HOMEMADE POWER CUTTERS for WEEDS AND GRASS

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THE WEED AND GRASS CUTTERS described in this circular were built and exhibited by farmers at the labor-saving shows held in 1944-45 by the Extension Service in Agriculture and Home Economics of the University of Illinois. They were of so much interest that many requests have been received for more information about them.

The machines can be made from parts that every farmer can readily find. Two kinds are shown: one has a mower type of cutter bar, and the other has a revolving cutter blade. When properly built, either machine does a satisfactory job of cutting weeds and grass.

The photographs and sketches give the essential features of these machines. They have not been drawn to uniform scale because that is not necessary in order to make their construction clear.

Engine. An air-cooled engine having 1½ horsepower and a variable speed governor supplies very satisfactory power for a 20- to 24-inch blade or a 30-inch cutter bar. Use a 2-inch or a 3-inch V-belt pulley on the engine.

Wheels. The wheels can be any size desired, but rubber or steel wheels 15 to 20 inches in diameter make the machines lighter and more easily handled. If high wheels are used, an adjustable frame can be made that will give the proper cutting height (Figs. 17 and 19) or a long cutter-blade shaft can be used (Fig. 21). Rubber tires are especially desirable on rough ground.

Frame. Angle iron or flat iron makes a good frame for the cutter. Build the frame narrow enough so that the wheels will not run over uncut material. Also make it as light as possible. Balance the engine and cutter on the axle for easy handling.

Make the handles adjustable for height if the machine is to be used by several persons.

When cutting tall weeds with a center-mounted cutter, it is a good plan to fasten an angling rod above the cutter mechanism to direct the weeds away from the uncut material (Fig. 21).

Bearings. Either metal or wood is satisfactory for the bearings for the shafts of the cutter-bar type of cutter. Anti-friction bearings are more desirable for the rotating type of cutter.

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MOWER TYPE OF CUTTER

For mowing weeds in fencerows, the mower type of cutter is probably more satisfactory than the rotating type. This is especially true if the cutter bar is made to extend out past the right wheel.

When cutting heavy wet grass, the cutter bar may clog. That is one reason why the rotating type may be the best one to build if much of this kind of work is to be done.

Under most conditions the mower type of cutter can be easily pushed along the ground without digging into it.

A wheelbarrow side-mounted cutter-bar mower with underslung mounting of parts. A 2-foot length of mower cutter bar, with the ends of the shoe cut off, is bolted to the platform. The sickle is driven with a short pitman rod by means of a crank arm and shaft mounted in two wooden bearings. An 8-inch to 12-inch pulley gives the right speed.

Side view of Fig. 1 showing mounting of motor and crank assembly. It is best to use adjustable straps.

Top view of Fig. 1 showing the mower, sickle, pitman, and crank-drive assembly. The 3-inch stroke of the standard mower sickle may cause too much vibration if the sickle is not operated at the correct speed. To lighten the cutter bar, cut 2 or 3 inches from the back of the bar with an acetylene torch.
Mower with center-mounted cutter bar, heavy construction. A combine cutter bar, sickle, drive link, bell crank, pitman, and V-belt pulley are used. The 30-inch cutter bar is extended past the right wheel to allow mowing under fence rows. The mower should cut ahead of both wheels.

Top view of the machine shown in Fig. 4. The frame bars are bolted to the cutter bar. A cutter bar with the guards spaced 1 1/2, 2, or 2 1/2 inches apart and with a stroke of the same length gives better cutting and less vibration than when the guards are spaced 3 inches apart. The guards on a mower cutter bar are often spaced 1 1/2 inches apart for use with a standard sickle.

MAKING A CUTTER BAR

A cutter bar from a combine can be used for this machine. Or if a heavy bar is desired, the inside 2 feet from the cutter bar of a mower can be used (Figs. 1 and 3). To reduce its weight, part of the back of the heavy cutter bar can be cut off with an acetylene torch.

To make a complete cutter bar, start with a piece of flat iron about 1/2 inch thick and 1 1/2 inches wide. Cut a piece 30 inches long. Bolt to this bar the guards wearing plates and clips (Fig. 6).

It is best to use guards spaced 1 1/2 or 2 inches apart. At this distance they will do a cleaner job than if spaced 3 inches apart, and they will not vibrate as much. (On many newer farm mowers the guards are spaced 1 1/2 inches apart for use with the regular mower sickle.)

