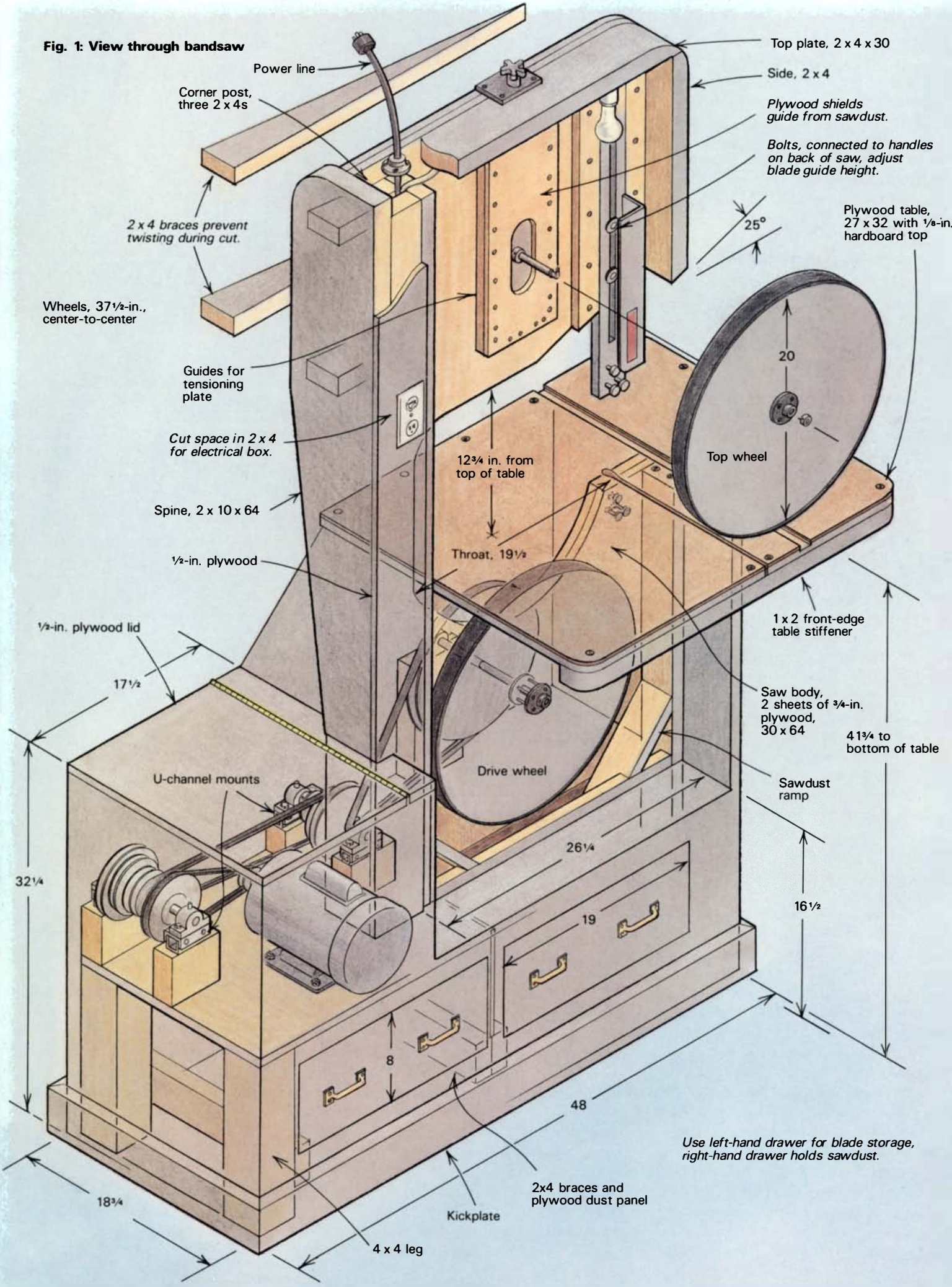
Fig. 1: View through bandsaw



Shopmade Bandsaw

Plywood and basic tools build the saw

by William Corneil

Most woodworkers' thoughts turn to tablesaws and radial-arm saws when they're confronted with buying a large stationary saw. But I'm different in two regards. First, I chose a bandsaw, for reasons that I'll make clear in a moment. And, secondly, I opted to build the machine myself rather than buy it.

