J. E. LAPPEN.

FEED GRINDER.

APPLICATION FILED JUNE 27, 1907.

954,114. **Patented Apr. 5, 1910.**

2 SHEETS—SHEET 1.

Fig. 1

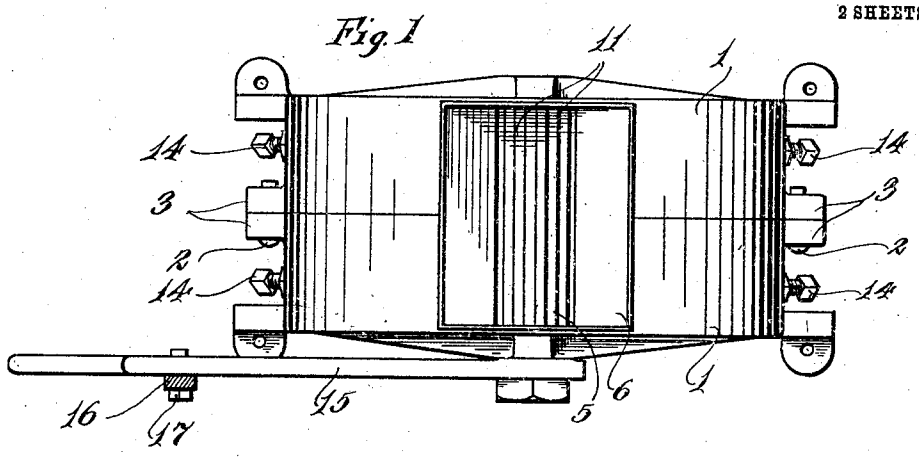

Fig. 2

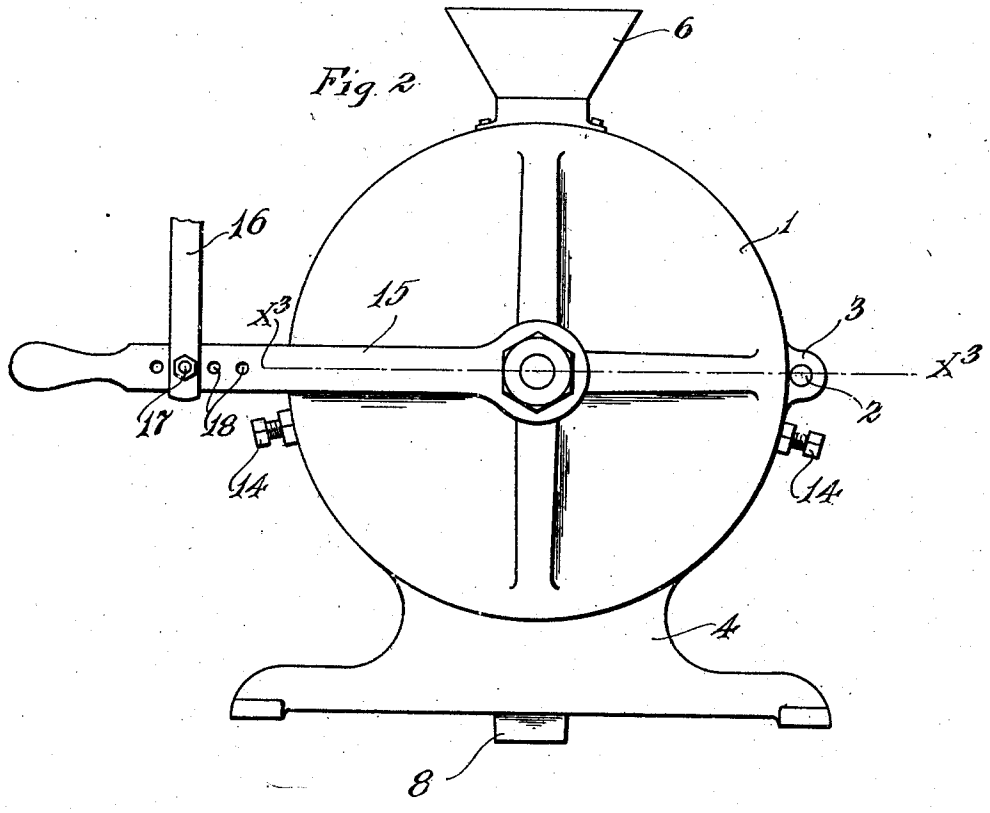

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Fig. 3

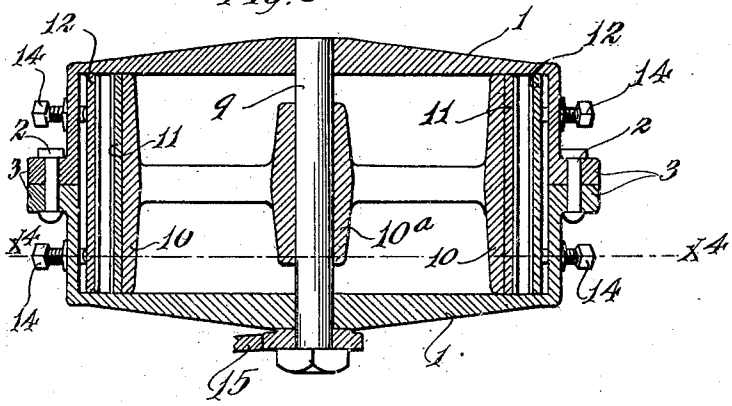


Fig. 5

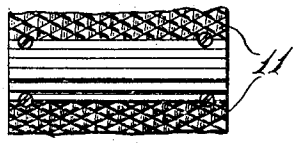


Fig. 4

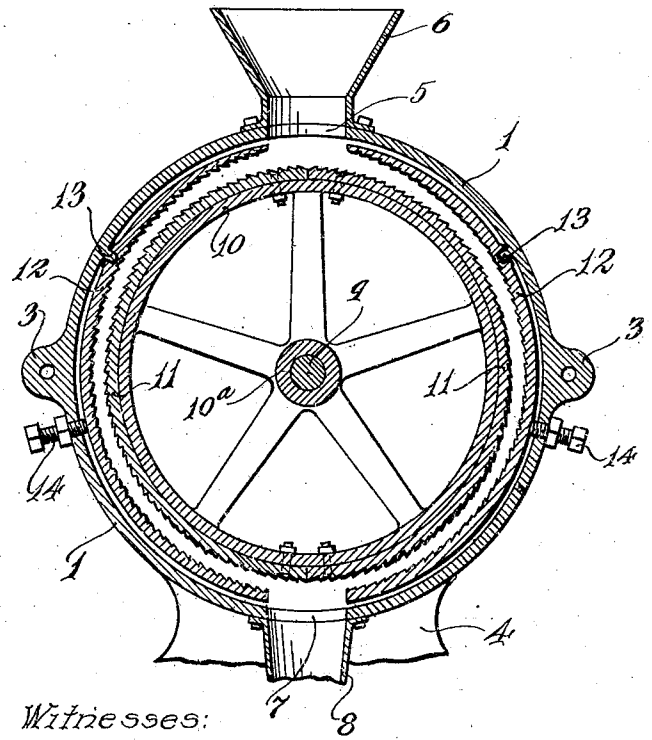
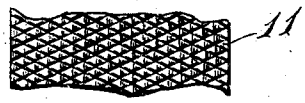


Fig. 6



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UNITED STATES PATENT OFFICE

JAMES E. LAPPEN, OF LE ROY, MINNESOTA.

FEED-GRINDER.

954,114. Specification of Letters Patent. Patented Apr. 5, 1910.

Application filed June 27, 1907. Serial No. 381,043.

To all whom it may concern:

Be it known that I, JAMES E. LAPPEN, a citizen of the United States, residing at Le Roy, in the county of Mower and State of Minnesota, have invented certain new and useful Improvements in Feed-Grinders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide an improved feed mill or grinder especially adapted to be operated by a wind mill, but adapted, nevertheless, to be driven by any other suitable power wherein motion is transmitted by a reciprocatory or vibratory member.

To the above ends, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claim.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a plan view of the improved feed mill. Fig. 2 is a side elevation of the same. Fig. 3 is a horizontal section taken through the mill on the line x^3 x^3 of Fig. 2. Fig. 4 is a vertical section taken through the mill on the line x^4 x^4 of Fig. 3. Fig. 5 is a detail in plan, showing the abutting upper end portions of the externally toothed grinding segments of the oscillatory cylinder; and Fig. 6 is a detail showing the intermediate portion of one of the internally toothed grinding segments or concaves.

