

Conversion of a Leaf Shredder/Wood Chipper into a Grain Thresher

Allen Dong and Roger J. Edberg, I-Tech, P.O. Box 413, Veneta, Oregon 97487
This invention was declared public domain August 1994, a gift to humanity.

A portable, engine driven thresher can be made by modifying a leaf shredder/wood chipper or a hammer mill. Small shredders/chippers use 5 to 8 horsepower gas engines that rotate at 2800 or 3600 revolutions per minute (rpm). The modification requires:

- Converting the free swinging hammers into rasp bars,
- Reducing the rotational speed of the hammers (250 to 1000 rpm on a 12 inch diameter hammer arms), and
- Altering the discharge port to allow smaller, threshed material to pass through a 3/8 to 3/4 inch screen while retaining larger materials
- (Optional) if electricity is accessible, the gas engine can be replaced with a 1/2 to 3/4 horsepower capacitor start electric motor (1725 rpm).

Materials:

- A 5 horsepower, 2800 rpm "Roto-Hoe model 500" leaf shredder/wood chipper is used (Figure 1). Additional parts include:
- Four 2-inch C clamps (A),
- Six 5/8 x 3 inch bolts (B),
- Six 1/8 x 1 inch cotter pins (C),
- One 5/8 inch inside diameter x 18 inch drip irrigation tubing or garden hose (D) as spacers between hammers, and
- One 8 x 10 inch sheet metal or cardboard (E) to block the slotted portion of the leaf shredder/wood chipper exit port.

Modification:

The "Roto-Hoe" shredder has six sets of three free swinging hammers (F). Convert the six sets of hammers into six rasp bars as follows:

- Cut the 5/8-inch tubing (D) in segments to fit between the free-swinging hammers (F).
- Tie the free swinging hammers (F) together by inserting the 5/8 inch bolt (B) into the hole of the first hammer, followed by a segment of tubing (D) as spacer, then another hammer, followed by a second segment of tubing, followed by the third hammer.
- Drill a 5/32-inch hole on the threaded portion of the bolt that protrudes from the third hammer.
- Reassemble the bolt, hammers, and spacers together and lock the bolt in place with the cotter pin (C) installed in the 5/32-inch hole. This assembly constitutes a rasp bar.
- Repeat the above procedure and tie together the remaining five sets of free-swinging hammers.
- Manually rotate the rasp bars and check for clearance between the rasp bars and the walls of the threshing chamber. If there is insufficient clearance, adjust the bolt position, grind the bolt head, or cut the bolt length to obtain the necessary clearance between the rasp bars and the walls.

The Roto-Hoe shredder exit port consists of a slotted section and a 3/4-inch diameter punched-hole screen. Use the sheet metal or cardboard (E) and C clamps (A) to block the slotted portion of the exit port (G). The threshed grain exits through the 3/4-inch holes. Start the engine and spin the rasp bars. Again, check for clearance between the rasp bars and the walls of the

threshing chamber. If there is a knocking sound, grind the bolt down to obtain the necessary clearance.

Operation:

Start the engine and spin the rasp bars. Dried plant materials with vines, stems, and leaves are fed in batches through the hopper. After threshing for 1 to 3 seconds, open the top door to eject the longer vines, stems, and leaves that have not been chopped up. Seeds and small bits of plant material exit through the punched holes at the bottom. The mixture of seeds and plant material must be separated after threshing.

The 3/4-inch diameter holes in the exit port are suitable for larger seeds (e.g. beans) and seeds with loosely attached husks (e.g. wheat, bok choy, and amaranth). Small seeds and seeds with tight husk or pods (e.g. barley, clover and radish) require smaller diameter exit holes to retain the larger unthreshed materials while passing the smaller threshed grains. This can be achieved by attaching a screen with smaller openings under the 3/4-inch diameter punched holes.

