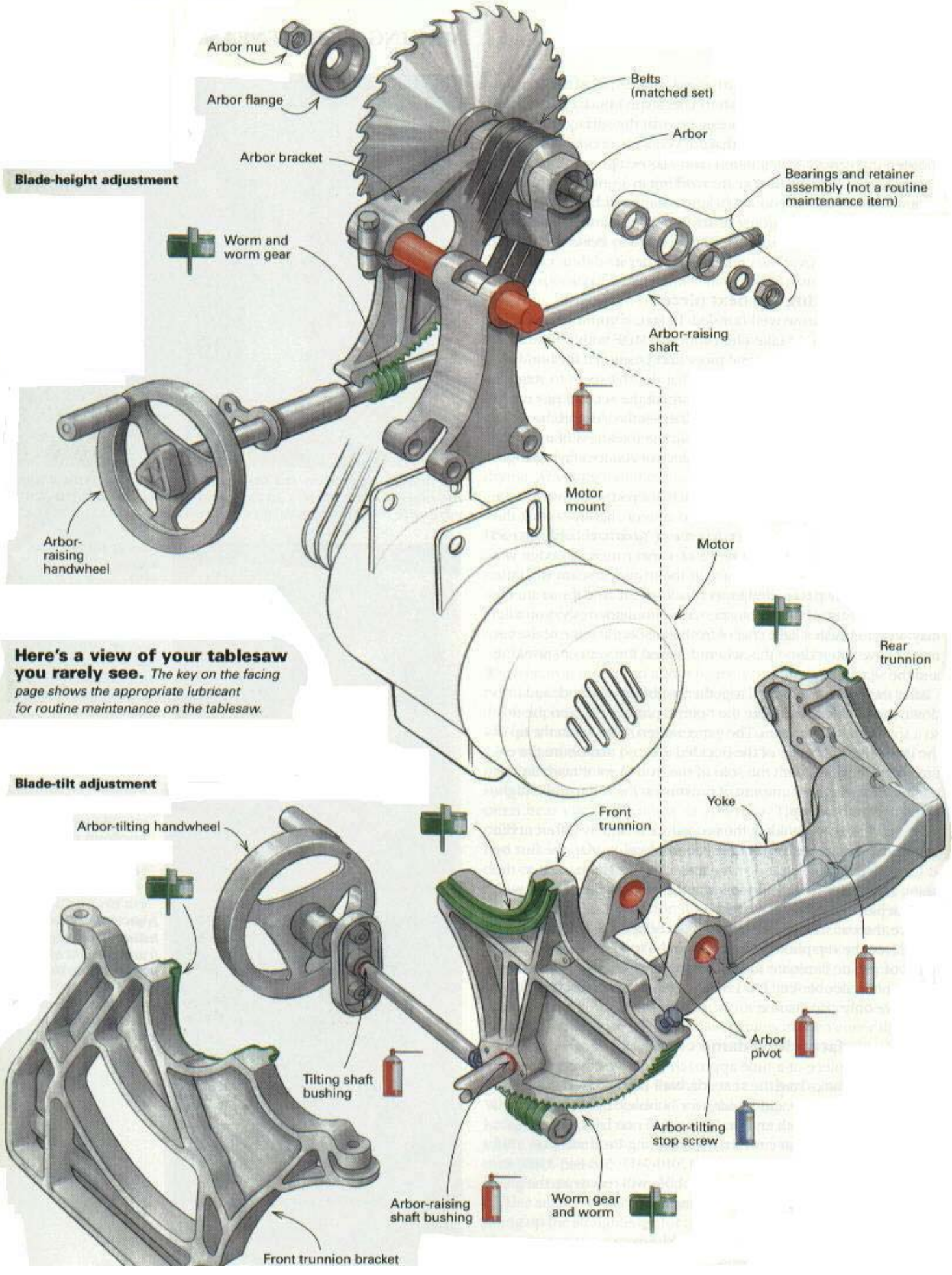
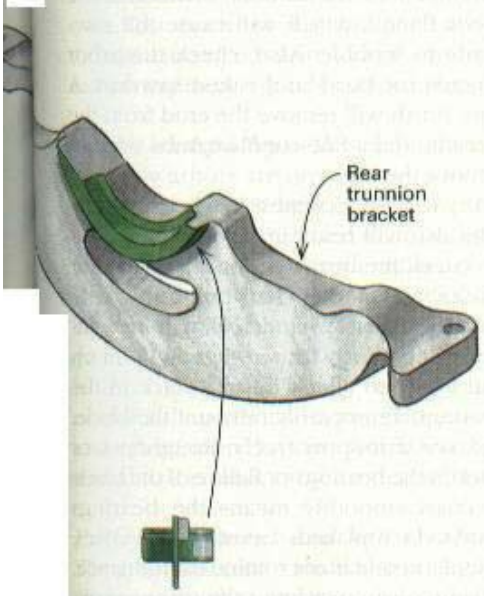

