April 2, 1929. J. WARD 1,707,697

GRINDING MACHINE

Filed July 16, 1925 3 Sheets-Sheet 1

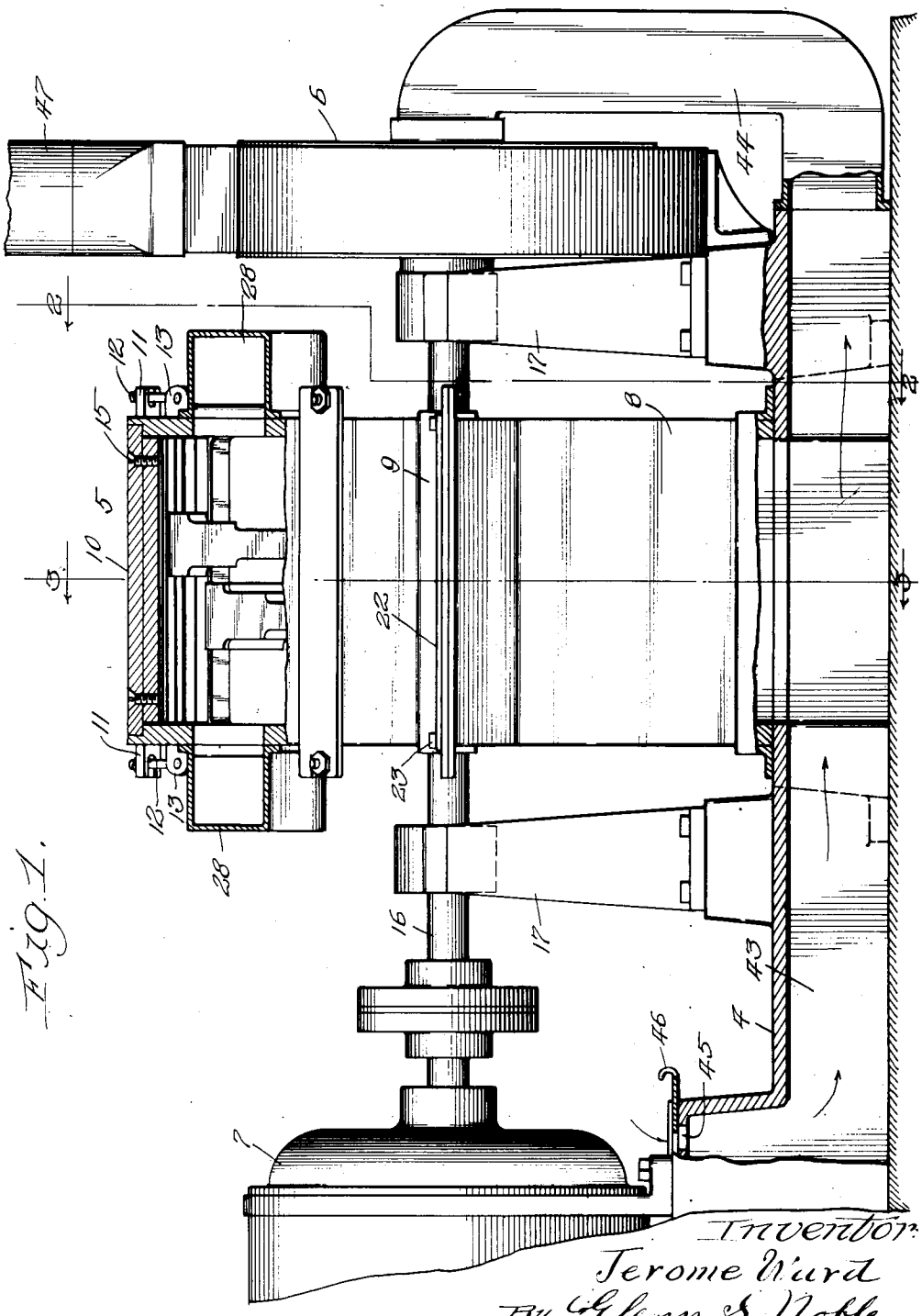


Fig. 1.