Larger seeds crack easier than smaller seeds. Reduce the rasp bar speed to decrease the percentage of cracked seeds. Use a larger pulley (H) and/or reduce the engine speed to achieve the desire rasp bar speed:

- 250-400 rpm for beans and large seeds
- 400-800 rpm coriander, radish, sunflower
- 600-1400 rpm wheat, oats, barley, rice and small seeds

Typical threshing rates are:

- Seeds Pounds of seeds per hour,
- Amaranth 66
- Bok Choy 22 to 30
- Oats 94
- Pinto bean 117
- Soy bean 81 to 127

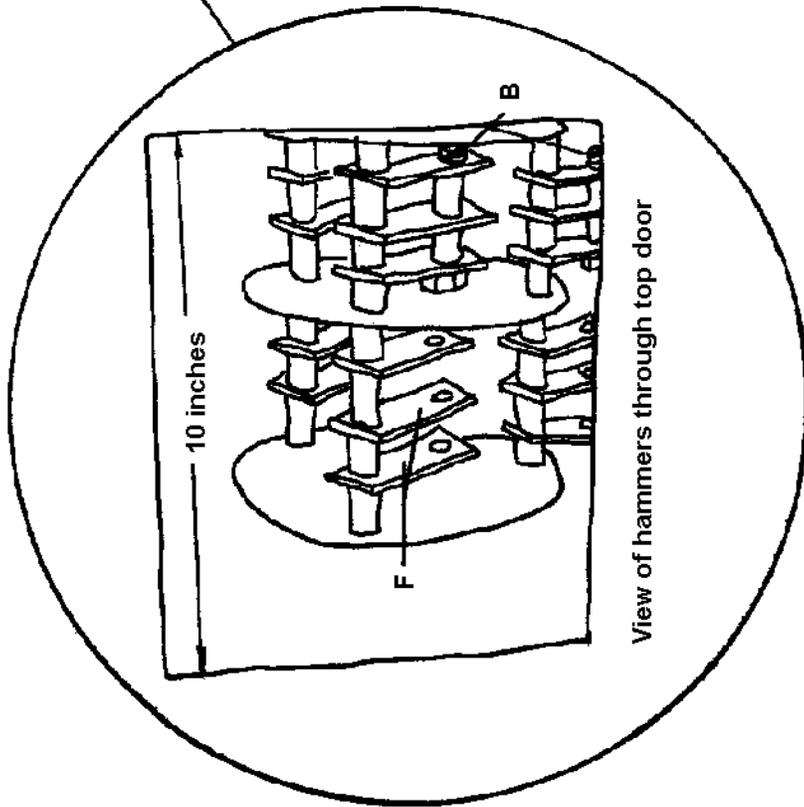
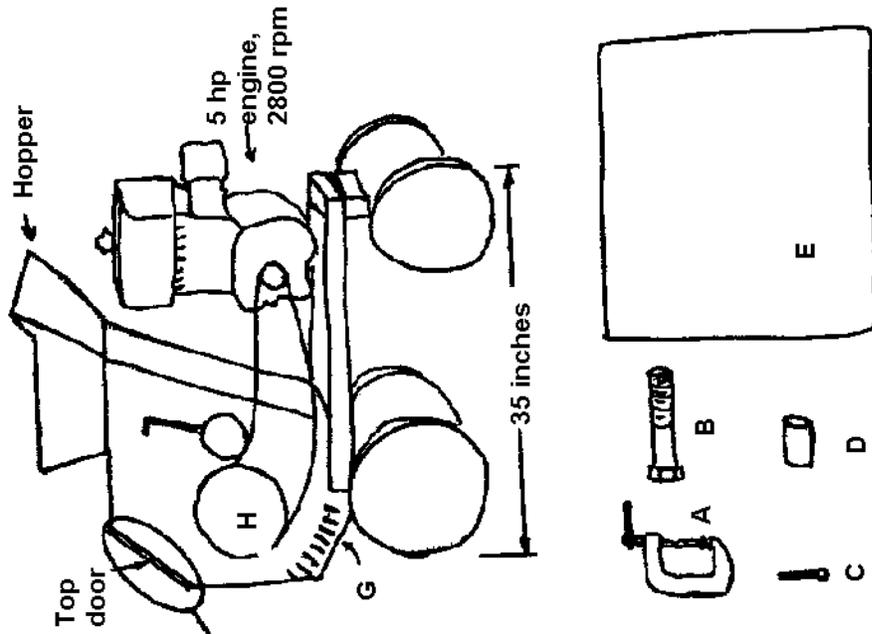


Figure 1. Grain thresher from a leaf shredder