Arbor nut
Arbor flange
Belts (matched set)
Arbor
Arbor bracket
Blade-height adjustment
Bearings and retainer assembly (not a routine maintenance item)
Worm and worm gear
Arbor-raising shaft
Motor mount
Arbor-raising handwheel
Motor
Rear trunnion
Here's a view of your tablesaw you rarely see. The key on the facing page shows the appropriate lubricant for routine maintenance on the tablesaw.
Blade-tilt adjustment
Arbor-tilting handwheel
Front trunnion
Yoke
Arbor pivot
Tilting shaft bushing
Arbor-tilting stop screw
Arbor-raising shaft bushing
Worm gear and worm
Front trunnion bracket

Tablesaw Tune-up

What lies below the top needs attention, too

by Kelly Mehler



Several times a day, dozens of times in the course of a week, I crank the handwheels to adjust the blade on my tablesaw. Each time, the smooth, precise response from this otherwise ordinary task gives me a brief sense of satisfaction—things are okay. But as the months and board feet of wood slide by, the once silky-smooth operation starts to take more muscle. Eventually, tugging on the handwheel raises the blade in intermittent jerks, and tilting the blade provokes a metallic squeal. My saw is telling me it's time for a tune-up.

The tablesaw is the most important power tool in my shop. Accurate and heavy, it's built for the long haul. But it's easy for me to take it for granted. I routinely check the cutting accuracy, but I don't have a schedule for servicing internal parts. The cabinet base, valued for its stability, noise reduction and dust containment, shrouds the motor and internals—out of sight, out of mind. So, even though I know that cleaning and lubrication keep the saw in top shape, it's only when I notice stiffness or noise while raising or tilting the arbor that I'm finally prodded into action.

The frequency of maintenance depends on how, and how often, the saw is used. Cutting abrasive materials, such as particleboard, Masonite and Formica, will increase the wear on internal parts. Sawing plenty of gummy, resin-rich or green wood creates pitch buildup. In my shop, internal parts should be cleaned and lubricated about once a year, and I set aside at least half a day to do it.

Tablesaw anatomy

It's a lot easier to maintain your tablesaw if you have the original instruction manual and the parts list. All of the machine's parts usually are shown as they would be assembled, which can be especially helpful when doing repairs and replacing parts. If you don't have a manual and parts list, ask for one. Most manufacturers will oblige if you give the name, serial and model number of your saw. Manufacturers' addresses can be found in the *Thomas Register* at your local library.

The drawing at left shows the guts of a typical cabinet-base tablesaw. The arbor assembly is the heart of the saw. It's a structural casting, with integral worm gear, that houses the sawblade drive shaft (the arbor) on a set of bearings. In addition, the motor, motor mount, belts and pulleys also are part of this assembly. The trunnion assembly, also with an integral worm gear, supports the arbor assembly and allows the whole unit to tilt about the two arc-shaped slides, which are called trunnions. They engage mating brackets mounted to the front and rear of the cabinet. Handwheels control blade elevation and blade tilt by turning worms that engage worm gears on the arbor and trunnion assemblies. These parts work best when they're clean.

Remove the top

Before doing any work on your saw, make sure it's unplugged. The best way to access all the internal workings is to remove the top from the saw. Removing a few screws at the upper corners of the cabinet is all it takes. But before you run off to get the wrench, you should measure and record the distance from the inside edge of the miter-gauge slot to the tip of the sawblade. Take this measurement with the arbor set at 0° and the blade elevated to its maximum height. This will aid you in getting the top back to its original position. If you've built jigs for your saw and they use the miter-gauge slot to reference their position relative to the blade, you'll want to replace the top *exactly* where it was.

