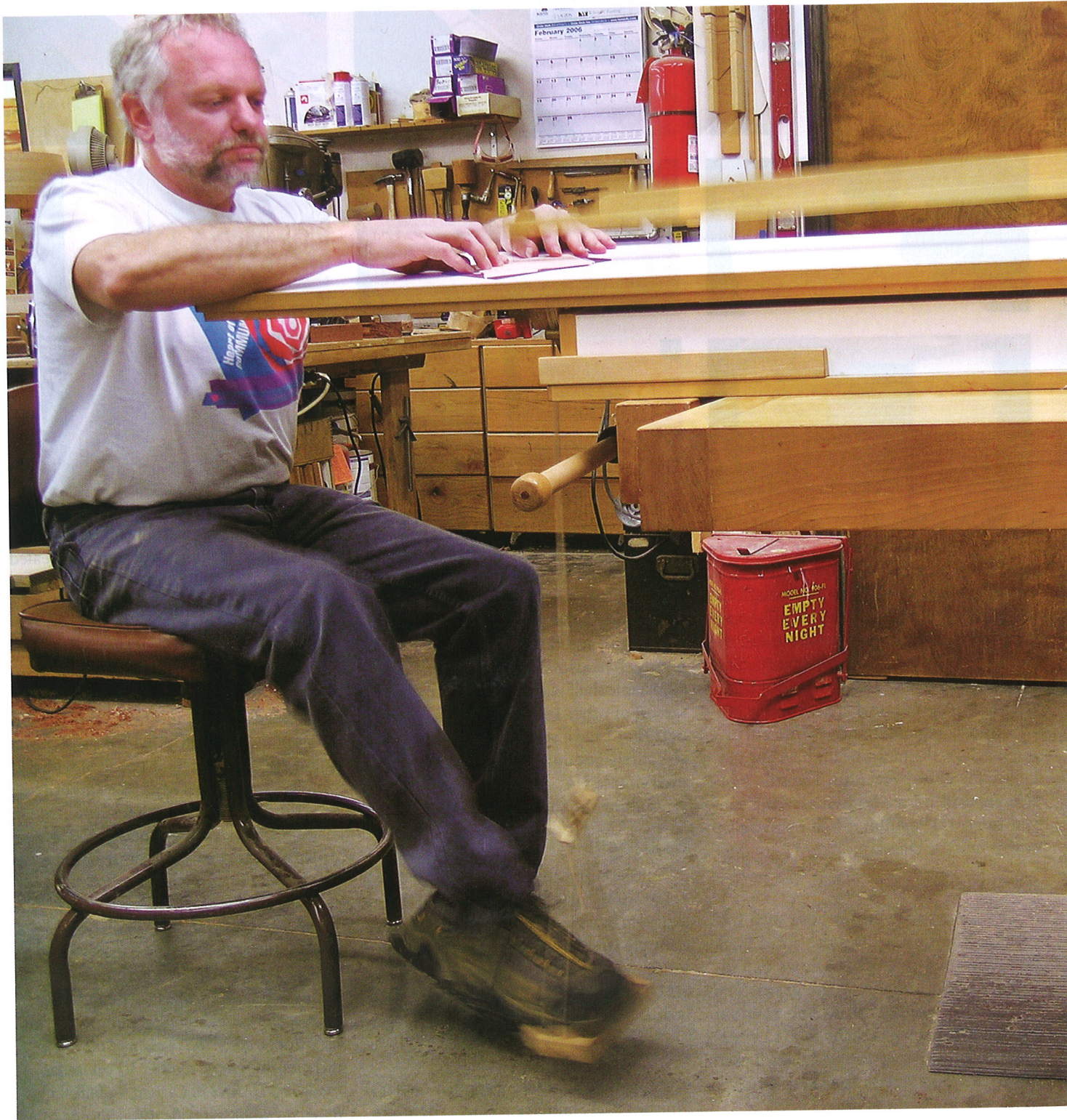


A Shop-made Scroll Saw

An inexpensive solution for handling large work

BY THEA M. GRAY



Why make a scroll saw when you can buy a perfectly good one? What if it isn't possible to buy a saw big enough for your project? What if you aren't willing or able to shell out a couple thousand dollars—or even a couple hundred—for the saw you need? If you were Brian Condran, a furnituremaker in Martinez, California, you'd ask around, do some research, and then build a scroll saw to your own specifications—for just about \$20 worth of parts. From start to finish it took him just seven days to research, design, and build his scroll saw.

When he was in his second year of the Fine Woodworking Program at the College of the Redwoods in Fort Bragg, California, Brian set out to build a cherry sideboard with leaves of inlaid marquetry. He had learned the art of marquetry from Greg Zall, a graduate of the same woodworking program, in a week-long workshop the previous spring, and he quickly applied his new skills to pieces small and large.

For his sideboard, Brian made the individual leaves with a fret saw but he wanted to use a scroll saw to create the tree branches and to inlay the leaves in the panel. When doing a marquetry technique called "bevel double cut," two pieces of veneer, generally 3/32" thick, are stacked and cut together at an angle of about 8°. Cutting the pieces together produces perfectly matched pieces with beveled edges. Once the pieces are separated, the pattern cut in the top piece will neatly fit inside the bottom piece, which will form the background. Because it's necessary to cut the bevel at a consistent angle, it's not possible to use a spiral cut saw blade and consequently the piece must be turned all the way around (rotated through 360°) to cut out a shape. In other words, it's highly unlikely that a large panel with an off-center marquetry design could be cut on a saw with a relatively small throat.

The throat of the school's Hegner scroll saw is just 18"—much too small for the 37" panel he had designed—and so Brian needed another option. He learned from David Welter, the program's administrator, tool keeper, and all-around knowledge resource, that another graduate had made

