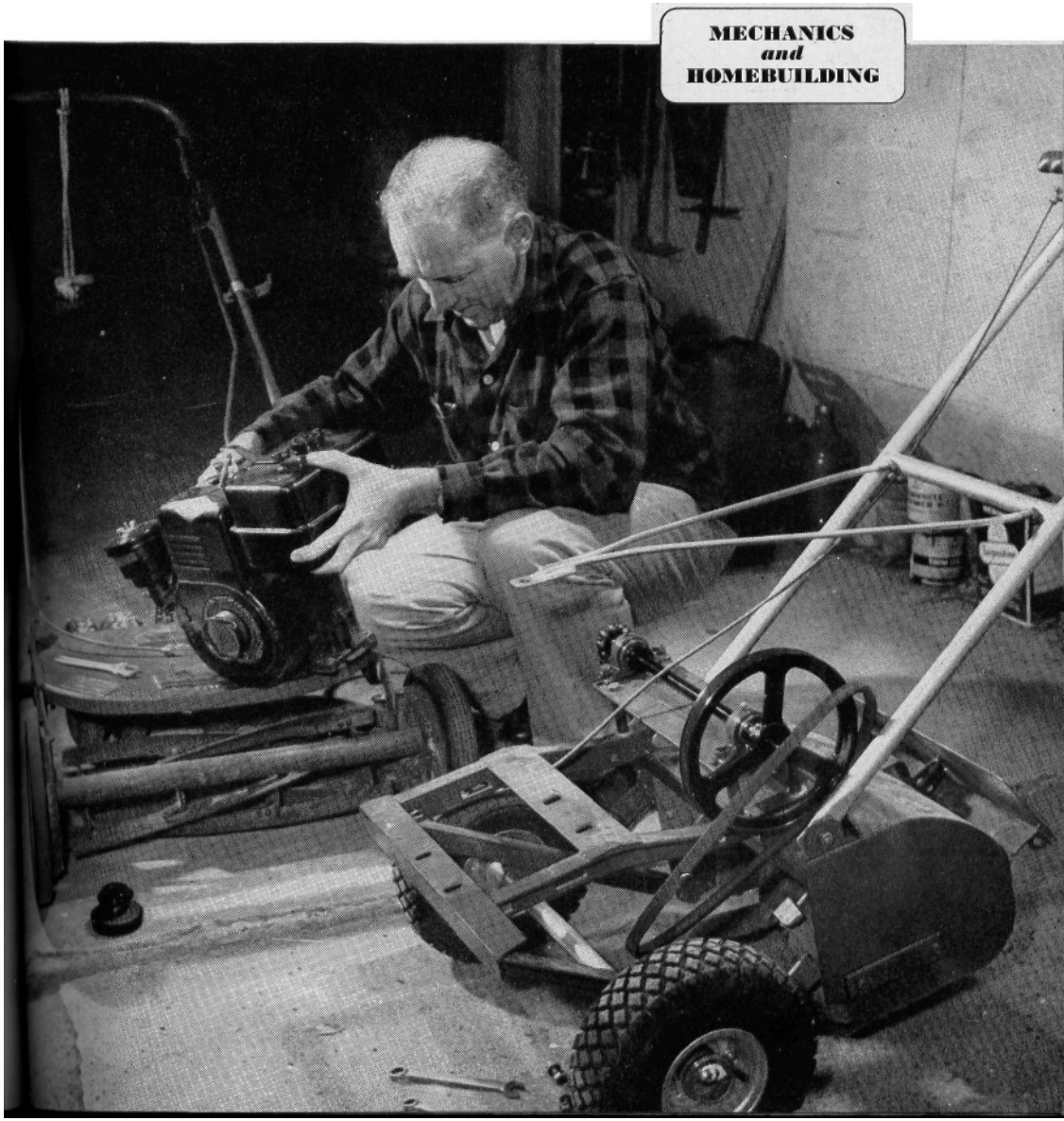
How to Build a Rotary Tiller

The *toughest part of the machine comes ready-made; powering it with the engine from your lawn mower cuts cost way down.*

By Howard G. McEntee

RIGHT around home you may already have half the makings of a rotary garden tiller. The engine of a gasoline lawn mower can be worked double shift to cultivate your garden as well as cut the grass. Switching it from mower to tiller, or back again, should not take more than 10 or 15 minutes.