Realigning the top can be a fussy, painstaking process. If you don't want to mess with it and the interior is not badly loaded with pitch, then most of the work can be done (with some difficulty) through the throat plate and the other openings in the cabinet. It's a personal preference.

If your saw is in dire need of a cleaning, remove the throat plate, the blade, the miter gauge, the fence and any other loose items, and then remove the top. With the top out of the way, you can methodically work your way through the machine in a multi-step process of cleaning, inspecting and lubricating.

The arbor assembly

Cleaning the interior of your saw prevents the accumulation of pitch and sawdust, which increases wear and makes operation difficult. The first step is to clean out all the dust and gunk from all the moving parts. This will make inspection and lubrication easier (or possible). Use a stiff-bristle brush to knock loose sawdust from the arbor, arbor pivot, worm and worm gear (see the top photo on p. 62). If your shop has an air compressor, a well-directed blast of compressed air really helps to clean hard-to-get-at areas.

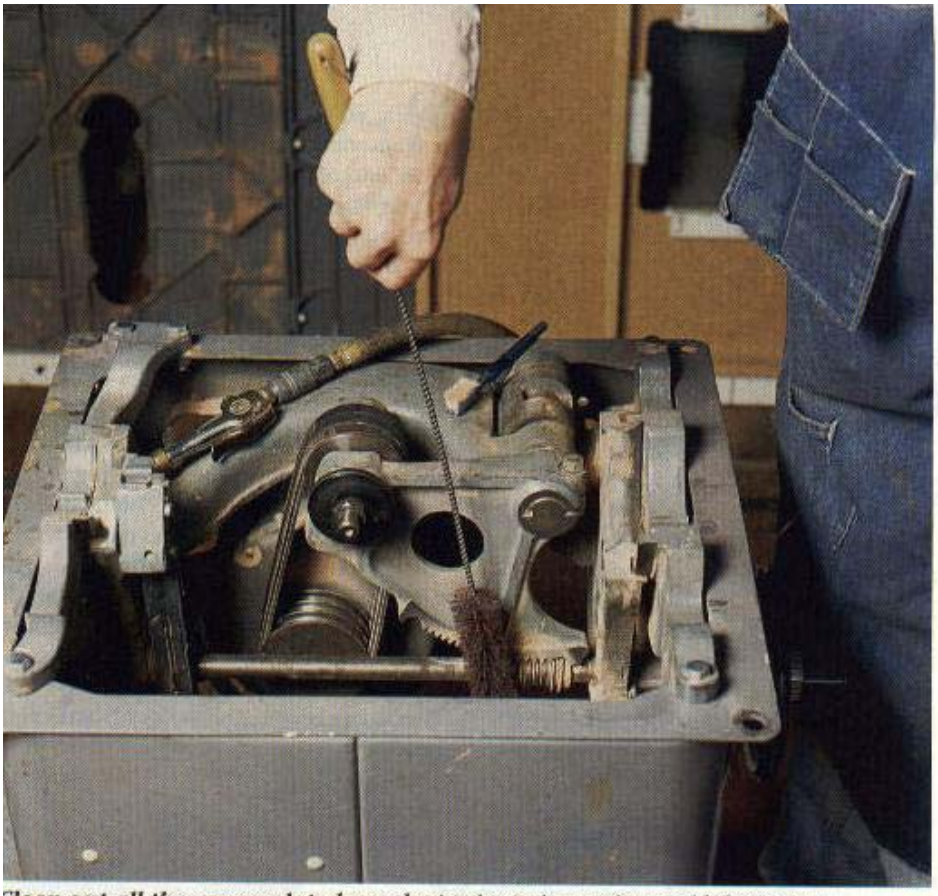
Next you'll need to remove the accumulated pitch, gum and packed sawdust. This is tenacious stuff, and you'll need some additional cleanup tools and solvent. A narrow putty knife, an old screwdriver, splints of wood and a wire brush will help to dislodge the cakes of pitch and sawdust.