a scroll saw during a previous year. Armed with an image of Ken Frye's saw and some books, particularly *Marquetry* by Pierre Ramond [available from Taunton Press], Brian embarked on building a scroll saw.

The saw's mechanism is simple. It's foot-powered, requiring no electricity and making very little noise. A pair of arms holding a saw blade bracket a table and pivot in a housing that sits just behind the table. The arms are pushed upward with a compression spring and pulled downward with a foot pedal that hangs, like a swing, from the bottom arm by a cord. Brian puts one foot in the pedal harness, rests that heel on the top of his other foot, and gently pumps his foot to drive the saw. He can use the saw all day, alternating his lead foot occasionally, and not feel sore at the end of the day. The saw can be used at an angle with a fine 2/0 blade for marquetry, or flat with up to a #9 blade when doing scroll work on a workpiece up to 3/8" thick. It's also very portable and can be fastened to any available work surface with a standard clamp.

Brian has put his saw and his marquetry skills to good use, both in pieces in which marquetry plays a major role, such as a jewelry cabinet enwrapped in a landscape, and in pieces in which it plays a minor role, such as an interior detail in a drawer for a claro walnut desk.

Want to make a saw of your own? A scroll saw can be made from just about any material to give you the throat depth you need; it all comes down to getting the right tension on the blade, and the tension will depend on the materials used and the overall construction. The veneer Brian needed to saw was 37" long, so he made a saw with a 38" throat. He used hickory, some maple, a bit of yew, melamine, some clothesline, and a handful of basic hardware. "The materials and dimensions are infinitely variable," he says. "Be creative, but choose wisely." Making the saw requires the willingness to work by trial-and-error; since the sizes and materials aren't set, you'll need to do a dry run before the final assembly in order to achieve the correct saw blade tension.

