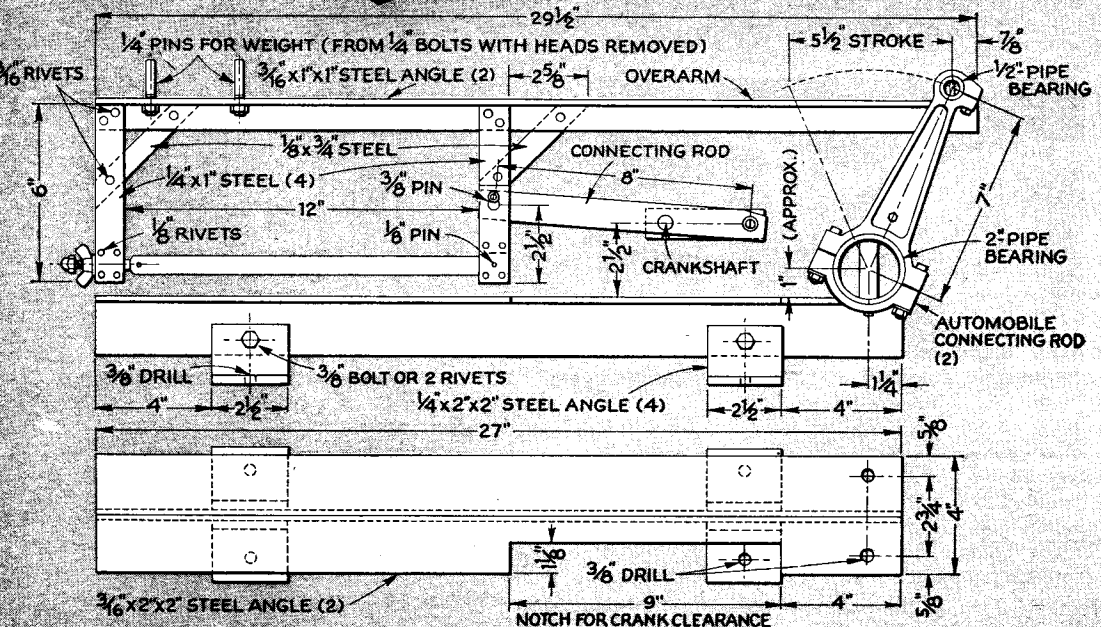
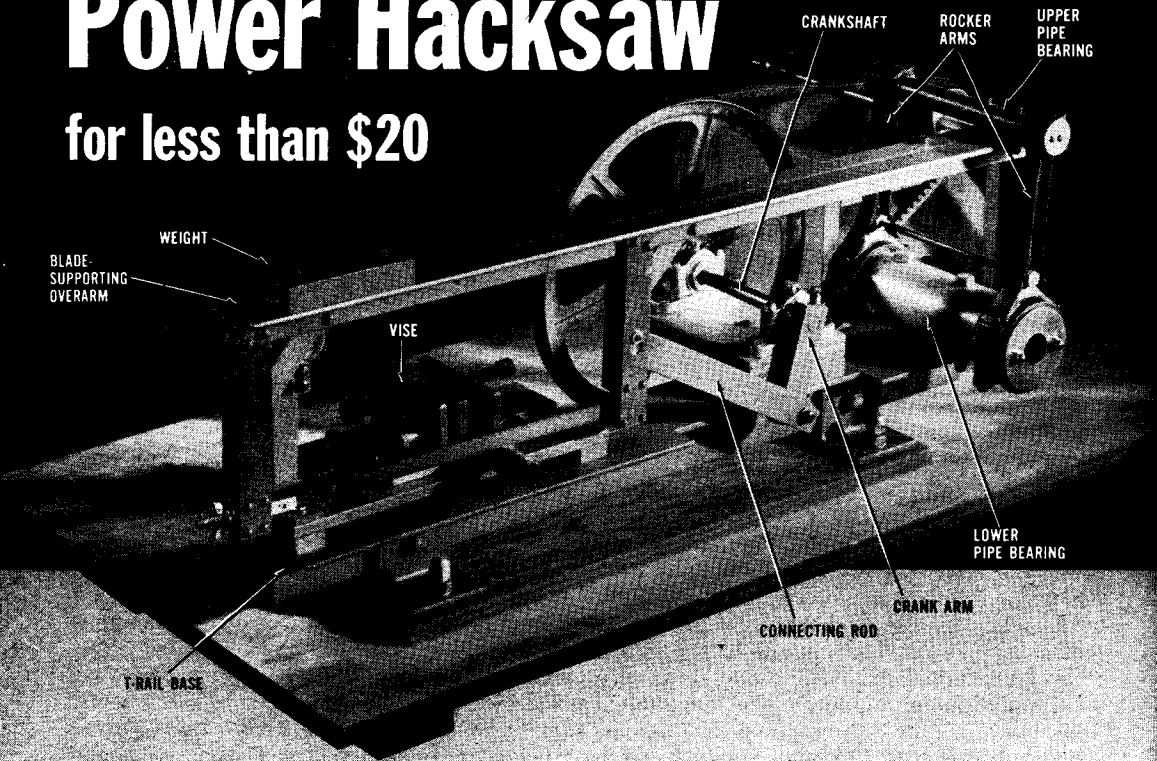