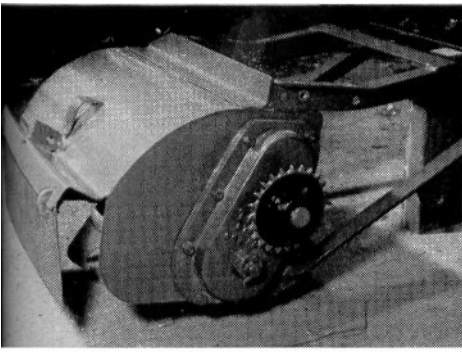
This two-for-one deal saves you the cost of a separate engine, and may put a tiller to work for you at just about half the price that you would otherwise pay. Nor need you be a mechanical whiz to build the machine; the most difficult



Tiller rotor is driven by a chain from the countershaft

PURCHASED TILLER and H-shaped tow bar are shown shaded in the drawing below. Pieces of angle iron are welded on to support the engine, wheels and countershaft. Adjust chain tension to leave ½" of slack as at right. If slots do not give enough adjustment, put washers under the spacers. Adjust V-belt tension by moving the engine backward or forward on its mounts.

Housing and rock guard protect the user



BOXLIKE TILLER HOUSING has a reduction unit with a 24-tooth sprocket mounted on its side. In the photo above, the tow bar, crosspieces and braces have been welded on, but countershaft is not yet in place. A hinged rock guard (at left in above photo) shields the user from flying dirt and stones. The machine propels itself; effort is required only to hold it back or guide it over the ground.

parts of it are available already made up.

These are the tiller-head components—the shaft and tines that stir up the ground. A national mail-order house sells a 12" head as an accessory for a small garden tractor.* Costing about $37, it is a well-made, neatly housed unit with hardened tines, good bearings, a built-in chain reduction and a rock guard. The tines are replaceable.

If your mower engine has a centrifugal clutch and you put l½"-wide wheels on the tiller, the total parts cost will run about $52. (The tiller shown cost more because it has heavy-duty 2½" wheels. These make it easier to handle in soft soil, but are by no means a must.) Welding will run four or five dollars if you don't do it yourself, but will still leave the total cost well below that of a comparable commercial machine.

Use all the pieces. With the tiller head you get a drive chain and an H-shaped tow bar for coupling to the tractor you haven't got. Both will be useful.

A boxlike angle-iron frame, to which the tow bar is meant to be bolted, is welded atop the tiller housing. The first thing to do is "unweld" this. Make center-punch marks along the weld beads, the diameter of a 3/16" drill apart. Run a drill that size in at 45°, just to the surface of the housing. Then use a diamond-tip cold chisel to cut through between the holes. Discard this frame.

Cut a piece of 1½" angle iron to span the full width of the housing, long enough to be welded to the ends as well as to the top. At one end, cut the vertical flange at a slant to clear the countershaft pulley.

Drill the top of the H frame for bolts to hold the countershaft mount. In the vertical flange of one frame leg, drill a hole for a handle bolt. The other handle mount is a 2" length of 1½" angle welded at the end of the housing.

The front crosspiece, a 15" length of angle, projects past the H frame on one side to line up with the housing.

Check your engine. This front crosspiece and the crossbar of the H frame form the engine mounts. The slots shown fit a Model 6 Briggs and Stratton engine; for others, minor changes may be needed.

By careful fitting and the use of extra brackets you could bolt the parts together. But welding makes the job

**Various attachments of this kind can be adapted. The drawings and construction methods described relate to Montgomery Ward's rotary-tiller attachment No. 87-5086 for the Til-Trac garden tractor. Semi-pneumatic 10"-by-1.75" wheels are available from various mail-order dealers at about $1.65 each.*

easier and results in a far stronger structure, with no bolts or rivets to work loose from vibration.

If you have the welding done outside, be sure to cut, drill and fit all parts beforehand. It's smart to clamp them up in a trial assembly. Scrape paint off the tiller head where welds are to be made. Remove the chain case and gasket so that welding heat will not damage the latter.

Wheels. Some commercial tillers have no wheels. But wheels give easier control of working depth, and facilitate moving the machine, especially over paved areas.

You can buy 10" rubber-tired wheels with a 1½" tread for less than two dollars apiece, or a metal-tired type made for wheeled garden tools for even less. For 10" wheels, weld the shaft hangers into the braces as shown in the drawing. For other sizes, locate them so that the engine will be level when the bottom of the tiller housing is about 1" *beneath* the soil. With the tines on a hard surface, the engine will slant forward. (As some will stall in this position when the fuel is low, it is important to have the engine nearly level in the working position.)