The case of the mill or grinder is preferably cylindrical and made up of two cup-shaped sections 1 rigidly but detachably connected by nutted bolts 2 passed through lugs 3 formed on the sides of said case sections. Each case section is provided with a base extension 4 that constitutes a rigid support for the case. At its top, the case 1 is provided with an inlet passage 5 that receives directly from a hopper 6 secured to the top of said case. In its bottom, the case 1 is provided with a discharge passage 7 which, as shown, delivers into a discharge spout 8. A rock shaft 9 which is located concentric to the axis of the case 1 is journaled in the heads or vertical walls of the said case, and to this shaft within the said casing is secured a cylinder 10 afforded by the rim of an armed wheel, the hub 10^a of which is keyed or otherwise rigidly secured to said shaft. To the outer surface of the cylinder 10 is bolted or otherwise rigidly, but preferably detachably, secured a pair of semi-cylindrical externally toothed grinding segments 11. The teeth of these two grinding segments 11 are extended or inclined in opposite directions circumferentially of the cylinder, so that they are adapted for positive grinding actions under opposite oscillatory movements of the cylinder. The first few teeth at the abutting upper ends of said grinding segments 11 are in the form of wide ratchet teeth that extend from edge to edge of the said segments (see Fig. 5), but the teeth that are farther down are diamond shaped and are brought to sharp points and are arranged much like the teeth of a coarse rasp.

Arranged within the casing for coöperation with the two grinding segments 11 are internally toothed grinding segments or concaves 12 that extend through less than 180 degrees and are so arranged that their upper and lower ends, respectively, leave the inlet and outlet passages 5 and 7 of the casing open. The grinding concaves or segments 12 are fulcrumed for slight rocking adjustments within the casing, and to this end they are provided about one-third way down from their upper ends with notches that receive fulcrumed lugs 13 formed on the interior surface of the casing, as best shown in Fig. 4. At points materially below the fulcrum lugs 13, adjusting screws 14 are threaded through the sections of the casing and impinge against the outer surfaces of the said grinding segments 12. By means of these adjusting screws 14 the concave segments 12 may be rocked on their fulcrum lugs 13 so as to bring their lower free ends at any desired distance from the toothed surfaces of the coöperating cylinder segments 11. It is of course evident that when the lower ends of said segments 12 are moved inward, their upper ends will be moved outward. The said segments 12 will usually be so adjusted that the channel formed between the same and the coöperating cylinder segments will be tapered or will be made gradually narrower from top to the bottom of the casing, so as to thereby give an increasing grinding action on the material passed between the coöperating relatively fixed concave segments 12 and the cylinder segments 11. The teeth

formed on the concave segments 12 are preferably diamond shaped, as shown in Fig. 6, and they are extended reversely to the direction of the teeth on the coöperating cylinder segments 11. By reference to Fig. 4 it will be seen that said teeth are so arranged that they will grind the material under oscillatory downward movements of the cylinder segments 11, while the teeth of the said segments 11 will slip under the material which is being ground under oscillatory upward movements. It is also evident that under oscillatory movements of the cylinder 10 and its reversely toothed grinding segments 11 the feed or material will be ground under both oscillatory movements thereof, so that a continuous grinding action is produced, thus giving the material a maximum of efficiency.

To impart oscillatory movements to the cylinder and its toothed segments, a lever 15 is shown as applied to one end of the rock shaft 9 and the reciprocatory rod 16 of a wind-mill is shown as pivotally connected to said lever. Also, as shown, the said rod 16 is adjustably pivoted to said lever 15 by means of a nutted bolt 17 which is adapted to be passed through any one of several perforations 18 in the said lever. This adjustment makes it possible to properly adjust the oscillatory movement of the cylinder to the throw of the wind-mill rod 16, the movement of which varies in different wind-mills.

The device described is adapted for general use as a grinder of feed and similar materials, and is especially adapted for use to crush and grind corn, to thereby render the kernels thereof more suitable for feeding purposes.

What I claim is:

The combination with a two-part casing made up of the sections 1, said casing having an inlet passage 5, an outlet passage 7 and internal fulcrum lugs 13, of reversely toothed grinding concaves 12 within said casing fulcrumed on said lugs 13, adjusting screws 14 working through the sections of said casing and engaging said concaves, a cylinder mounted within said casing, reversely and externally toothed grinding segments 11 detachably secured to said cylinder and arranged for coöperation in alternate order with said grinding concaves 12, and means for oscillating said cylinder and the grinding segments carried by said cylinder, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES E. LAPPEN.

Witnesses:

H. D. KILGORE,

F. D. MERCHANT.