I chose a bandsaw because it can do many things a tablesaw can do, plus it can cut curves. As a project, it seemed less daunting than building a tablesaw or radial-arm saw, both of which would be great to own but are too expensive to buy on my budget.

My problem as an amateur woodworker is that I find it hard to justify (to myself and my spouse) the need to buy larger stationary equipment simply to "build better birdhouses." Granted, many cutting tasks are performed quicker on a tablesaw, but for the amateur, time doesn't mean money. Aside from cutting curves, I can resaw, rip and even cut lumber from logs on my saw. It also has five blade speeds: 120, 300, 600, 1,200 and 3,000 feet per minute (fpm). The slowest speed allows me to cut ¼-in. angle iron.

As machinery goes, the price was right. I built the 20-in. saw you see at left three years ago for under $100, Canadian (about $72 American today). I kept the cost down by using locally available materials and hardware. Most of the saw is built from ¾-in. interior-grade plywood and construction-grade lumber (which needs to be dried well first). I recently swapped the saw's ¼-HP motor for a used ½-HP model, but the smaller motor is more than adequate, unless you use the saw to cut lumber from logs, as I do.

It's ironic that my saw incorporates features that many store-bought saws don't, such as a worklight above the blade guard, one drawer for blade storage and another to catch sawdust, a built-in 110v AC power outlet and a conveniently located power cord.

Anybody who's built even a reasonably complex piece of furniture shouldn't find the saw hard to build. I built mine with the usual cast of characters: a saber saw, an electric hand drill and a borrowed belt sander. The only machine I used that many shops may lack is my homemade 12-in. disc sander.

I'll admit the project requires basic metalworking skills. If I were to build the saw again, however, I wouldn't use bushings for the wheels; I'd opt for roller or needle bearings instead. Although more expensive, bearings would eliminate much of the metalworking, and would also save time on building the machine.

Ball bearings would also have negated the need to run a network of copper-tubing lubrication lines throughout the saw to all the pillow blocks (for clarity, this network isn't shown in the drawing at left or those on p. 63). Similarly, two other jobs would also have been eliminated: drilling out the top wheel axle to fit it with a lubrication cup, and routing a groove in the saw body to run an oil line to the bushings in which the drive axle rides.

Even if you can't handle the more involved metalworking (such as building the wheel-tensioning assembly), a machine shop should be able to do it for a reasonable price—and you'll still accomplish the project for a lot less than what you'd pay for a good used machine of this capacity.

My bandsaw can be separated into three main components: the base, which supports the saw and table and contains the motor, drive components and two drawers; the saw body, which supports the wheels the blade rides on, along with the adjustment mechanisms and the door; and the mechanicals—the motor, pulleys, bearings, electrical wiring and adjustment mechanisms.

The logical place to start construction is with the base. This is no more than a ¾-in. plywood top, face, back and end pieces screwed to four 4x4 legs. A divider of ½-in. plywood separates the base into two drawer compartments and prevents sawdust from getting into the blade-storage drawer. The drawer runners are 2x4s with rippings glued to them.