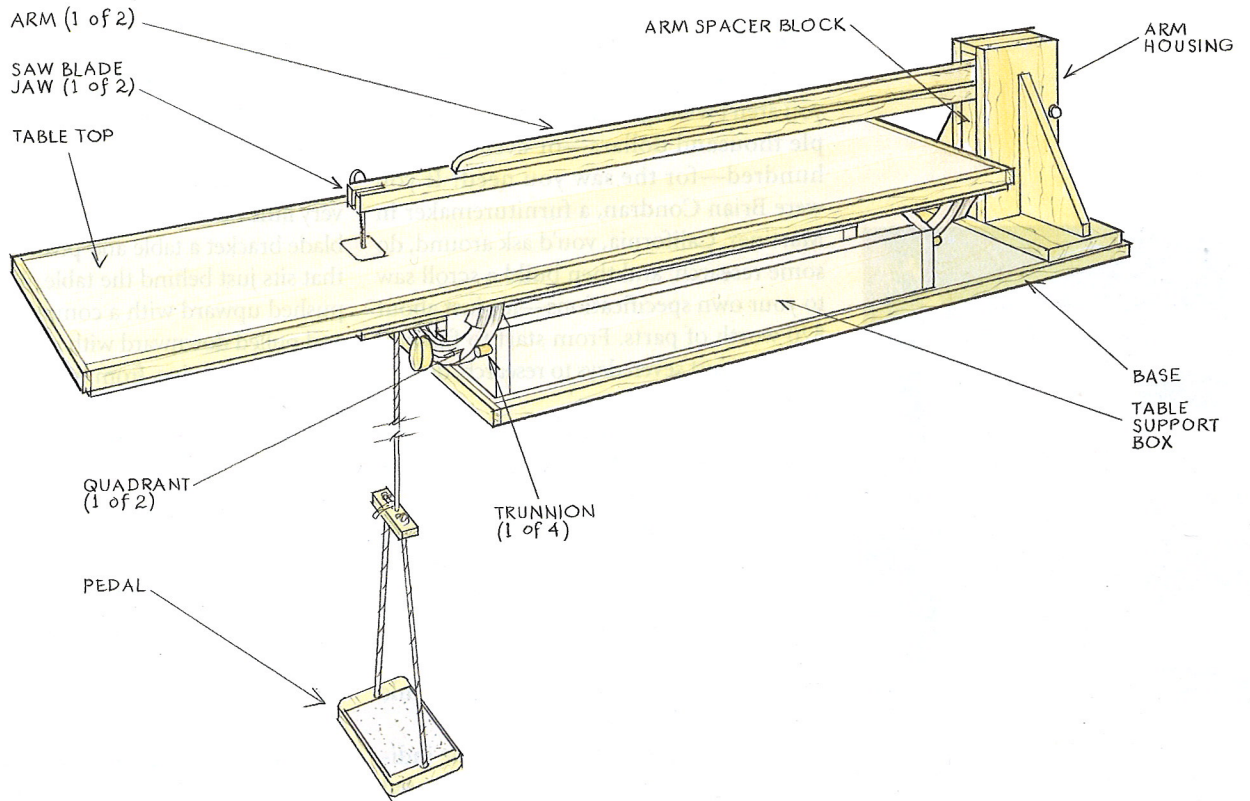
If you want to make one like Brian's, these are the parts you'll need: arms (2), saw blade jaws (2), arm spacer block (1), arm housing (1), spring (1), table top (1), trunnions and quadrant (2 pairs), table support box and base (1), pedal (1), and saw blades [see drawing].



PHOTOS BY THEA M. GRAY EXCEPT AS NOTED

Brian Condran works his pedal-powered, deep-throated, shop-built scroll saw.

SCROLL SAW PARTS



ARMS

Brian used hickory for the arms of his saw, but any material that's strong and flexible will do. Because he wanted a saw with a 38" throat he made the arms 44" long; 5" of this length extends beyond the table and another 6" or so is enclosed in the arm housing. Each arm is made of two pieces of wood with rectangular cross-sections placed perpendicularly to each other to form what looks like half of an I-beam (the lower half of the "I" for the top arm and the upper half of the "I" for the bottom arm).

