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Poultry Feed Grinder VITA Technical Bulletin 31

by: Frank Redeker

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# TECHNICAL BULLETIN 31

## Poultry Feed Grinder

**FRANK REDEKER**

This is a plan for a grinder used to prepare feed for poultry. The grinder as shown here is relatively easy to construct and was put together using tools and equipment likely to be available in a large village.

The grinder, designed for use with a small motor, was originally constructed to respond to a request which came to VITA from Ghana. VITA Volunteer, L. Z. Eggleton, a specialist in poultry marketing at Iowa State University, worked with Redeker, an agricultural engineering student and with Redeker's professor, Wieliard Anderson.

The prototype machine was taken to Yucatan, Mexico, where it was adapted to hand cranking as illustrated.

Please send testing results, comments, suggestions and requests for further information to:

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## GRAIN GRINDER

### Specially Constructed Parts:

|                                   |     |                        |     |
|-----------------------------------|-----|------------------------|-----|
| 1. Side plates                    | SP* | 7. Lower delivery form | LDF |
| 2. Rotor drum (4 1/2" O.D.)       | RD  | 8. Hopper              | H   |
| 3. Stator (from 5 1/4" O.D. tube) | S   | 9. Adjustable side     | AS  |
| 4. Rotor face discs               | RFD | 10. Adjustment link    | AL  |
| 5. Upper delivery form            | UDF | 11. Baseboard          | BB  |
| 6. Deflection scoop               | DS  |                        |     |

\*As designated on drawing

### Standard Items:

12. Rotor shaft: 3/4" diam. and 10 1/2" long.
13. Clamp-bolts (4) 5/16" diam. and 6 1/4" long.
14. " " (2) 1/4" diam. " " " "
- Bolts are threaded at both ends. Half an inch of threading for most. Baseboard bolts call for 1 inch.
15. Clamp-bolts (1) 1/4" diam. and 2 7/8" long-(threads to 3/8 inch)
16. Nuts for 5/16" screws (14)
17. Nuts for 1/4" screws (6)
18. Two suitable 3/4" ball-bearings (with holders)
19. Two attachment screws for the hopper - 3/16" diam. and 3/8" to 1/4" long.

### Construction Procedure:

Side plates (SP): After clamping two suitably sized 1/4" thick plates together, cut and drill the holes according to the dotted outline on p. 1, which will provide the pattern. The identity of the two plates is more important than the accuracy of the shape and the hole positions.

Rotor drum (RD): The rotor drum (RD) is rough-cut as a piece of 4 1/2" o.d. steel tubing, slightly over 5" long. Mount it on a lathe and face it to a length of 5". This is the rotor drum.

Drill two rough-cut discs with central holes 3/4" in diam., and weld them onto the shaft (12) with a space of 4 3/8" between them. Weld from the inside only. The shorter end of the shaft should protrude 1 1/2".

Turn the discs by the shaft on the lathe and trim them to fit the inner diam. of the drum. They should each be inset by about 1/16". The rotor drum is now a rigid unit.

Stator (S): Face the larger (5 1/4" o.d.) rough-cut tube to a 5-inch length. Cut and shape the stator as indicated on p. 1. Avoid twisting it. Most of the lower semicircle should have its o.d. approximately 3/16" greater than the o.d. of the rotor drum. The upper 2 to 2 1/2 inches must be suitably flattened to the degree called for by the diagram.

Parts 5 (UDF), 6 (DS) and 7 (LDF): These are shown in the assembly on p. 1 and half size on p. 2. They are all to be cut from 1/8" thick sheet and should be accurately 5" wide. Their lengths are not critical. Shape them as in the diagram on p. 1. The welding on of the clamp bolts is postponed till the initial assembly. (The stator (S), upper deliver form (UDF), and deflection scoop (DS) are to have clamp bolts (CB).)

Hopper (H): Is to be shaped as indicated on p. 2, with the dimensions shown on p. 1. Holes for the two attachment screws may be of 3/16" diam. and counter-sunk with centers about 1/4" from the lower edge. The adjustable side (AD) is to be 2" wide (9).

Adjustment links (AL): Cut from 1/4" thick steel as shown on p. 2 (full size). Round off the 1 1/4"-long end by grinding or filing to approximately 5/16" diam. and thread it for 5/16" nuts. The lug (L) should be made ready with a 11/32" hole centered 3/8" from its lower edge. It may be 1" wide (perp. to the figure). Its upper edge should be suitably shaped for welding to the stator. It projects (at the left) 7/8".

Baseboard (BB): May well be made of wood. The length may be 12 to 18" as needed to accommodate a 1/3 h.p. motor.