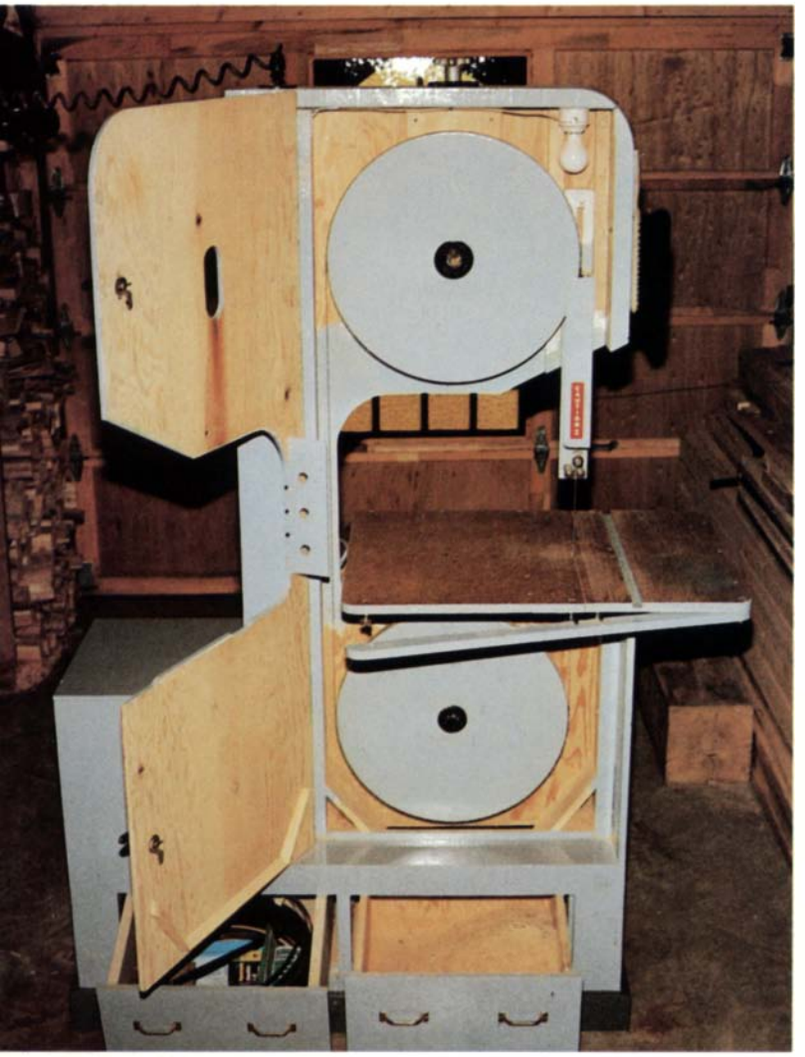
After the base is built, begin work on the saw body by drawing its profile on two sheets of plywood that have been tack-nailed at the corners. Cut the profile and remove the scrap. The sole purpose for cutting an arcing, concave profile in the saw body's top is to conserve material for wheels, so handle the throat scrap carefully.

If you opt to use bushings instead of bearings, you'll have to run a lubrication line down to the bushings that the lower axle rides in. You'll also have to rout a groove large enough for the lubrication line (I used ¼-in.-dia. copper tubing for lube lines throughout) in one of the plywood sheets. The tube that feeds the lower bushings stops just above the axle and lubricates the bushings by dripping oil onto the axle.

Glue and screw the two plywood sheets that will form the saw body together. After the glue has dried, attach the 2x4 top plate, the 2x10 spine and the 2x4 braces on the back. Next, glue and screw the three 2x4s to the left of the front of the glued-up sheet so that they form a corner post. Be sure to leave a gap between the post and the sheet on the left-hand side—to provide room to run the switch and outlet wiring. Now, attach the top and bottom vertical 2x4s on the right-hand side of the saw body. Cut out and attach the ramps that spill the sawdust into the drawer.

Use the same pattern for the saw body to cut out the ½-in. plywood door. Then, rip the piece of plywood that's attached next to the door—the door swings from this piece by a piano hinge. Next, fasten another sawdust ramp at the bottom of the door, and cut out the oval slot in the door to allow the top axle to travel vertically.

Make up each wheel from the ¾-in. plywood throat cutouts. Rough out each piece, then glue a piece of ½-in. plywood on top of



Canadian woodworker Bill Corneil built this 20-in. bandsaw three years ago and has found it a reliable performer. Shown with its door and two drawers open, the saw is powered by a used ½-HP motor. It is built from construction-grade lumber and interior-grade plywood.

it, making each disc 1¼ in. thick. When the glue has dried, draw the 20-in.-dia. circles on each piece, and cut them out slightly oversize. I bored a ⅝-in. centerhole in each wheel, mounted the bushings to them and mounted the wheels, one at a time, on a jig on my disc sander. Then, I spun each one against the sanding disc to make it concentric with the axle and to make the edge perpendicular to the face. There's no need to put a crown on each disc to keep the blade on track; I'll explain more about this later.