The horizontal elements of the arms are 3/4" thick. The vertical elements are about 5/8" thick and taper from 1-1/4" at the back end of the saw to about 7/8" at the point where they stop, about 5-1/2" from the end of the arms. The combination of the half I-beam construction, the taper, and having the front section (1/8 of the overall length) of the arms consist of just the horizontal element makes the arms stiffer where they need to be, toward the arm housing, and more flexible toward the front of the saw.

Brian drilled a hole about 2" from the front end of the lower saw arm; he then fed

the cord for the pedal up through it and knotted it (1, 3). To hold the saw blade jaws, Brian cut a 1-1/2" vertical slot in the front end of each saw arm and mortised a rectangular hole 1" deep.

SAW BLADE JAWS

The saw blade jaws were made from 1/8" flat brass or steel stock, each side being 3/8" deep and 1" long. To hold the saw blade, a screw runs from the knob epoxied on its end, through a washer, into the saw arm, through the first jaw, and into a threaded hole in the outside jaw (2). If he were to make another scroll saw, Brian speculates he would make smaller knobs, since he finds the ones on his current saw a bit over-sized.

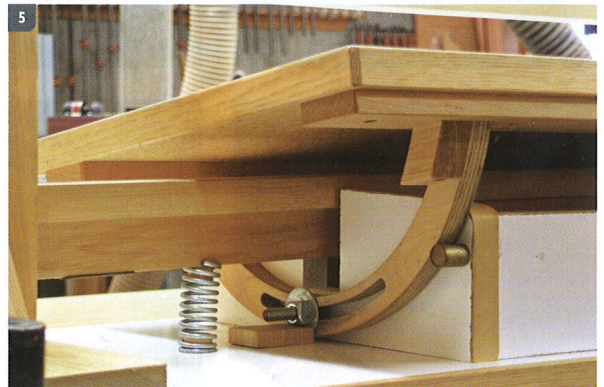
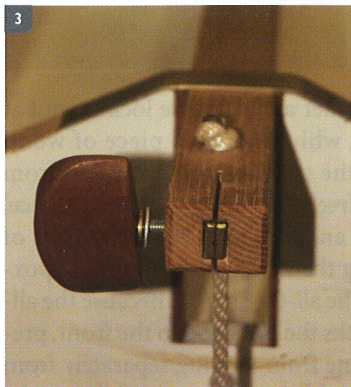
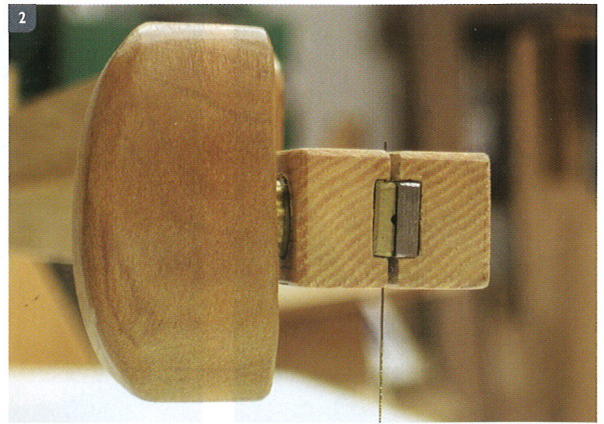
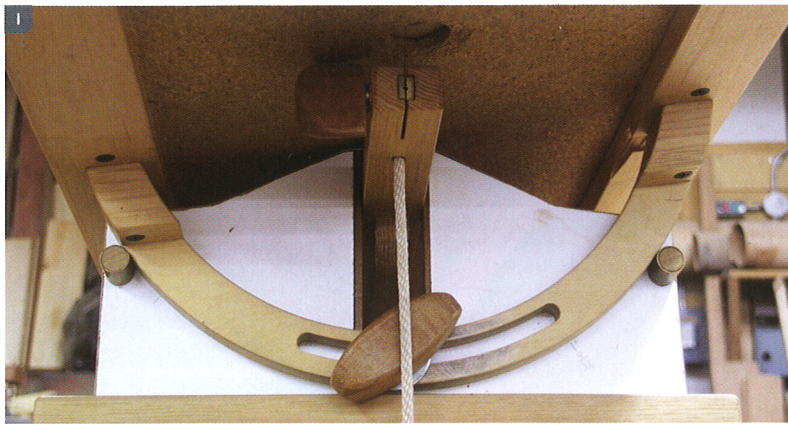
ARM SPACER BLOCK