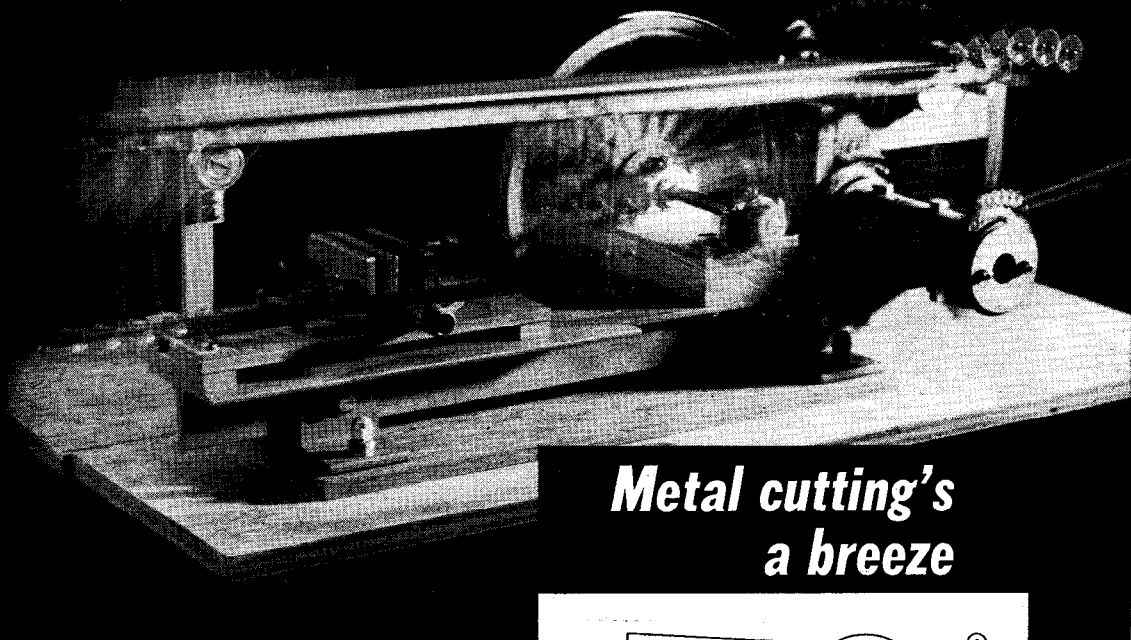