The drawing on the facing page shows the axle turned down and threaded at one end. You can, instead, use a shaft collar at both ends, and so avoid machining. Be sure to use the felt seals shown if your wheels have ball bearings, to keep grit out of them.

The power train. It takes considerable torque to spin the tined shaft; an over-all reduction of about 1:16 is required with a 1¾-horsepower engine. The reduction built into the tiller unit has a ratio of about 1:1.5. With an 8" pulley on the countershaft, the V-belt drive from the automatic clutch of the engine shown gives a 1:4.4 reduction. A 10-tooth sprocket on the other end of the countershaft drives the 24-tooth sprocket on the tiller head at a 1:2.4 ratio. Multiplying all the figures on both sides of the colon shows the over-all ratio to be 1:15.84.

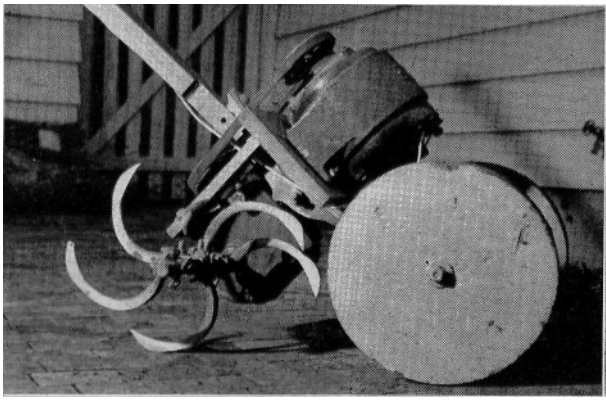
If your engine does not have a centrifugal clutch, you can install one or rig a belt-tightening idler controlled by a flexible cable. This is cheaper, but the centrifugal clutch is handier, giving you full control by use of throttle alone.

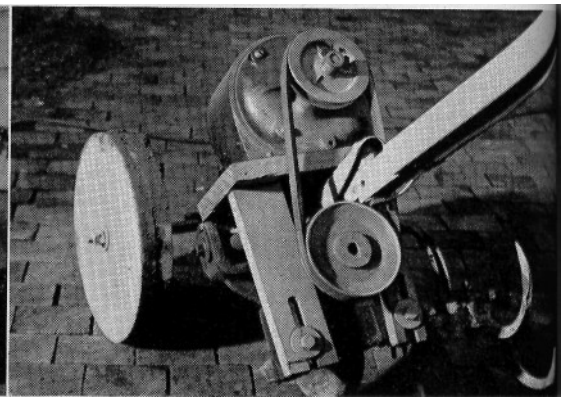
Mounting the countershaft. A 3/16" steel plate is mounted on the tow-bar legs with long bolts and spacers. Cut the spacers from 3/8″ pipe, taking care to get them all the same length. The bearings are bronze-bushed pillow blocks. Slots

A ¼-Hp. Motor Drives This Light-Duty Electric Tiller

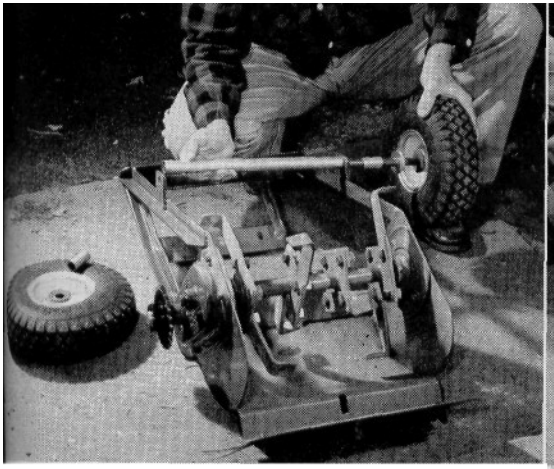
WANTING a light-duty rotary tiller, Everett M. Cronk of Ardsley, N.Y., made this electrified one. A V belt from its ¼-hp. motor drives what was once the wringer power take-off on a washing machine. Tines from a hand garden cultivator were fastened directly to the output shaft of this reduction unit, flats being filed on the shaft to key the tines securely to it.