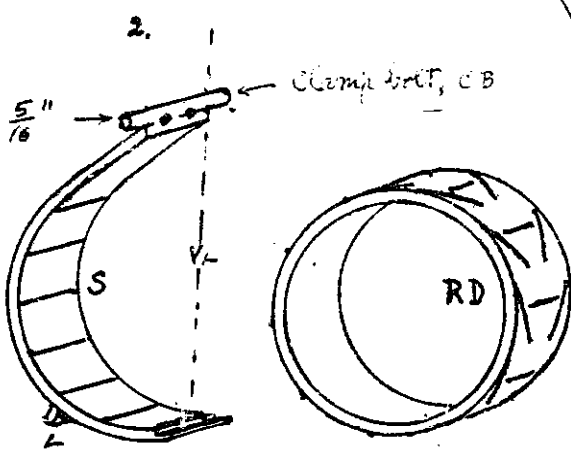
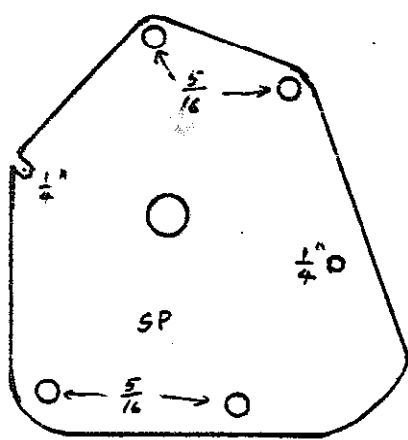
Initial Assembly:

- a. All the parts shown on p. 1 except the hopper and the UDF, and the second nut on AL are clamped in their proper positions against the 5" width. The bolts should project equally through the two side plates.
- b. Make positioning weld-attachments for the clamp bolts onto S and DS, and for L on S.
- c. Declamp enough to remove the baseboard and AL, and put in UDL in a reversed position (its upper tip projecting outward). Tighten again and make positioning welds for the LDF on S and the UDF on its clamp bolt.
- d. Disassemble and complete the welds (W). In the hopper the clamp bolt may be welded onto AS directly in one operation.

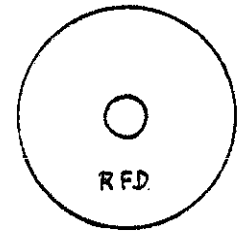
Final Fittings and Adjustments:

- a. In the middle region of the head formed by the welding of the clamp bolt to S, flatten the "right" side to make a face parallel to the vertical line (VL). Drill and tap out two holes for the hopper attachment screws (19) as indicated on p. 2.
- b. Using surface hardening rods, weld on the ridges for S and RD. Check the direction of turn with motor. (see p. 3)
- c. Mount the rotor in the lathe and reface both edges of the drum, leaving gaps of about 1/64" to allow free turning.
- d. It will probably be necessary to grind down the weld ridges to a near uniform height - say about 3/64". The final adjustments and trials after mounting with the ball bearings are matters for the person making this grinder to handle. Suitable pulleys will be needed.