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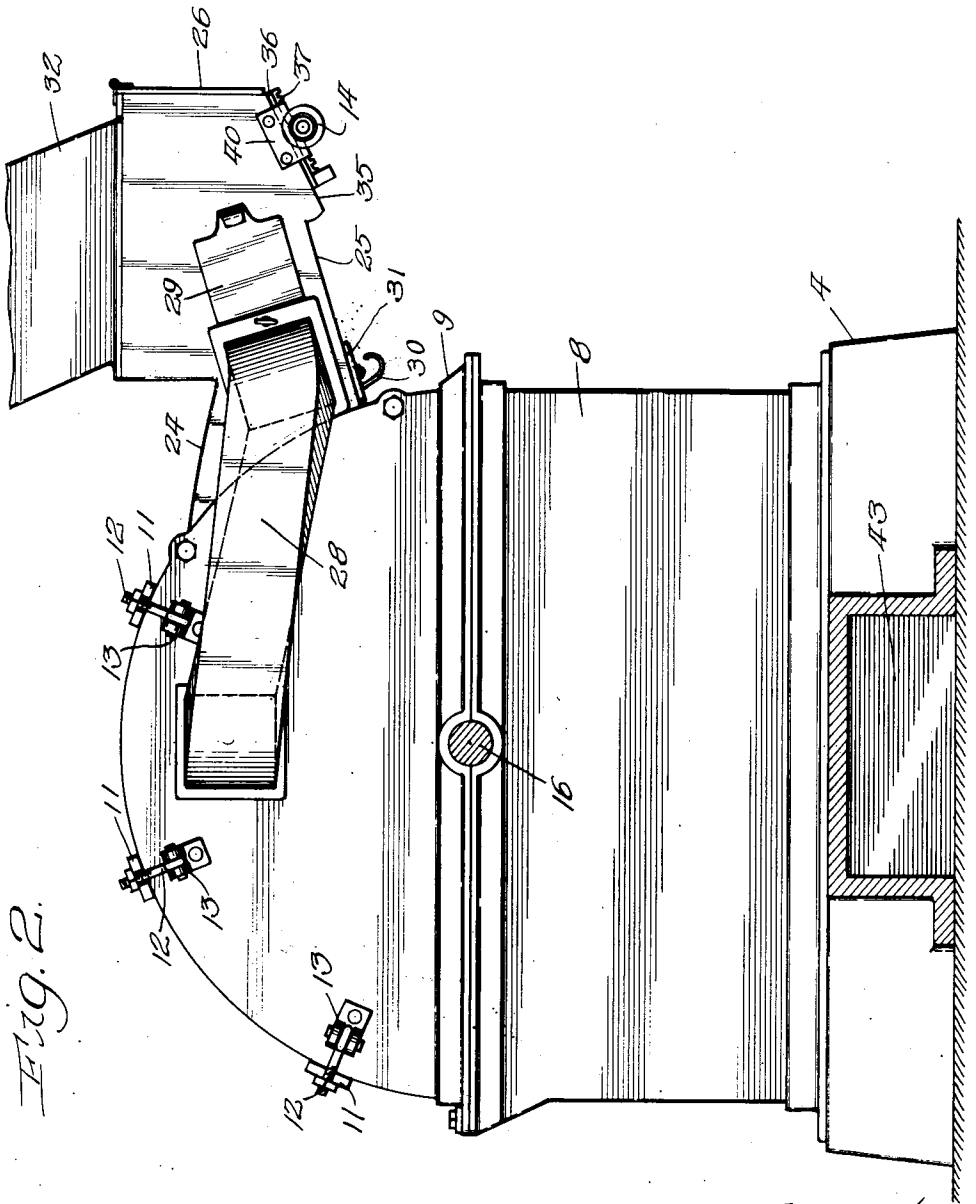


Fig. 2.