Next, I bought an 18-in. bicycle inner tube, cut off the valve and split it into two large bands about 1 in. wide. I stretched these bands over each wheel—to prevent the blade's tooth set from wearing a groove in the wheel edge.

You can make your own bearings using bushings housed in floor flanges, which are threaded fixtures allowing plumbing pipe to be used as closet coatracks, machine stands and the like. You'll need four ½-in. floor flanges, two ⅜-in. floor flanges and four ¾-in.-long sintered bronze bushings with a ⅝-in.-dia. inside hole and ⅞-in. outside diameter. Drill out the centerhole in the ½-in. floor flanges to slightly under ⅞ in. dia., and press the bushings into the hole.

Pick one plywood disc as the top, free-running wheel and bolt a ½-in. floor flange to each side of the disc with flathead machine screws. I used a piece of ⅝-in. steel rod inserted through the hole to keep both flanges aligned while bolting them to the wheel (and also to mount the wheel to my sanding jig).

Mount the top wheel-tracking assembly to the saw body. This assembly consists of a threaded rod with a knob mounted to it. Turning the knob clockwise threads the rod through a plate mounted to the saw body. The rod then pushes on the back of the plate to which the axle is welded, causing the wheel to tip back in relation to the front of the saw.

The wheel-axle plate hangs from the top of the saw and needs about ¼-in. clearance behind it. It's kept in side-to-side alignment by two pieces of 1-in.-thick wood—one on each side of the assembly—screwed to the saw body. A plywood shield is screwed to these pieces to serve as a cover.

Once again, if you decide to use bushings instead of bearings, you'll have to drill out the ⅝-in. steel-rod top axle. Bore a ⅛-in. oil channel down the center of the rod, then bore two ⅛-in. drip holes perpendicular to the oil channel—to lubricate the bushings the axle rides in. Use two collar stops to secure the top axle.

The other two ½-in. floor-flange bearings are attached to the saw body's laminated center—not to the lower wheel. The alignment of these lower bushings is critical. First, stand and plumb the saw body on its base and screw it down. Drop a plumb bob from the center of the top axle and mark the center of the bottom wheel with a vertical reference mark. Now, make a horizontal reference mark about 37½ in. down from the top axle. The bottom flange bearings are centered on these marks.

Drill out the two ⅜-in. flanges to ⅝ in. in diameter. Drill and tap three setscrew holes in each flange. Attach these two flanges to the bottom wheel in the same manner you attached the flanges to the top wheel. The setscrews—six in all—tighten the wheel to the axle. No collar stops are needed.

Cut a ⅝-in. steel rod to 12 in. long and push it through both the drive wheel and the bearings attached to the laminated body. The rod should almost touch the back of the base.

Install a piece of 2x6 to support the pillow block that the drive axle will rest on, then mount the pillow block itself (see figure 2). Next, install the V-belt and the 12-in.-dia. V-belt pulley on the lower axle. Finally, mount the axle to the pillow block.