# Homemade

# Power Hacksaw

## for less than \$20





## Metal cutting's a breeze

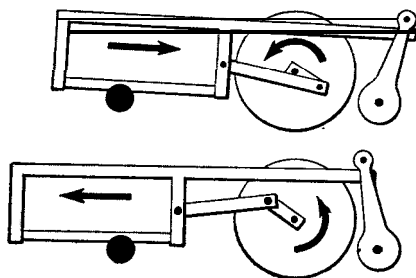
By Walter E. Burton

**H**ACKSAWING is the one onerous shop job for which there is no inexpensive and readily available power tool to ease the sweat. Commercially made power hacksaws are costly and aren't found in most home shops.

Here, however, is a new answer. After several years of building and experimenting, **POPULAR SCIENCE** experts have come up with a simplified design for a home-built power hacksaw at a cost that makes it a practical tool for any shop. All parts, except for the motor and pulley drive, can be assembled for less than \$20. Any  $\frac{1}{4}$  to  $\frac{1}{2}$ -hp. motor will run the machine. Any standard 12" hacksaw blade can be used in it.

In speed, accuracy, and capacity, the saw rivals even big commercial machines. It will cut stock of any size and shape up to 3" high and 4" wide. In tests, it proved so precise it sliced off disks from a solid steel bar as thin as .050".

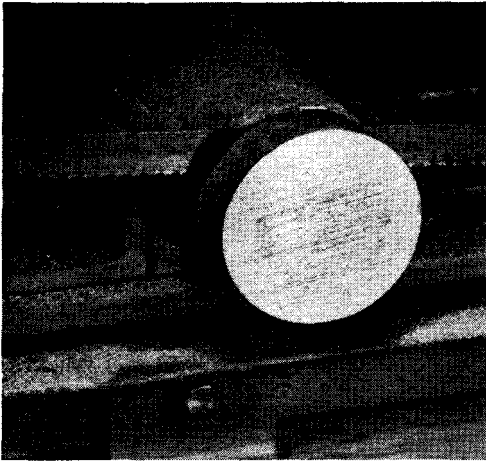
The secret of the saw's low cost is the use of stock materials plus a pair of old automobile connecting rods for the main rocker arms—the heart of the machine. No



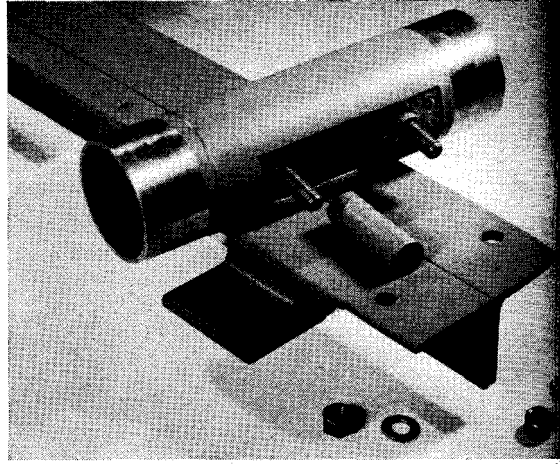
**Rocker-arm action is key to the saw's simplicity and accuracy. It keeps the blade rigid and at the same time lets it move back and forth parallel to the base.**

machining is necessary, and all parts are fastened easily with bolts or rivets. The base is simply a pair of 2"-by-2" steel angles pinned back to back to form a sturdy T-rail backbone. Four short sections of the same angle provide "feet" for the T rail. Everything else mounts on top.

The overarm that supports the blade is a similar T rail made of two lengths of 1"-by-1" angle. It's connected to the base rail at only one point—the pair of con-rod rocker arms. The rocker arms support the rear end of the overarm while a motor-driven crank moves the blade back and forth across the work, something like the piston in an engine.



**Big saw with a big bite:** This solid-aluminum rod nearly 3" thick is quickly sliced through under the tool's steady 60 strokes a minute.