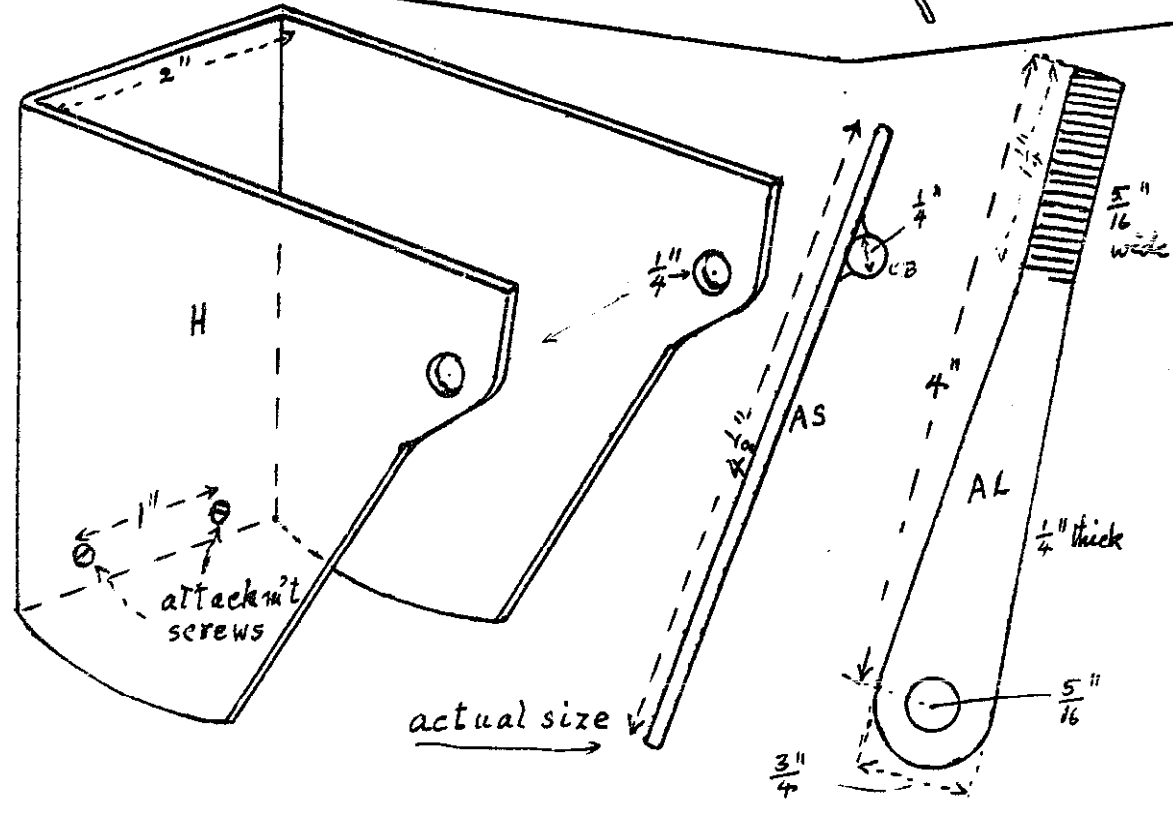
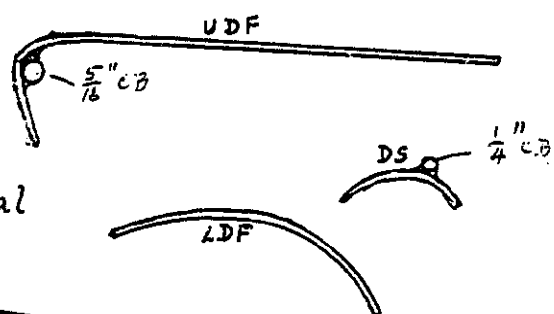