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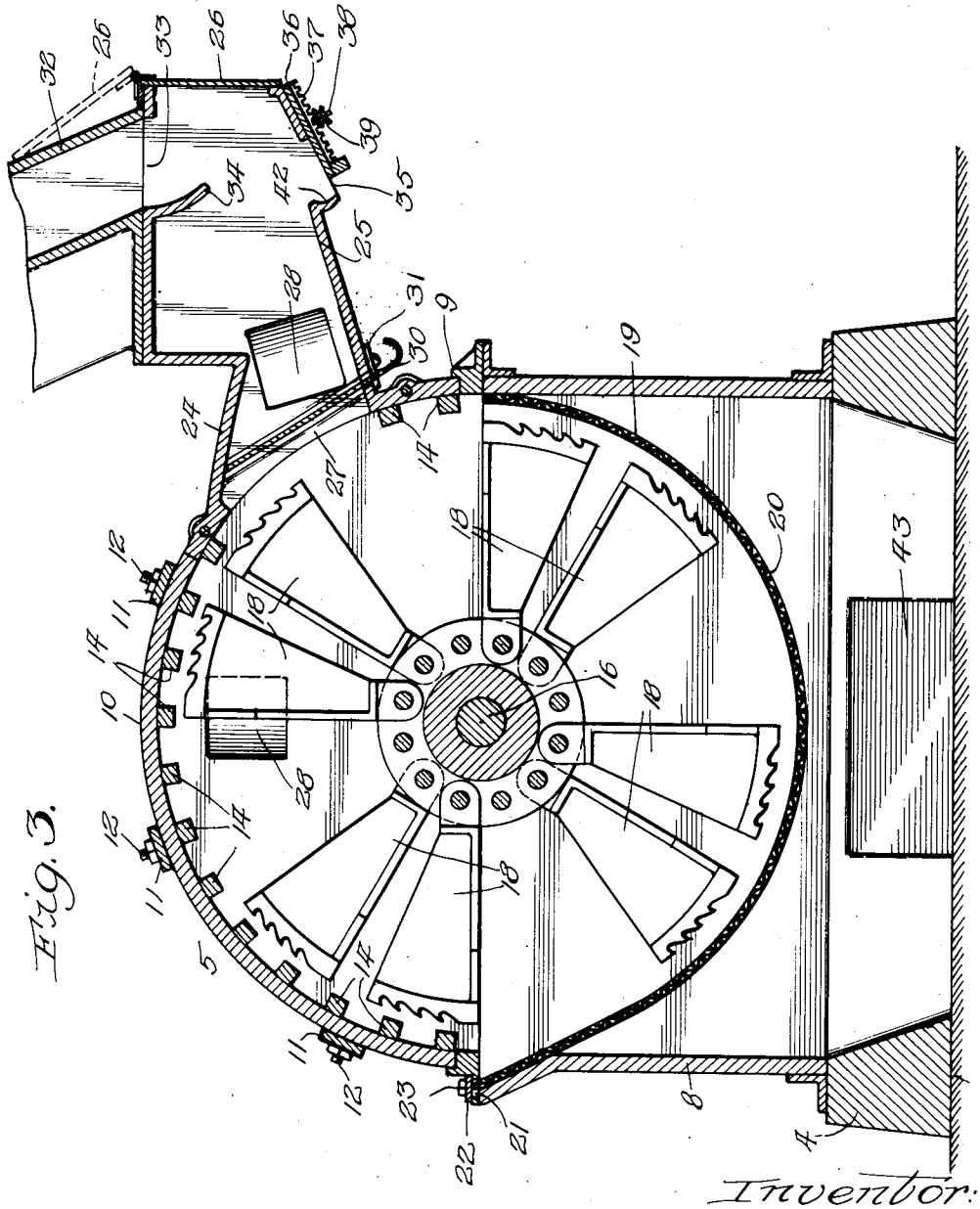


Fig. 3.

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UNITED STATES PATENT OFFICE.

JEROME WARD, OF WAUKEGAN, ILLINOIS, ASSIGNOR TO BLATCHFORD CALF MEAL COMPANY, OF WAUKEGAN, ILLINOIS.

GRINDING MACHINE.

Application filed July 16, 1925. Serial No. 44,039.

This invention relates particularly to grinding machines for mills adapted for grinding grain, feeds or other material and is directed to the general improvement of such machines as well as to certain details of construction.

The objects of this invention are to provide an improved grinding machine for material of the character indicated; to provide machines having a novel feeding arrangement, whereby the material may be fed through the medium of a feeder or may be shoveled directly into the machine; to provide improved means for regulating the suction through the mill; to provide an improved cover with means for holding the same and with grinding means attached thereto; and to provide such other advantages and improvements as will be described more fully hereinafter.