A regular 6-foot sickle will make two 30-inch sickles for the weed mower. A shaft speed of 350 to 425 r.p.m. (revolutions per minute) gives satisfactory cutting. An 8- to 12-inch pulley on the pitman drive will give the desired speed.

THREE KINDS OF SICKLE DRIVES

There are three ways to make a drive for the mower type of cutter-bar sickle.

1. Use a crank arm and a shortened pitman rod (Figs. 1, 2, and 3).

2. Use combine parts, such as the bell crank, connecting link, pitman, and V-belt drive pulley (Figs. 4 and 5).

3. Use a crank arm in a slotted drive (Figs. 7 to 11).
Top view of a simple and easily constructed center-cut mower with a slotted sickle drive. A straight shaft with a crank on one end is mounted on the frame to drive the sickle by means of a vertical drive slot. The sickle can be driven from the center or the end.

The construction and mounting of the drive slot is more clearly shown in this drawing. A hardened roller from the drive clutch of a corn-planter plate shaft can be used in the slotted drive.

A vertical shaft and crank that drives the sickle thru a horizontal slot is simpler to construct. This machine can be changed to a revolving cutter by substituting a vertical shaft and cutter-blade for the parts shown.
MAKING THE DRIVE SLOT FOR THE CRANK ARM

The construction of a drive slot when a crank arm is to be used for the sickle drive is illustrated in Figs. 7 to 11.

Take a piece of ¾-inch angle iron and weld it to a flat strap. Then fasten the strap to the top of the sickle with 4 rivets. The side pieces forming the slot must be strengthened as shown in Fig. 9.

If the drive shaft is to extend straight back, the slot must be about 7¾ inches high. This height is necessary in order to let the 10-inch drive pulley clear the ground.

If a universal joint is used in the drive shaft, the slot can be shortened and set at an angle (Fig. 10). The pulley shaft can then be mounted in a horizontal position and placed high enough for pulley clearance.

A simple way to build a slotted drive for the sickle is to mount the crankshaft drive in a vertical position (Fig. 11). To prevent clogging or wrapping, place a shield around the drive.

A hardened roller from a corn-planter clutch can be used on the end of the crank arm to drive the sickle slot. A crank arm can be made by welding a short piece of shaft of the right diameter along the side of the main drive shaft.

By taking off the crank drive and cutter bar and substituting a vertical shaft and cutter blade, the machine can be converted into a rotating type of cutter.

ROTATING TYPE OF CUTTER

The rotating cutter is very satisfactory for both weeds and grass. It is a much lighter machine than the cutter-bar type, and it is also much easier to handle. A supporting runner (Figs. 21 and 22) will keep it from digging into the ground.

For safety purposes, the blade of this cutter should be shielded as much as possible. Since it turns at a speed of 1,500 revolutions per minute or more, it will throw rocks and other objects with a good deal of force. It is therefore dangerous for anyone to stand in front of this machine while it is running.

This weed and grass cutter, with a revolving blade, is simple in design and easy to build. The blade is driven at a speed of 1,500 r.p.m. (revolutions per minute) or more, and has tremendous cutting force. When this machine is used for cutting weeds, the front is left unprotected. When used for grass, a shield could be placed clear around the blade and a castor gage wheel or runner used.

A saw mandrel drives the blade, which is made from a spring leaf. If sickle sections are riveted to the ends of the blade, the blade does not need sharpening.
(Rotating Type of Cutter, Continued)

THREE WAYS TO BUILD THE DRIVE SHAFT

1. Mount a small saw mandrel with inclosed ball bearings on a vertical plate attached to the frame (Figs. 12 and 15).

2. Take a water pump from an engine and bolt it to the cutter frame. Then attach the cutter to the lower end of the shaft (Figs. 13 and 14). If the pump shaft is too short, make a new shaft of the right length to fit.

3. Use the front hub and bearings of an automobile instead of the water pump. A very heavy and durable type of drive (Figs. 17 and 18) can be made in this way. A new drive shaft must be machined at one end to fit the bearings and drive pulley. To make the drive lighter and more compact, take the brake drum off the hub.

13 This side view of a revolving weed cutter shows how a gage wheel gives an even cutting height. A castor wheel makes the cutter easy to operate. An engine water pump with an extended shaft drives the cutter blade.

14 This is a larger view of the water pump and shaft drive for the rotating blade. If the pump uses a short shaft, a new and longer shaft may have to be substituted for the regular one.

