw clamps the seam with an F-clamp and a caul. A second stick, with one end suspended by wire from an overhead shelf, prevents the cone from sagging while the epoxy cures. When it is finished, the shade rests in the lamp without fasteners.*

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