Lubricant key

Paste wax

White lithium grease

WD-40



Clean out all the accumulated sawdust *prior to inspection and lubrication.*

Paste wax applied with a toothbrush *lubricates gears and doesn't attract sawdust.*

The solvent I particularly like is Oxisolv blade and bit cleaner (Oxisolv Inc., 12055 Universal Drive, Taylor, MI 48180; 313-946-4440) because it's nontoxic, nonflammable and water soluble. It is as effective as oven cleaner without the noxious fumes, and it can be wiped off with a dry rag—no water needed.

The arbor and bearings—The arbor needs very little maintenance, but you should check for burrs on the face of the arbor flange, which will cause the sawblade to wobble. Also, check the arbor threads for burrs and caked sawdust. A wire brush will remove the crud from the threads, and a fine-cut file can be used to remove the burrs.

Any wear or looseness in the arbor bearings also will result in sawblade wobble. To check the bearings, loosen the motor mount, and take the tension off the belts. Turn the arbor by hand, feeling for roughness. Grasp the arbor and gently pull up and down to check for any slack in the bearings. Temporarily remount the blade, and see if it spins freely. Roughness or slack in the bearings or failure of the blade to coast smoothly means the bearings need to be replaced.

Replacement is not routine maintenance. This involves removing the trunnion assembly, unseating the bearings and replacing them using an arbor press—something probably best done at a machine shop or by a repair technician.

Blade wobble also can occur when the arbor flange is not perpendicular to the arbor. You can determine this by measuring the out-of-plane motion of the flange—this value is called runout. To determine the runout, use a dial indicator with a magnetic base. Mount the magnetic base to the closest rigid structure (the arbor bracket or the top if it's in place), and place the indicator tip against the flange. Rotate the arbor. Runout should be less than 0.010 in. More than that will cause enough vibration at the edge of the sawblade to cause rough cutting as well as splintering (especially with sheet stock). If the flange needs truing, remove the arbor assembly, and take it to a machine shop.

The motor—The motor runs in a dust storm inside the cabinet. Because of this environment, a quality saw has a totally

enclosed fan-cooled motor (the motor

windings and bearings are sealed within a steel shell, and an external fan blows cooling air over the motor housing). For long motor life, make sure this fan is free of obstructions, such as caked sawdust, on the intake grill.

To promote free air circulation, the cabinet has openings. Keep the level of sawdust in the cabinet to a minimum, well below the motor. If you have a motor cover on the cabinet, then the vents in the base should be clear of accumulated sawdust. Too much sawdust and pitch inside the saw base also is a fire hazard—another reason to practice good housekeeping.

V-belts and pulleys—Most cabinet-base tablesaw arbors are driven from a motor via two or three V-belts, which are sold and installed as a matched set. Check for frayed or cracked belts, and replace them with new ones to the manufacturer's specifications. If only one belt is worn, replace them all as a set; otherwise, more of the load will be carried by the new belt. Uneven loading results in premature wear and vibration in the saw. Vibration transmitted to the blade causes rough cutting.

Pulley alignment and belt tension—The arbor and motor shafts should be parallel to each other, and the pulleys must be in alignment (see the drawings at right). Even a slight misalignment will cause excessive belt wear from poor tracking and will increase vibration and noise.

To make this alignment, loosen the setscrew in the pulley on the motor shaft. Place a straightedge on the arbor pulley so that it makes contact with both edges of the rim, and then move the motor pulley until the straightedge touches both sides of its rim, too.

If the pulleys are aligned, then the shafts will be parallel. If you can't get the pulleys to align, it's because the shafts aren't parallel. In that case, loosen the motor mounts, and shift the motor until you get the desired alignment.

Once the pulleys are aligned, slide the motor mount to tension the belts. When you can deflect the belts about 1 in. at the center span between the pulleys using light finger pressure, the tension is correct.

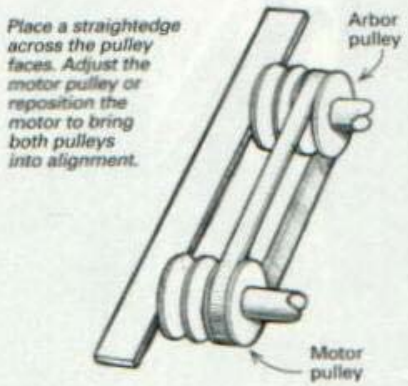
Arbor worm gears and arbor pivot—The arbor-raising worm and worm gear also are exposed to a blast of sawdust. They get packed with pitch and caked sawdust. Enough of this stuff can make operation difficult. Use a stiff-bristle or wire brush to dislodge the material. For really tough cases, like pitch buildup, use Oxisolv cleaner.