The saw arms are held apart at the correct tension by the spacer block; the width of the spacer determines the amount of tension on the saw blade. This will be the last piece that is cut to size. Once the other saw components have been built, clamp the arms together with a scrap block and flex them to test the tension; Brian plucked the blade until he felt it had the right "ping."

Purposely start with the scrap block taller than you think necessary and then trim the block down in small increments until the blade tension is correct. Once you've gotten the correct tension on the saw blade, cut a block the same width as your scrap block and the same thickness as the arms. Drill a 3/8" hole in it 5/8" from the back edge. Then glue the arms and the spacer block together; Brian used dowels to help align the top and bottom arms flush with the block.

ARM HOUSING

The arm housing is a tall, narrow, open-ended box that flanks the arm unit and holds the pivot point (4). Brian made his out of solid wood and connected it to the table base with a triangular brace on either side. Since Brian's interest was in using the saw for marquetry, the pivot point hole should be approximately 3/32" above the top of the table to optimize the slight arc for cutting veneers (when cutting two pieces of 3/32" veneer, the pivot point will be between the two). The arm housing should fit the arm unit snugly yet allow it to pivot freely. For a pivot point, Brian used a 3/8" x 3-1/4" bolt, two washers, and a nut.



SPRING

The source of the tension in Brian's saw is a heavy-duty gate spring (5, 6) that he purchased at the local hardware store. It is held in place with short dowels in the table base and the lower arm, and it provides enough tension that the arms pop right back up after being pulled down by the foot pedal.

TABLE TOP

The table of Brian's saw is 48" long by about 12" wide. If he were to make another saw, Brian says he might consider widening the table that supports the material being cut. Others who have made the saw have

added wings to the table, but Brian finds them unnecessary; if a large piece has to be turned and he's running out of arm length he can move to one side, still working the saw's pedal since it swings freely, turn the material, and then scoot back to sit squarely in front of the saw.

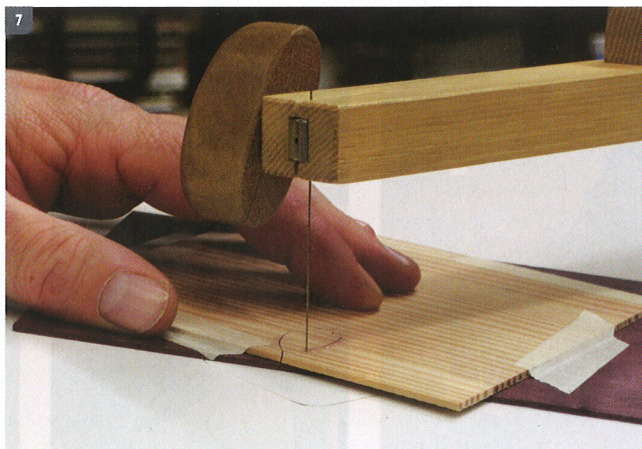
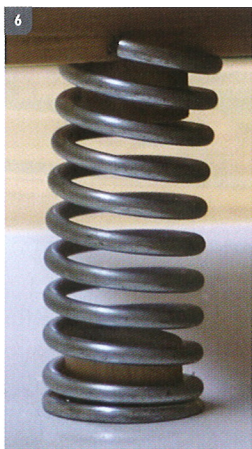
Like a bandsaw, the scroll saw table will need a hole for the blade. Brian built the table of his saw to accept a removable insert, which is just visible beneath the piece he's sawing in the figure below (7). To make the hole and the seat for the insert, drill a 1" hole through the table top about 12" from the front of the table and then use

a router and a chisel to cut a shallow 1-3/4" square half the table's thickness. You can make an assortment of inserts to accommodate different size blades.