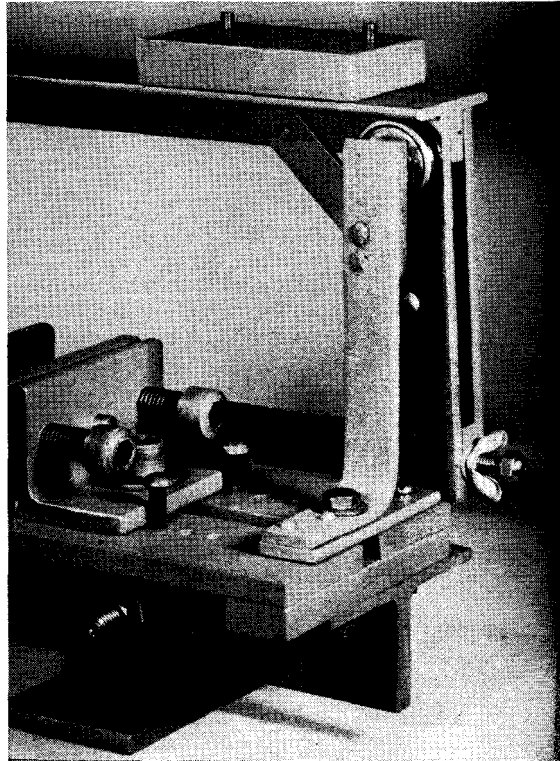
**Lower pipe bearing is notched  $\frac{1}{4}$ " deep to fit over the base.** Sleeves of "X" pipe keep the clamping bolts from distorting the bearing.

*Fitting the rocker arms.* The auto connecting rods give you a ready-made way of pivoting the saw's overarm rigidly and accurately. They can be scrounged from an auto junkyard for about \$1 apiece. Those shown here are from a '56 Chevy and have an operating length between centers of 7". Exact length, however, is not critical. The saw's height can easily be adjusted to suit any con rods you can find that are within an inch or so of the dimensions shown here. The rods are used just as they come except for drilling one hole in each near the large end for the  $\frac{1}{4}$ " cross bolt that serves as a spacer.

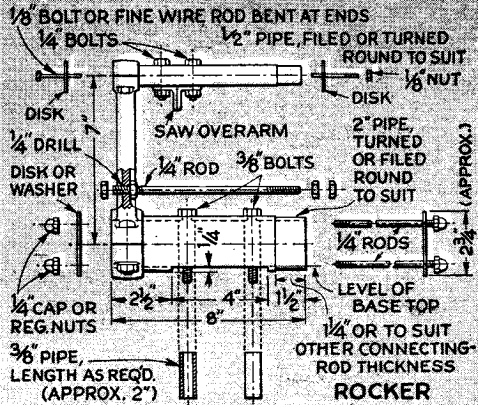
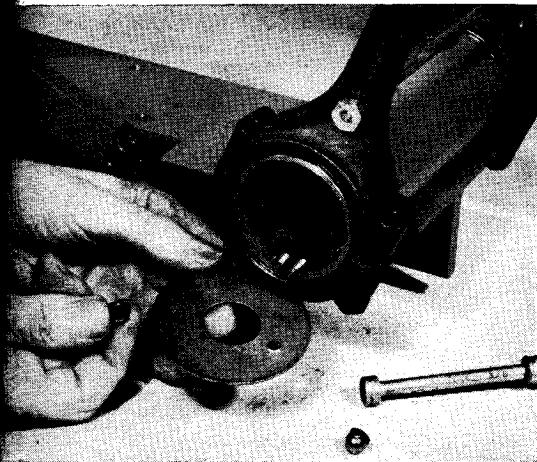
The lower ends of the con rods pivot on a bearing of 2" pipe. The pipe's outside diameter (2 $\frac{1}{2}$ ") is slightly larger than the openings in the con rods and must be slimmed down at the ends to a smooth, sliding fit. This can be done on a lathe or by careful hand filing.

The upper wrist-pin ends of the con rods pivot on a similar bearing of  $\frac{1}{2}$ " pipe bolted to the back end of the overarm. This, too, must be smoothed at the ends to a close fit in the rods' openings. Large washers or steel disks are used as end caps on both the upper and lower pipe bearings to keep the con rods from sliding off. Lubrication is through the existing oil holes in the con rods. You can enlarge them if you wish to admit an oil-can spout easily.