In the accompanying drawings illustrating this invention,

Figure 1 is a front view with parts broken away to show the interior construction;

Figure 2 is a sectional side view taken on the line 2—2 of Figure 1; and

Figure 3 is a sectional view taken on the line 3—3 of Figure 1.

In the particular form of the invention as shown in these drawings, I provide a bed plate 4 on which is mounted the mill 5 and a suction fan 6, together with the motor 7 for driving the same. The mill 5 has a frame or casing comprising a bottom portion 8 and a substantially semi-circular upper portion 9 which is provided with a cover 10. It has heretofore been more or less customary to make the top portion of the casing of a single casting, but by providing a cover which fits over the sides, it is much easier to gain access to the mill. This cover is held by means of cross bars 11 which are slotted at the ends to receive fastening bolts 12 which are pivoted to lugs or brackets 13 on the sides of the mill. This provides an exceedingly strong and rigid support for the cover which is apt to be subjected to undue strain in the event of an accident or any parts coming loose in the mill.

In place of the usual grinding elements, I provide rectangular bars 14 which are secured to the inner side of the top and cover in any suitable manner, as by means of screws or bolts 15. These bars may be of any suitable size, but I have found that they operate successfully when made rectangular and about one-half inch in thickness and one inch wide.

The main shaft 16 is connected directly with the motor 7 and also operates the fan 6. This shaft is mounted in bearings 17 on the base plate 4 and carries the beaters 18 which are located within the mill and which co-operate with the bars 14 for grinding the material.

The base or casing 8 is provided at the sides with semi-circular grooves 19 for receiving a screen 20 which fits therein and forms the lower portion of the grinding or pulverizing chamber. In order to insert and remove the screen, I provide a slot or opening 21 at one side through which the screen may be passed in order to place it in position or remove it from the mill. This slot is preferably covered by a plate 22 which is held by bolts 23. This forms a particularly desirable arrangement inasmuch as it permits the screen to be changed without raising the top or cover of the mill, and may be done while the mill is running empty.

The improved feeding apparatus includes means for separating heavy articles or particles, such as stones, pieces of metal or the like, from the grain and means whereby the mill may be fed automatically or by the use of a feeder, as well as by having the material shoveled directly therein. The feeding apparatus 24 is secured to the mill in any suitable manner and is made in the form of a chute or chamber as shown in Figures 1 and 3. This chute has a bottom 25 which preferably slopes toward the opening 27 into the mill and has a door 26 at the outer end which may be raised to permit the material to be shoveled directly through the chute into the mill. In this instance the material passes directly through the main opening 27 into the upper portion of the mill.

When grinding fluffy or light fibrous material such as oat hulls or screenings, I have found it desirable to feed the material into the sides of the mill which will produce a greater rending and tearing action which is necessary for material of this kind. For this purpose, I provide pipes or passageways 28 which lead from the sides of the chute to the

sides of the mill as will be readily seen from the drawings. These side passageways are controlled by means of slides 29 which provide means for stopping or regulating the suction or flow therethrough. The main opening 27 is controlled by a slide 30 as shown in Figure 3.

The mill may also be fed by means of a feeder of any suitable kind which may be secured to the top of the feeding apparatus 24. A feeder delivery pipe or outlet 32 is shown as leading to a feed opening 33 in the top of the feeding apparatus adjacent to the forward end thereof. A baffle plate 34 is arranged adjacent to the inner side of this opening for directing the material toward the outer end of the chute chamber. A transverse opening 35 is provided in the bottom of the chute below the opening 33 for permitting the entrance of air and also for permitting the discharge of stones, pieces of metal or the like. This opening is regulated by means of a slide 36 which may be adjusted by means of any suitable mechanism such as the rack and pinion arrangement shown. The rack 37 is engaged by a pinion 38 on a cross shaft 39 which is mounted in bearings 40 and which may be turned by means of a hand wheel 41.

A curved wall 42 is provided at the inner side of the opening 35 for directing the air upwardly and outwardly in order to create a whirling movement in the outer end of the chute or feed chamber 24.

The bed plate 4 is provided with a passageway 43 which is connected with a conduit 44 leading to the fan 6 and which is in direct communication with the bottom of the mill. This passageway is also provided with an air inlet 45 underneath the motor 7 which is regulated by a slide 46.