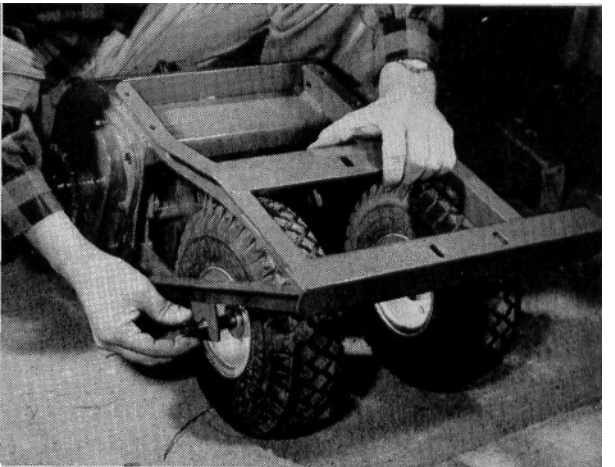
A wooden motor platform is mounted on two slotted posts, which can be slid up or down to adjust belt tension. The handle is from a lawn mower, the wooden wheels from discarded lawn furniture. Because the action of the offset tines tends to turn the machine, the builder plans to relocate the transmission to bring the tines closer to the centered handle. He also suggests using a smaller pulley on the motor shaft instead of the one shown, to further reduce rotor speed.



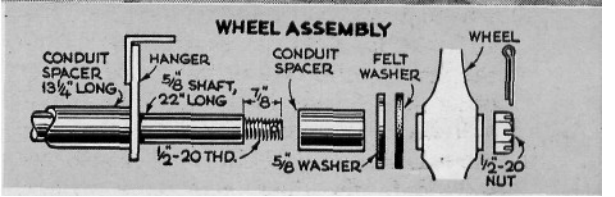


Wheels can be put inside for cultivating close-set rows





WHEELS ARE HELD ON either with a collar at each axle end, or with a collar at one end and a nut at the other, as in the drawing at right. Cut dust seals from 1/8"-thick soft felt. For narrow-row cultivation, use a 15" axle, a spacer to fit between the wheels when they are inside the engine-support frame (above right) and felt seals on both sides of the wheel hubs.



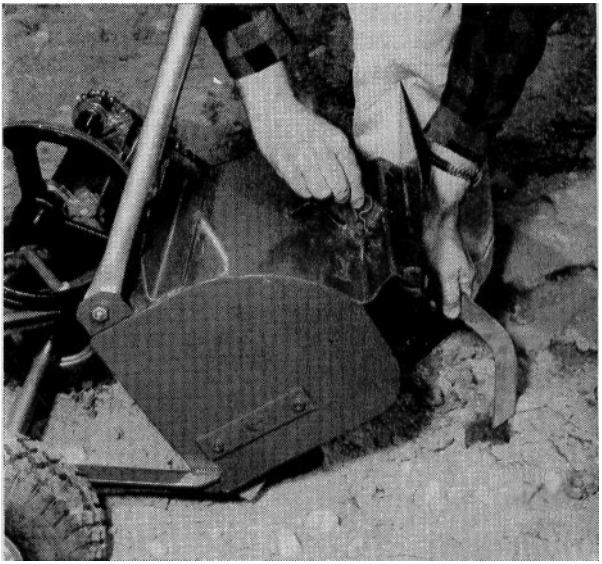
for the mounting bolts allow these to be slid forward or back to adjust chain tension. Make sure that the shaft turns freely after all the bolts are pulled tight.

The sprocket is best held on the countershaft with a taper pin. A setscrew will secure the pulley provided you drill a dimple in the shaft for it to seat in.

Both for your own safety and to keep sticks and gravel out of the chain, a guard should be fitted. Cut one flange off 1" angle iron where it is to be bent to a radius, as shown in the drawing on page 176. Use flathead bolts, with the heads countersunk inside the guard, to join the ends and attach mounting brackets, one above, two at the lower end.

Handle is brazed up. Cut ¾" electric conduit for the handle parts. Remove the zinc coating with abrasive cloth where the brazed joints must be made. Flatten the lower ends before drilling them for the 5/16" mounting bolts.

The bracing fork consists of two pieces of 5/16" rod bent, threaded and brazed to a 3/16" plate. This is clamped under one engine-head bolt. With a nut on each side of the handle crossbar, the fork can be adjusted to raise or lower the handle to convenient working height. Bolt the throttle control within easy reach and slip bicycle handgrips on the top bar. END



FURROWING GUIDE, provided with tiller head, can be set to hold tines at desired tilling depth, or it can be reversed with the hook forward as above. In this position it holds the machine back for deep cultivating or plowing.