*Assembling the crank drive.* The  $\frac{1}{2}$ " crankshaft runs in two bronze pillow-block bearings mounted 4" apart on a platform

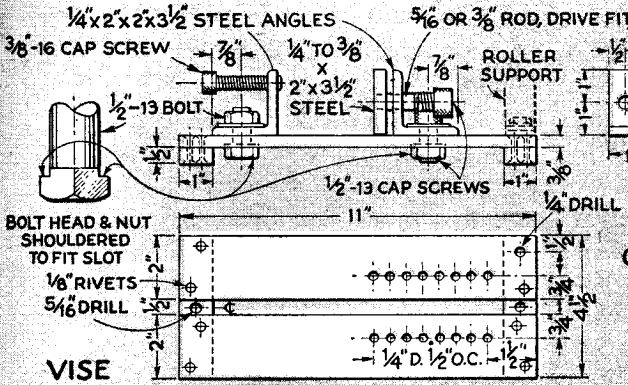


A roller bearing supports the overarm when the blade breaks through, allowing the arm to continue moving back and forth without dropping. The roller bracket is bolted to the front of the vise rails, which in turn are bolted to the T-rail base. Note weight on overarm to increase cutting pressure.

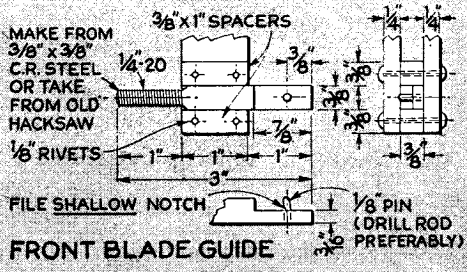
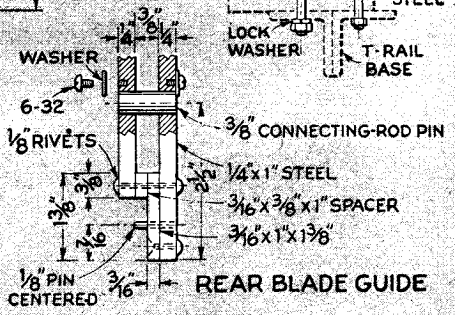
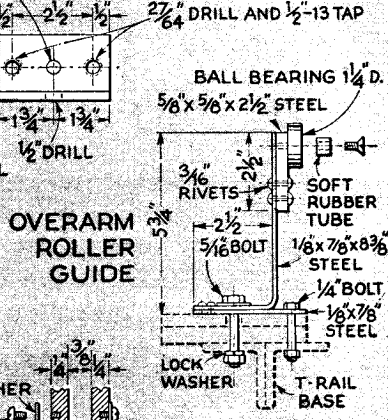
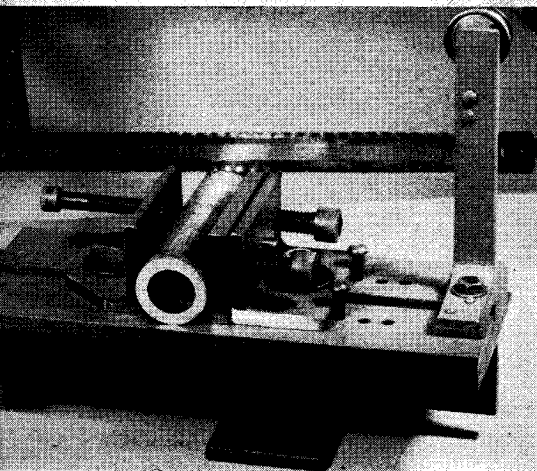


Rocker arms are held on the two pipe bearings by steel disks that form flanged end caps. Long threaded rods pass through the pipe sections to

hold the caps on. Note the one long spacer bolt between the rocker arms—the only modification you make to the automobile con rods.