When the material is to be shoveled directly into the mill, the door 26 and the slide 30 are opened so that the material will be directed into the grinding chamber where it will be acted upon by the beaters 18 which force the material against the bars 14, thereby causing a rapid grinding and pulverizing action. As fast as the material becomes sufficiently fine to pass through the screen 20 it will be sucked out by the fan 6 and blown through the fan outlet pipe 47 to a receiving bin or room.

When the material is to be fed through the feeder 32, the slide 36 is opened a short distance to allow air to pass up through the opening 35 and as it passes the curved wall 42 it will be directed upwardly and outwardly so as to suck the grain or material passing down over the baffle plate 34 toward the outer end of the feeding chamber Any solid particles such as stones, pieces of metal or the like, will be dropped down through the opening and the grain or lighter particles will be drawn into the mill either through the opening 27 or through the side passageways 38 If an excess of air is necessary for carrying the pulverized material through the fan, the hole 45 may be opened, thereby allowing air to enter through the passageway 43.

From this description it will be seen that I provide a grinder having various novel features providing such advantages as will be readily apparent to those familiar with this art, but it will also be noted that changes may be made in the details of construction in order to adapt the machine for various purposes and therefore I do not wish to be limited to the exact arrangement shown and described, except as specified in the following claims, in which I claim:

1. The combination with a mill, of a feeding device having a downwardly sloping bottom with an air inlet therein, said inlet having a curved guide portion at one side thereof for causing a rotary movement of the feed passing into the mill, said feeding device also having a door in the outer wall thereof which may be opened to admit the material directly from the outside into the mill.

2. The combination with a centrifugal mill for grinding grain having a single grinding compartment, of a feeding apparatus comprising a chamber with a plurality of openings for introducing the material into the chamber, and a conduit leading from the side of the chamber to the side of the mill.

3. The combination with a centrifugal mill for grinding grain or the like having a single grinding chamber, of a feeding chamber, conduits leading from the side of the feeding chamber to the side of the mill, and means for controlling the flow of the material through the conduits.

4. The combination with a centrifugal mill of the character set forth for grinding feed or the like, of a feeding apparatus adapted to coact with the mill and having a direct opening into the periphery of the mill, conduits leading from the apparatus to the side of the mill, and valves for controlling the flow of the material through said conduits.

5. The combination with a centrifugal mill, of a feeding apparatus comprising a chamber having a downwardly sloping bottom and provided with an outlet into the periphery of the mill, conduits leading from the sides of the chamber to the sides of the mill casing, and opening therein at a sufficient distance from the periphery to provide a suction through said conduits, said chamber having an opening in the bottom adjacent to the mill, an adjustable cover for said opening, said chamber also having an air inlet provided with a curved wall at its inner edge, an adjustable slide for regulating said inlet, an inlet for the material at the top of the chamber, and a baffle plate extending down-

wardly and outwardly to direct the material into the path of the air entering through the air inlet.

6. A feeding apparatus for centrifugal mills having single grinding compartments, comprising a feed chamber having a plurality of openings for feeding the material therein and for admitting air thereto, and a plurality of passageways from the said chamber to the mill.

7. A centrifugal grinding mill having a detachable cover member, transverse bars secured to the mill and adapted to engage with the outer surface of said member, and bolts for engagement with the bars for fastening the cover in position.

8. In a centrifugal grinding mill, the combination of a casing having substantially semi-circular side walls, a curved cover engaging with the upper edges of said walls, and cross bars engaging with the cover and having slots in the ends thereof, and bolts pivotally secured to the sides and adapted to engage with said slots for holding the cover in position.

9. A milling apparatus comprising a bad plate having a passageway therein, a motor mounted on said bed plate, a centrifugal mill and a fan also mounted on said bed plate and driven directly by the motor, a connection from the fan intake to the said passageway, and a discharge from the mill into said passageway, said passageway also having an air opening adjacent to the motor, and means for controlling said opening.

10. The combination with a grinding machine having a single grinding compartment of a feed chute and a feeding apparatus providing for the suction of material through said chute into the grinding machine, said chute having a door for admitting material directly therethrough into the grinding machine independently of the feeding apparatus.

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