The best lubricant is one that does not attract sawdust, such as powdered graphite, hard wax or white lithium grease. For the worm and worm gear, I use furniture paste wax. Use a toothbrush to work it into all the gear teeth (see the bottom photo on the facing page).

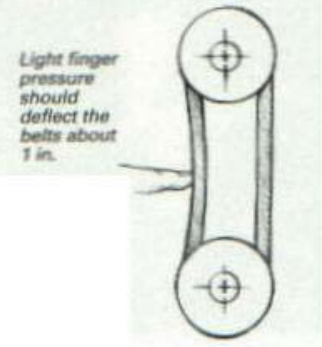
Clean the accumulated gunk from the bushings that support the worm shafts. Strips of solvent-soaked rags used in a shoe-shine fashion work best here. Use this same technique for the arbor pivot. To lubricate these hard-to-reach areas, I use a white lithium grease spray (see the photo at left). Then raise and lower the arbor several times to make sure that the operation feels smooth.

***White lithium spray grease** is used to lubricate the hard-to-reach pivots.*

Checking pulley alignment



Tensioning the belts



The trunnion assembly

Because the trunnions carry the weight of the entire arbor assembly, including the motor, they work best when clean and lubricated. Using your arsenal of cleaning implements, pick and scour the debris from the arc-shaped trunnion grooves and their mating trunnion brackets. Because you'll have to tilt the assembly back and forth to get it all, clean the worm and worm gear at this time, too. Using paste wax and a toothbrush, tilt the arbor assembly from stop to stop to work in the lubricant.

Arbor-tilting stop screws—The final step in the tune-up is lubricating the arbor-tilting stop screws. These usually are a hex-head machine screw with a locknut and need only a shot of penetrating oil, like WD-40 or Liquid Wrench, on the threads. This will help them move easily when you set the arbor tilt for 0° and 45°.

Replace the top, and then align

After the parts inside the cabinet have been cleaned and lubricated, put the top back in place. Reinstall the screws holding on the top until they are finger tight. Raise the arbor to its maximum height, and replace the sawblade. Because the slot-to-blade reference measurement was made with the blade set at 0°, you need to reset the blade to perpendicular, and set the stops. Then you can align the miter-gauge slots so that they are parallel with the blade.

Using a combination square or a draftsman's 45° triangle, set the arbor-tilting stops. Hold the square against the blade, and nudge the handwheel until the blade is perpendicular with the table. Carefully turn the machine screw until it's hard against the fixed stop. While holding the screw with a wrench, tighten the locknut. Tilt the arbor away, and then bring it back against the stop. Check again that the blade is still perpendicular to the top. Now, using the 45° part of the combination square or the triangle, tilt the arbor over, and repeat this procedure for the 45° stop.

With the blade at its maximum height, nudge the top back into its original position using your recorded measurement of the sawblade to miter-gauge slot distance. Snug up the cap screws using light torque on the wrench.

The final alignment check involves making a test cut. Clamp a ¾-in.- to 1-in.-sq. piece of hardwood to the miter gauge so that it extends about 1 in. past the sawblade. Cut the stock, turn off the power and unplug the machine.