Vise jaws—simply two short angle sections—are bolted to the two base rails through the slot between them. The movable jaw gets extra bracing against adjustable pins in the rails.



made of two thicknesses of  $\frac{3}{4}$ " plywood. The platform measures 4" by 5" and is bolted rigidly to the T-rail base.

Position the crankshaft so that when the arm is at 3 o'clock the front blade holder lines up with the front end of the T-rail base. The crank arm is pinned firmly to the

crankshaft with a  $\frac{1}{4}$ "-20 setscrew that locks into a hole drilled part way in the side of the shaft.

The connecting rod from the crank arm to the blade frame is a  $\frac{1}{2}$ "-by-1" steel bar notched at the end to fit between the two bars that form the rear blade-holding leg.

The con rod is linked to the crank and the blade frame by two  $\frac{3}{8}$ " drill-rod pins. The holes for these pins should be fitted with brass or bronze bushings reamed to a close fit. A brass or fiber washer  $\frac{1}{32}$ " to  $\frac{1}{16}$ " thick provides clearance between the crank arm and con rod. Note that the T-rail base must be notched out at the left side to allow clearance for the swing of the crank.

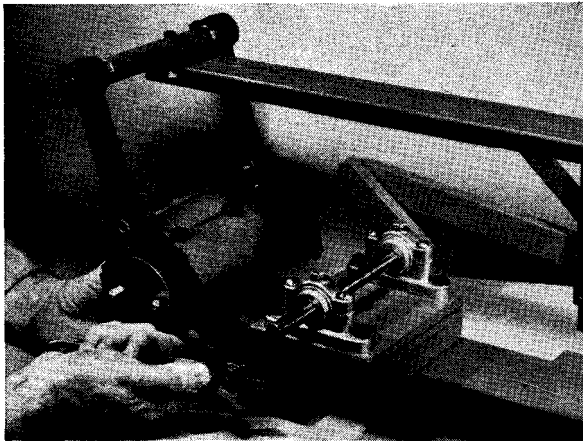
**Rigging the V-belt drive.** A n 11" pulley is mounted on the crankshaft at the opposite end from the crank arm. One belt runs from this to a 2" pulley on a jackshaft mounted in pillow blocks on a platform. A 14" pulley is on the other end of the jackshaft, and a second belt runs from this to a 2" pulley on the motor.

The result is a powerful two-stage reduction that, with a standard 1,750-r.p.m. motor, gives the saw a cutting speed of about 60 strokes a minute—correct for hack-sawing. You can use any combination of pulleys and jackshafts that result in a similar ratio. While the crank drive will work in either direction, it's best to rotate it counterclockwise as viewed from the crank end of the shaft. This causes the connecting rod to put a downward pressure on the blade on the forward cutting stroke.

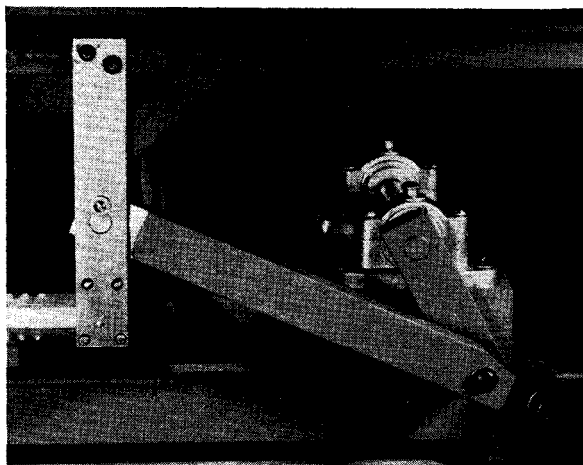
The platform that supports the jackshaft is simply a wood box screwed loosely to a wood base so it tilts slightly forward under belt tension on the shaft. By tightening or loosening the two rear screws, you can adjust the tension perfectly.

**The overarm support.** To keep the overarm from dropping all of the way down when the blade cuts through the work, a small roller is mounted on a bracket at the front.