$\frac{1}{3}$  actual size



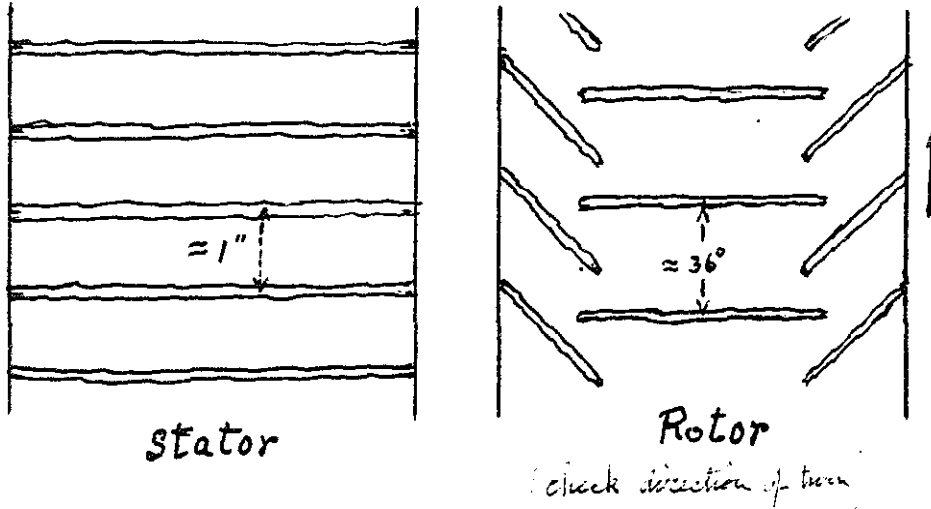
Half actual size



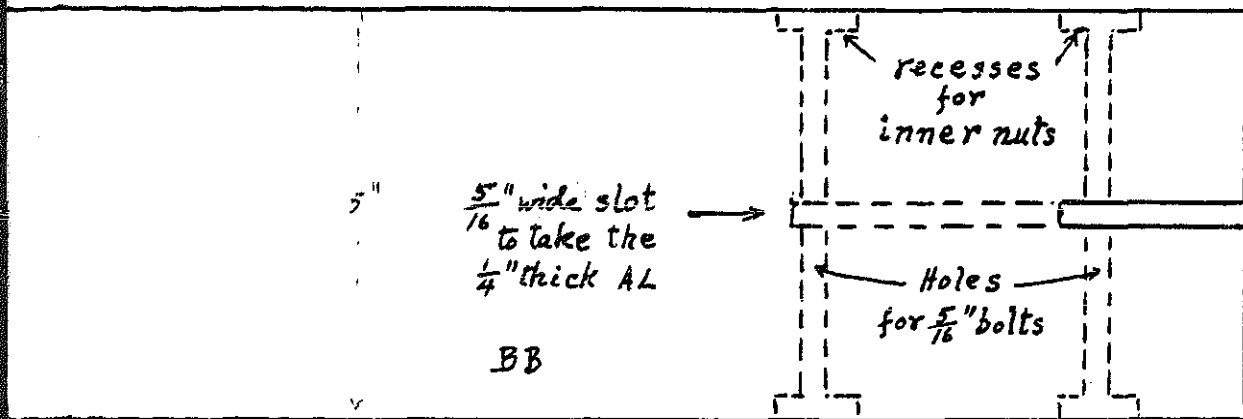
actual size

3.

Scheme of welded ridges



(Half actual size)

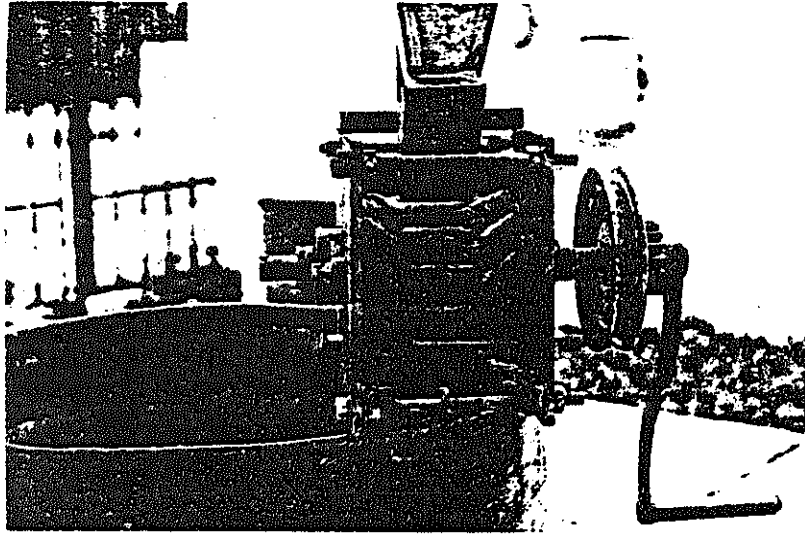


Plan of base-board

FEED GRINDER ADAPTED FOR HAND CRANKING

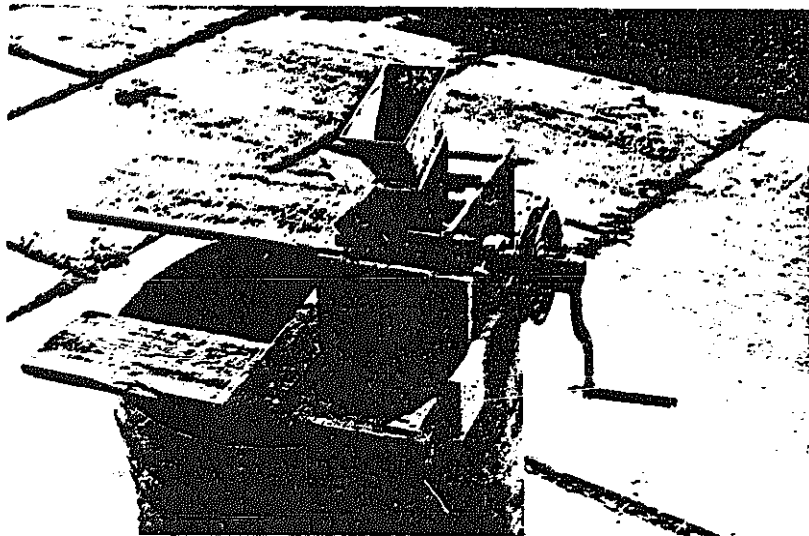
Initial Use:

"I think the grinder fills a need, especially for grinding grain for animals."



FRONT VIEW

Front cover removed--note weld beads on rotor. Adapted with hand crank on shaft outside (motor) pulley. Grain chute has been lengthened.



TOP VIEW

Ground grain drops into 3/4 bbl. Front guard replaced by a board.

Because the user needed the grinder for limited application, the hand crank was added. It was mounted on a 55 gallon drum but could be mounted and a bag placed underneath to catch the corn. When the hand crank is used, the corn may have to be ground twice. This occurs when the rotor drum moves slowly: some grain is likely to drop back and fall behind. This can be avoided by adjusting the chute and by driving the rotor at a steady, fairly high speed.