Make a Shapely Bowsaw

BY WILLARD ANDERSON

Proper, tapered handle holes make this piece period-correct.

The bowsaw is an ancient tool and a member of a class of saws called frame saws, in which tension from the frame is designed to hold the blade taut. Also sometimes called a “turning saw,” the bowsaw features a very narrow and thin blade with handles that turn in the frame—that makes it particularly useful for cutting curves and fretwork. Because the blade is attached by means of loose pins that are inserted in holes at each end of the blade, it is easy for a blade to be removed from the frame and slipped through a pilot hole in the stock, then remounted on the frame for cutting.

Bowsaws range in size from 6” (about the size of a modern coping saw, which is also a frame saw) to about 15” in overall length. The bowsaw contrasts with the felloe saws, which feature wider blades fixed in the center of the frame and are typically used for ripping or cutting stock lengthwise.

I spied the antique bowsaw shown in the top right photo on the facing page in stone and wood and steel and brass. “Men admire the man who can organize his wishes and thoughts in stone and wood and steel and brass.” — Ralph Waldo Emerson (1803 - 1882)

American philosopher and essayist

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I spied the antique bowsaw shown in the top right photo on the facing page at a tool sale, judged it too expensive to purchase, then asked the owner to lend it to me so that I could make a reproduction. He generously gave his consent. Here’s irony: The cost of reproducing this bowsaw exceeded the original’s price. However, what I got for my extra money was an invaluable lesson in the design and construction of the form.

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is often used. I cut my boxwood log to length and cut the handle blanks from the log just shy of the pith. Drill one end of the blanks to $\frac{9}{32}$" (the small diameter of the brass pins).

While the blanks are in the rough, ream the holes using a hand reamer until the pins are just shy of seating completely. Turn the handles to their final dimensions. The handles are then carefully reamed for the final snug fit of the pin. Coat the pins with hide glue and tap them into place. Because the hole in the small handle is so much shorter than in the long handle, two reamers will be needed, one cut to length for the small handle.

**Arms**

On most bowsaws, the inside face of the arm at the handle hole, the mortise, and the finial are all in a line. This makes it easy to lay out and cut the holes and joinery on square stock, then to shape the arm afterward.

But on this bowsaw, the curvature of the arm is so exuberant that the finial is well in front of the mortise. Therefore, the arm needs to be partially shaped before the joinery is done. I used perfectly quartersawn beech for the frame but many other options are possible.

The weakest part of the arm is at the finial, so orient the template to give the longest grain in this region. Saw two parallel cuts to define the front and back of the arms as much as possible. Plane and spokeshave these two surfaces flat and square.

I inserted a $\frac{5}{8}$"-thick spline into a $\frac{3}{4}$"-deep slot into the end of each arm, at right angles to the face of the arm. The

**Spline.** While the tool I was copying didn’t have this spline, I added it to reinforce the tapered hole for the handle.

**TAPERED HOLE FOR THE HANDLE.**

**Hole.** Drill a $\frac{9}{32}$" hole in one end of each handle blank.

**REAM.** Before turning each handle to its final dimensions, use a hand reamer to ream the holes so that the brass pin is just shy of fully seating.
original bowsaw does not have such a spine, but I have seen these on other examples of the tool. The spine ends just below the handle hole and functions to prevent the handle from splitting under the force of the taper from the pins.

The handle hole is drilled from both faces of the arm to ensure that it is square to the handle. Scribe the mid-line from both cheeks, then scribe a line 1” up from the bottom. Clamp the stock in a vise flush with the bench surface, and drill the hole with a 1/2” bit, using a square to keep the drill vertical.

When reaming for the handle, the goal is to seat the handle so that it is locked in by the taper and not by abutting the arm. This is a trial-and-error process until the gap between the arm and the handle is 1/8” to 1/16”. If you taper too far, you can take a few shavings from the outside face of the arm until the handle seats properly. You will correct for this when you make the stretcher.

The mortise is as wide as the stretcher (1 1/4”), with shoulders only on the cheeks. Eventually the mortise cheeks are cut on an arc, but for now they are left straight. The dimensions of the mortise are 1 1/4” wide and 5/16” deep. I chopped this with a sash mortise chisel.

Shape the Arm

The transitions from curved surfaces to flat surfaces (at the mortise and the handle hole) should be crisp and square to the profile and meet at the corners of each edge. Define these shoulders with careful rasp and shallow gouge work.

The last shaping step is to round over the long edges of the arms. On the inside long edges, taper the round-over down from the finial and along the waist of the lower arm to end at points at the shoulders. Use a spokehole to round the profile through the shoulders along the whole length of the arm, and with a round-over on the outside edges of the arms. The effect will be for the shoulder to arise to curve up and down from the mortise area in gentle arcs. At the finial, carve the rounding to give a pleasing neck at the bottom of the whorl.