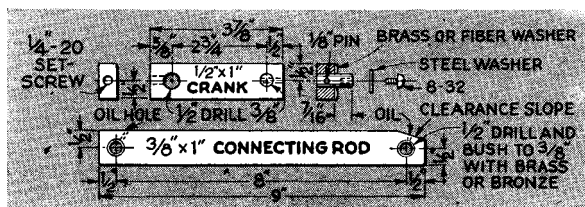
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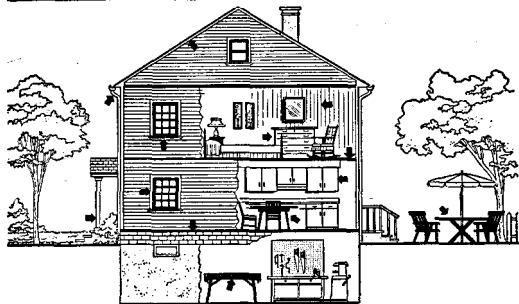
Crankshaft is mounted in pillow-block bearings on a platform of doubled  $\frac{3}{4}$ " plywood. It's important that the platform be bolted securely to the T-rail base, with the crankshaft precisely at right angles to the blade.



Simple crank mechanism moves the blade back and forth as the crankshaft is turned by the motor. Drawings below show how crank arm and connecting rod are linked by drill-rod pins running in brass or bronze bushings.



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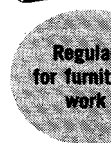
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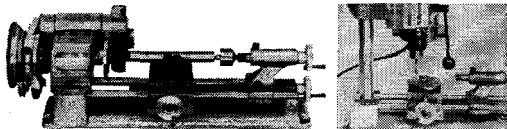


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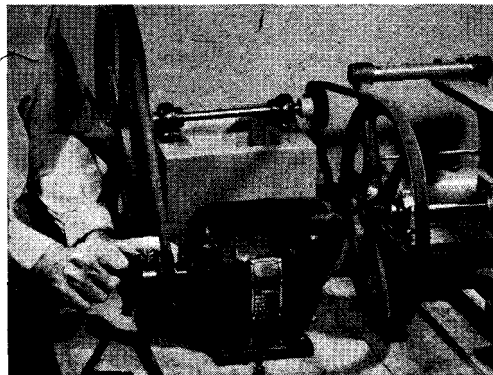
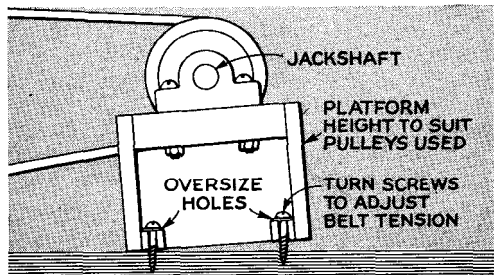
As the blade cuts through, the overarm drops gently onto this roller.

A sealed ball bearing makes an excellent roller, although you can use any small metal or plastic wheel. A short section of rubber tubing fitted into the roller's hole makes a cushioned hub for the axle bolt.

To increase cutting pressure, the overarm is weighted with a steel block. The one used here measures 1" by 2" by 4". It slips over two pins made of headless bolts screwed into the top of the overarm. You can experiment with other sizes of blocks.

**Making the vise.** This consists of a fixed jaw and a movable jaw made of 2"-by-2" steel angles. The jaws are mounted on two bars that serve as rails. The movable jaw can be locked with a cap screw and, for extra holding power, can be braced against pins dropped into holes in the rails.

A pressure plate on the movable jaw is adjusted independently with two cap screws after the jaw has been locked at a rough setting. A third cap screw in the fixed jaw bears against the pressure plate and keeps it from cocking when small stock is gripped.



Four-pulley jackshaft drive brings motor speed down to sawing speed. Note how jackshaft platform is tipped. By tightening its rear screws, you can vary the angle to adjust belt tension.