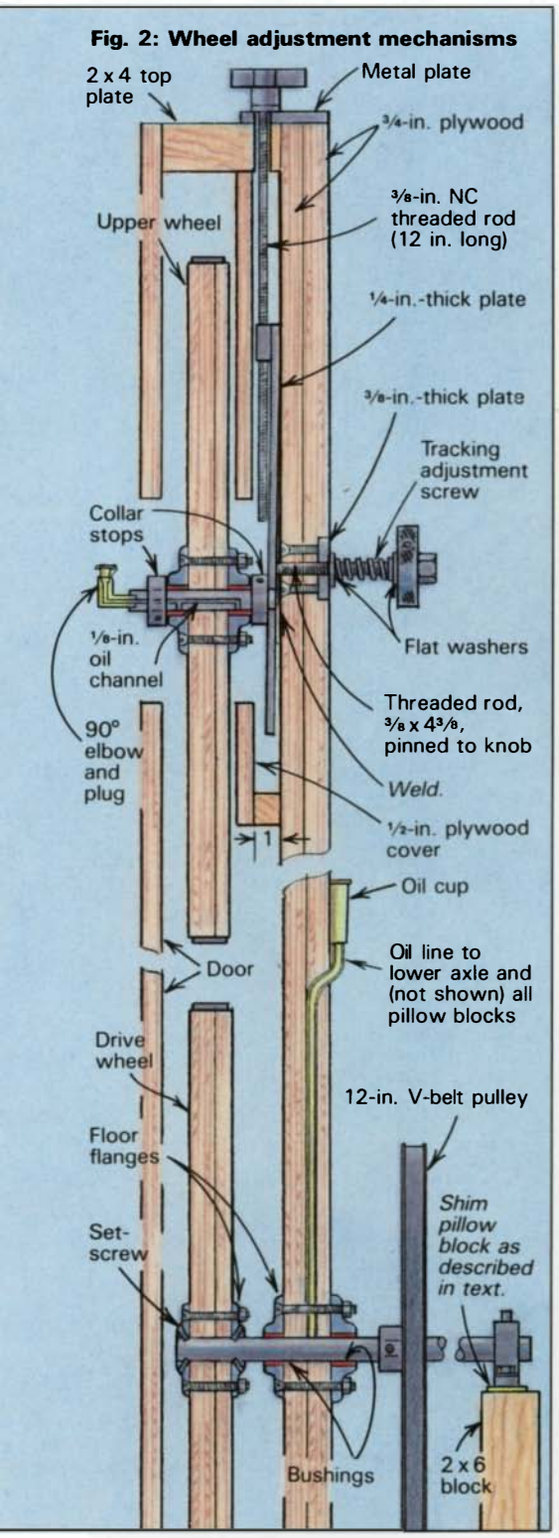
The key to blade-tracking success is shimming the pillow block that the drive axle rests in. This will make the axle run downhill, tipping the lower wheel slightly. The lower inside face of the wheel is closer to the saw body than the top by about ⅛ in. (or a little less). You might have to experiment with shimming the axle to get the blade to track correctly, but, once done, the blade tracks extraordinarily well. Mine hasn't come off the track in more than three years of heavy use, even after ripping more than 200 logs into lumber.

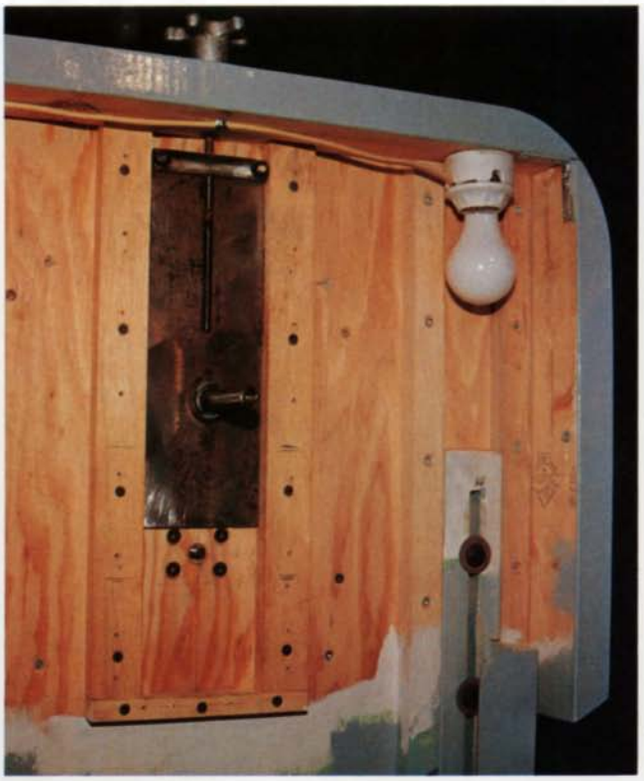
Next, mount the two sets of intermediate five-step pulleys to their axles which, in turn, ride in pillow blocks bolted to 3-in. U-channel mounts (see figure 1). Slotted holes for bolts allow the pillow blocks to adjust horizontally, and the U-channels to adjust vertically, for fine-tuning alignment.

Build the sliding blade guard as shown in the photos, facing page. The blade guard slides between two pieces of wood screwed to the saw body. The bearings are positioned by nuts (threaded to either a rod or a bolt) after a blade has been installed. Two of the bearings in each trio should be located to ride along both faces of the blade, while the third backs up the blade from behind.