Shape the Stretcher

The mortise-and-tenon joints where the stretcher meets the arms are meant to rotate to account for slight variations in the effective blade length at the handles, as the handles wear in and seat over time. The tenon shoulders are curved with an arc (2 1/4” diameter) over the full width of the stretcher material and this arc matches the arc cut on the mortise cheeks.

The tenons are tapered and rounded at the ends to give play in the joint. The cheeks of the mortise and the tenon should be snug, however. Cut a template to match the width of the stretcher stock (11/4”) and shaped inside and outside arcs at both ends. I used this template to lay out the arcs on the tenon shoulders and on the mortise cheeks so they would match. An alternative method (one that the original maker used) is to define the arc on the stretcher using a divider set to the radius of the circle. The maker found the midpoint on the stretcher by scribbling a curve from each corner of the tenon shoulder, then used this midpoint to scribe the arc across the width of the stretcher. Lay out the tenons as 1/16” thick and 1/2” long at each end. Lay out a second shoulder on 1/2”. Cut the tenons to the first shoulder. Lay out the arc using the template or dividers set to the second shoulder. Chop the curved shoulder profile with vertical cuts using a bench chisel. Taper the two long edges of the tenons and knock off the corners of the ends of the tenons.

Cut the Toggle Mortise

The mortise is centered on the longitudinal edge of the top of the stretcher. This mortise is meant only to catch the toggle of the windlass. The mortise measures 5/16” by 1/2”, and is approximately 1 1/2” deep. Note that the tenon on the toggle is only 1/2” long.

Shape the Stretcher

The stretcher is shaped in much the same way as the arms. There is a straight, flat area at each end of the stretcher approximately 2” in length where the tenons begin, and an area of about 1 1/2” in the center for the mortise. Each of these elements is defined by crisp shoulders. The area between these elements is rounded in two dimensions to give it a waist. I cut these waist profiles using both the coping saw and the crosscut methods, rough shaping with rasps and defining the shoulders with gouges.

Make the Windlass

The windlass has two parts: the toggle and windlass.

The string whorl has a central through-mortise. Lay out the whorl on square stock. Draw centerlines and carry these around on both faces. Center the mortise on these centerlines using a mortise gauge and one long and one short reference edge of the stock. In this manner, you can chop the 3/4” long, 3/8” wide marks on all edges. Clamp the whorl in a vise and use an 11-sweep 10 mm gutter gouge to define the depth of the slot, then shape the curve up to the edges with an 8-sweep 10 mm gouge. Refine the grove with a round rasp and sandpaper.

The toggle is designed so that the shoulder-to-shoulder length between tenons is just a bit longer than the distance between the top of the stretcher and the bottom of the whorl when the toggle is in place. So, the tension of the string pushes the two toggle tenons snugly into their respective mortises. The tenon through the whorl is fairly snug and the mortise through the whorl is the tightest. The stringer into the stretcher is relatively loose (approximately 1/2” shy in both dimensions).

Lay out the toggle tenons with a mortise gauge, then cut them with a bench chisel (because so little material has to be removed). Shape the waist, starting approximately 1/2” from each tenon shoulder. Because the cuts are so shallow, use a raps for this step.

The Finishing Steps

The period bowsaw I copied for this build appears to have been stained — although this could be patina from age. I decided to sand my bowsaw parts up to 220 grit. I then applied three coats of shellac, and followed this by buffing with #0000 steel wool, then topped it with a final coat of wax. The final task is to string the saw. I used a heavy cotton twine, but jute would work, too. I tied one end with a loop, then wound the string around the finials three full times. On the fourth course, I cut the string off halfway around, then wove the end through the three strings on one side.

Now insert the toggle and whorl between the two groups of three strands and turn the windlass until the blade is tight. The blade should have a sharp pitch when plucked, but not be overtight (this is a matter of feel and, ultimately, of performance).

When the saw is not in use, release the windlass a turn or two so that the tension is off the blade but the saw pieces remain together.

Bill works and teaches woodworking classes in his workshop at the base of Edwards Mountain in Chappaqua, NY.

For links to all these online extras, go to: popularwoodworking.com/nov11.

Bill has been a repeat question on Roy Underhill’s PBS show “The Woodwright’s Shop.”

Bill is featured in the mid-west Tool Collectors Association — the world’s largest organization of its type.

In our Store: “Understand and Use a Bowsaw,” from October 2010.

Our products are available online at: ShopTool woodworking.com