15 These two views show how the mandrel drive for the rotating blade is built and mounted. On this type of machine the wheels should, if possible, be mounted to run inside the cut of the blade.

16 A good revolving cutter can be made by taking a 15-inch or 16-inch colter and riveting to it 3 or 4 mower sickle sections.
(Rotating Type of Cutter, Continued)

TWO WAYS TO BUILD A ROTATING BLADE

1. Use a single blade (Figs. 12, 13, 15, 18, and 21). The blade for this type of cutter is 18 to 22 inches long. It is made either straight or with curved ends (Figs. 15 and 22). Since the blade cuts at its outer ends, it will do satisfactory work whether it is straight or curved.

The curved blade is sharpened back past the curve. The straight blade can be sharpened, or a sickle section can be riveted at each end to do the cutting if the blade itself is not sharpened.

The spring from the seat of a farm wagon makes a strong, light blade with a hardened cutting edge. All types of cutter blades must be well balanced.

2. Use a disk (Fig. 16). Another type of cutter blade can be made by riveting 3 or 4 sickle sections to a rolling-colter blade. The colter blade should be 15 or 16 inches in diameter. This type of cutter is heavier than the single-blade machine and may need more power.

Shield gives protection. A shield should be placed back of the blade to protect the person operating the machine (Fig. 12).

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\text{AUTOMOBILE WHEELS ARE USED FOR THIS MORE HEAVILY BUILT REVOLVING TYPE OF WEED CUTTER. AN ADJUSTABLE MOUNTING IS NEEDED FOR THE PLATFORM WHICH SUPPORTS THE MACHINE. THE FRONT WHEEL HUB OF A CAR, WITH ITS ROLLER BEARINGS AND SPECIALLY FITTED SHAFT, PROVIDES STRONG CONSTRUCTION. THE CIRCULAR SAW IS PROBABLY NOT SO GOOD FOR CUTTING WEEDS BUT IT DOES A GOOD JOB OF CUTTING SCRUB BRUSH IN PASTURES.}
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\text{DETAILS OF CONSTRUCTION WHEN THE FRONT-WHEEL HUB OF AN AUTOMOBILE IS USED. THE HUB HAS TWO TIMKEN BEARINGS AND GIVES A VERY STURDY DRIVE WHEN A NEW SHAFT IS MACHINED DOWN TO FIT THE HUB. A PLATE IS WELDED TO THE BOTTOM OF THE SHAFT AND THE CUTTER KNIFE IS BOLTED TO IT. THE CURVED BAR Shown WITH A SICKLE SECTION ON EACH END IS SAID TO REDUCE CLOGGING.}
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The Department of Agricultural Engineering of the University of Illinois can assume no responsibility for the satisfactory performance of machines that may be built from the designs shown in this circular. Their efficiency and safe operation will depend on the skill of the builder and the judgment with which they are used. Commercial cutters of the types shown are no doubt more satisfactory than homemade machines, but not many are now available.
(Rotating Type of Cutter, Continued)

TO CUT WEEDS TO EVEN HEIGHT

A gage wheel (Fig. 13) or a runner (Figs. 21 and 22) will keep the blade at an even height and also keep it from digging into the ground. The runner type of gage runs on the cut ground. It is lightweight and works well under all cutting conditions.

TO SHOVE TALL WEEDS TO ONE SIDE

A round rod frame fastened at an angle across the front of the machine will prevent tall weeds from falling in the path of the machine after they are cut (Fig. 21).

TO PREVENT WRAPPING

To prevent grass from wrapping around the rotating shaft, place a small shield around the front of the shaft and extend it down to the blade. Or place a loose piece of pipe over the lower part of the shaft and let it rest on the blade.

This rotary cutter is built especially for grass. The two gage wheels at the front carry much of the weight. A curved cutter knife is used.

A runner to support the lower end of a revolving cutter can be either looped at the end (upper drawing) or made without a loop (lower drawing). The runner is made of ½-inch round iron. It is fastened to the lower end of the drive shaft thru a small ball bearing, which has a dust-proof top. The bearing is pressed on the end of the revolving shaft and held by a clamp in a cup which is welded to the runner. Place a grease fitting on the back of the cup.

This machine is mounted on bicycle wheels. Note rod placed above the cutter at the front to push the weeds to one side. Also note the runner for the rotating blade.