The hole in the right front corner of the table (8, 10) might look like a small cup holder, but it allows Brian to easily drill the starter hole for marquetry designs that sit in the middle of a field of wood. Brian positions the piece he's working on and his drill over the hole; the table top provides more support for the wood than it would have if it were hung over the edge of the worktable.

TRUNNIONS AND QUADRANT

Each quadrant sits and rotates on two trunnion pins, allowing you to adjust the angle of the table. "You can make them as complicated as you like," Brian says, "but why?" Rather than solid brass or bronze, Brian's trunnion pins are wooden dowels fit inside sleeves of 1/2" diameter brass tubing. He shaped his quadrants (9) out of 5/8" Baltic birch plywood using a router. Small blocks are glued to the upper ends of the quadrants to that they can be easily fastened to the underside of the table. A slot routed into the middle third of the quadrants is just wide enough to accept a piece of 5/16" all-thread rod.



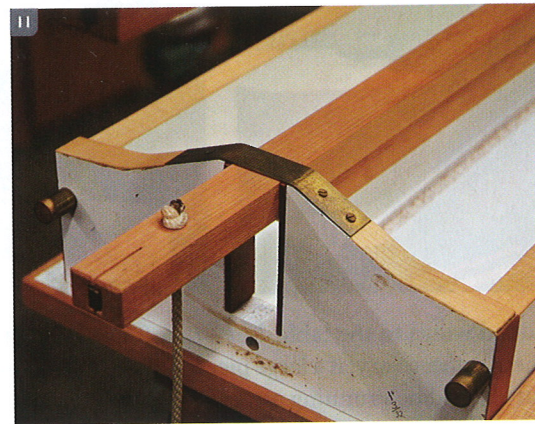
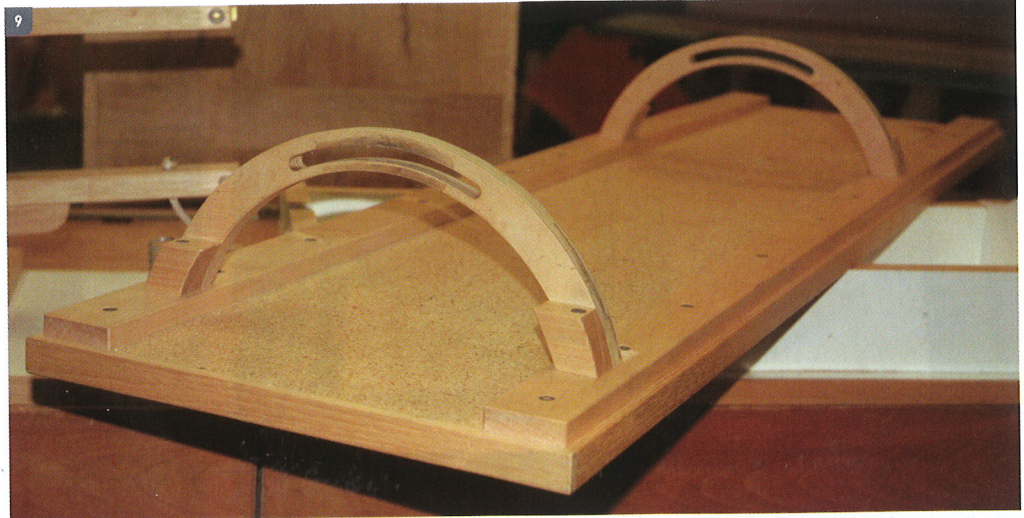


TABLE SUPPORT BOX AND BASE

The table support box is a basic box attached to the base that has a slot at either end to accommodate the lower saw arm. In Brian's saw, the box is approximately 25" long and 10" wide. Arm guides sit inside the slot at the front of the saw, hugging the lower arm to allow free vertical movement within the available range but prevent horizontal play. The guides can be made of any hard, naturally lubricated wood such as lignum vitae or yew and can be held inside the slot with double-stick tape.