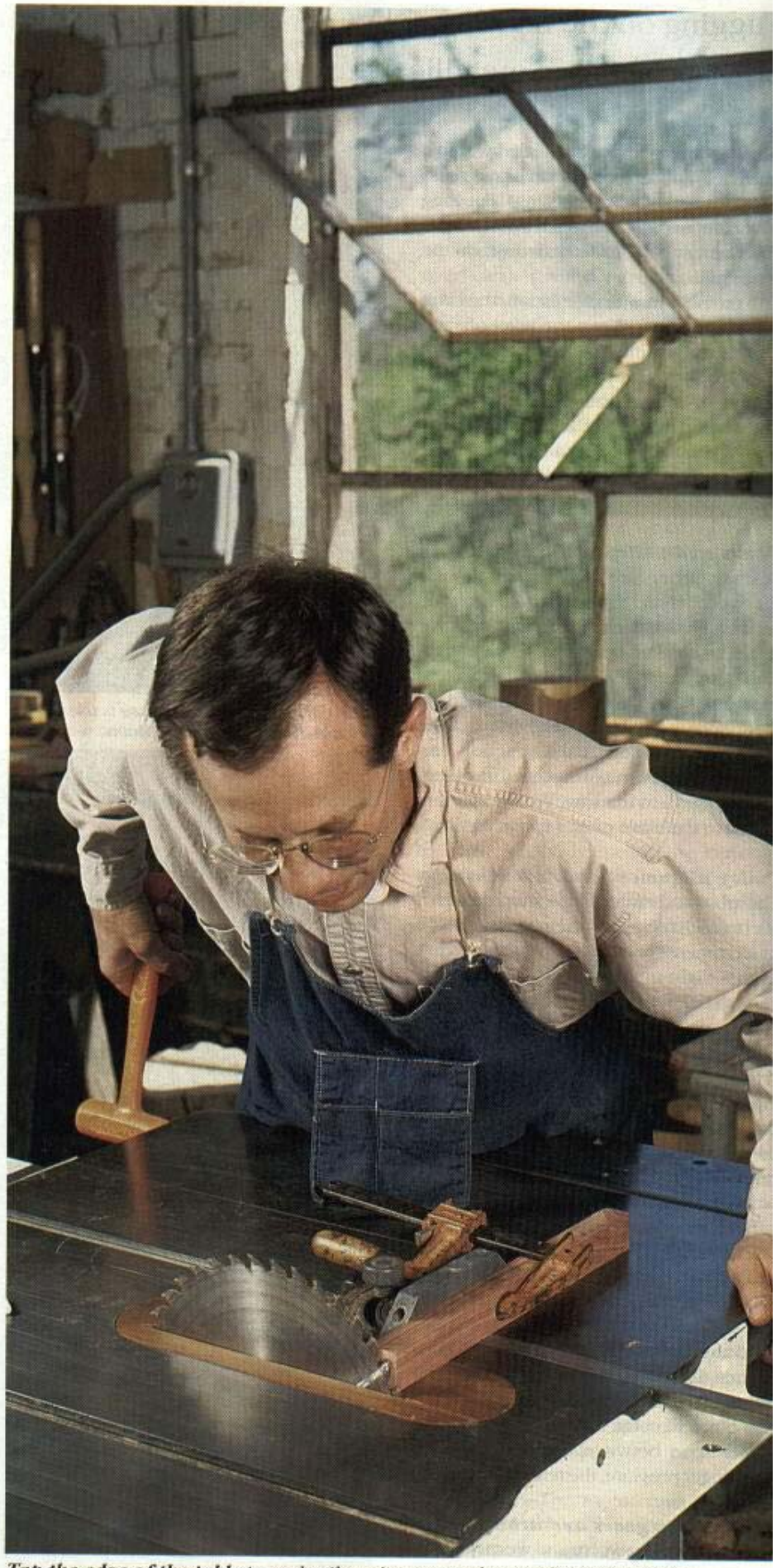
With the end of the workpiece at either the front or back of the blade, rotate the blade (backward so that no wood is removed) until you find the tooth that hits the wood the hardest and makes a scratching sound. Mark that tooth with a piece of chalk, and move the stock to the other side of the blade.

Look and listen as you rotate the blade. If the blade is parallel to the miter-gauge slot, the marked tooth will hit the wood and make the same sound. If the tooth does not hit the stock (it probably won't), the blade and miter slot are not parallel.

To jigger the top into the correct position, slightly loosen the cap screws holding the top to the base. Now tap the tabletop in the desired direction, as shown in the photo at right, rotate the arbor, and listen to the sounds the sawblade makes against the test piece. When the sounds match at the front and back of the blade, tighten the bolts and recheck.

Final tightening is best done in several go-rounds. If you crank down hard on the cap screws and go for the maximum torque in one yank, the phenomenon known as creep can throw the top out of alignment. So tighten the screws in steps, going from one to another, just as you would tighten the lug nuts when changing a tire on your car. □

Kelly Mehler is the author of The Table Saw Book *(The Taunton Press, 1993) and a furnituremaker in Berea, Ky.*



Tap the edge of the table *to nudge the miter-gauge slot parallel to the blade.*