Bolt the motor in its compartment using the inside face of the base as the reference point. Use a straightedge or a steel square to align the pulleys before tightening down their setscrews. Run the power cord in through the top of the saw, and fish the wiring

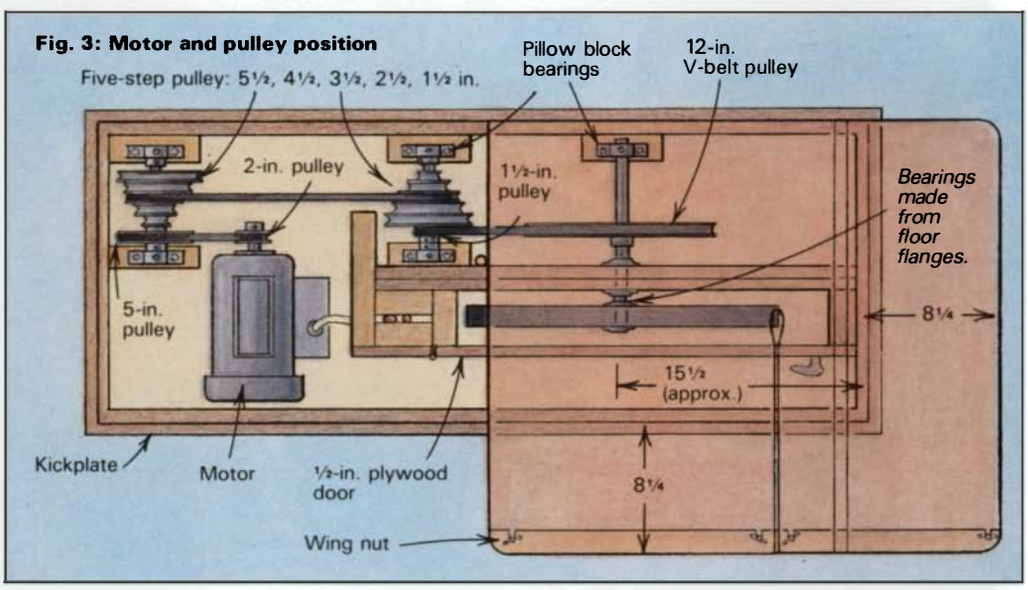
Fig. 2: Wheel adjustment mechanisms





With its guard and the top wheel removed, the saw's blade-tensioning assembly (above, left) is exposed. The assembly is raised higher than normal to show the tracking assembly behind it. The blade guard slides in tracks screwed to the saw body. Blade guide bearings (top right) are made of ball bearings on threaded rods or bolts. The top backup bearing in the upper trio is smaller that the bottom backup bearing because it's a temporary replacement. The author burned out the original bearing after three years of use, milling logs into lumber.

Fig. 3: Motor and pulley position



down through the support post to the switch/receptacle. Wire the motor between the switch/power outlet and the light. When wired correctly, the bulb should light when the saw is turned on, and the receptacle should have power at all times. By having the power cord exit the top of the saw, you can plug it into a ceiling receptacle, keeping the cord high and out of the way.

The remaining work is simple. Attach the hinged cover for the motor compartment, build the drawers and the saw table, attach hardware, cover blemishes with filler, then sand and paint.

While the saw accepts blades from 138 in. to 146 in. long, I use a ¾-in. by 144-in.-long blade most of the time. Take the blade on a test run by slipping it over both wheels. You should also snug up the blade tension; the blade should be snug enough to ring when you strum it like a guitar (see "Home-Shop Bandsaws," *FWW* #63). With the saw unplugged, turn the top wheel over by hand and adjust its tracking.

Now comes the moment of glory. Quickly flip the switch on and off a couple of times to test how the blade tracks. All that's left is to take it for a test drive down a long and winding cut. □

Bill Corneil lives in Thorndale, Ontario. Eight detailed sketches of his shopmade bandsaw are available by sending a self-addressed # 10 envelope and 39¢ in stamps to Corneil Bandsaw, The Taunton Press, Box 355, Newtown, Conn. 06470. Photos by author.