Because the arm unit is pressed upward by the spring until pulled downward by the pedal, it's necessary to prevent it from hitting the bottom of the table. Brian did this by fastening a brass strap across the top of the front support box end (11).

The quadrants support the table top and rest on the trunnions, which are attached to either end of the table support box. The all-thread rod runs through a fender washer and the slot in the front quadrant, down the channel in the table support box, and out the back quadrant. It's capped by another

fender washer and a square locking nut at the back, which sits on a piece of wood glued to the table base to prevent it from spinning freely. Locking the table into place, flat or at an angle, is a simple matter of tightening the handle that has been epoxied onto the all-thread rod. Because the all-thread locks the back end to the front, preventing one from moving separately from the other, it lends additional stability to the saw body and helps keep the table level.

PEDAL

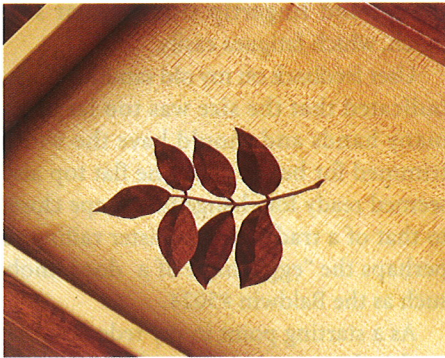
The pedal is just a block of wood suspended from the bottom saw arm by some 1/4" cord (12, 13). Sandpaper (400-grit) glued to the top of the block will prevent your foot from slipping. Brian drilled six holes in a thin piece of wood to make a simple and effective adjuster—the cord snakes in, out, around, down, and up and around again so that the pedal can be raised or lowered depending on the height of the chair—but a set of knots would probably suffice.

SAW BLADES

Finally, you'll need some saw blades.



PHOTO BY KATHLEEN BELLESILES



Examples of Brian Condran's work using his scroll saw. The saw was designed with a deep throat specifically to handle projects like the jewelry case at lower right with the wrap-around marquetry.

When choosing a set of blades for your work, remember that three teeth should engage the material you're sawing at all times.

To insert or change a blade, you'll need a spare piece of wood roughly the same width and thickness as one of the vertical saw arm elements. Fit it below the lower arm in the slot of the front table support box (14). This will allow you to pull down on the top arm and sufficiently loosen the tension in the blade so that it doesn't spring out of the top jaws when you loosen them (15).

As mentioned earlier, once all the other saw components have been built, you'll need to test the blade tension by clamping the arms together with a scrap block that is taller than you think necessary. Test the tension and if it's too tight, or if you can't even get good purchase on the blade ends because the arms are too far apart, cut the block down by small increments at each end until the blade tension is correct. Once you have the correct size you can make the final arm spacer block and glue the arms together.

Put the parts together and voilà, you've made your own scroll saw. "It ain't complicated," says Brian, "You just build it and get to work."

Thea M. Gray is a freelance writer and editor in San Francisco. She can be reached through her website at www.theagrays.com. Brian Condran is a furniture maker and designer in Martinez, California. He also teaches classes in marquetry, basic woodworking skills, and veneering through the Diablo Woodworkers and the Pleasant Hill Adult Education program. Brian can be reached at briancondran@aol.com.

PHOTO BY SETH JANOFSKY



PHOTO BY SETH JANOFSKY

