April 19, 1949. M. D. PENDERGAST 2,467,691

FEED GRINDER

Filed April 9, 1947

FIG. 1.

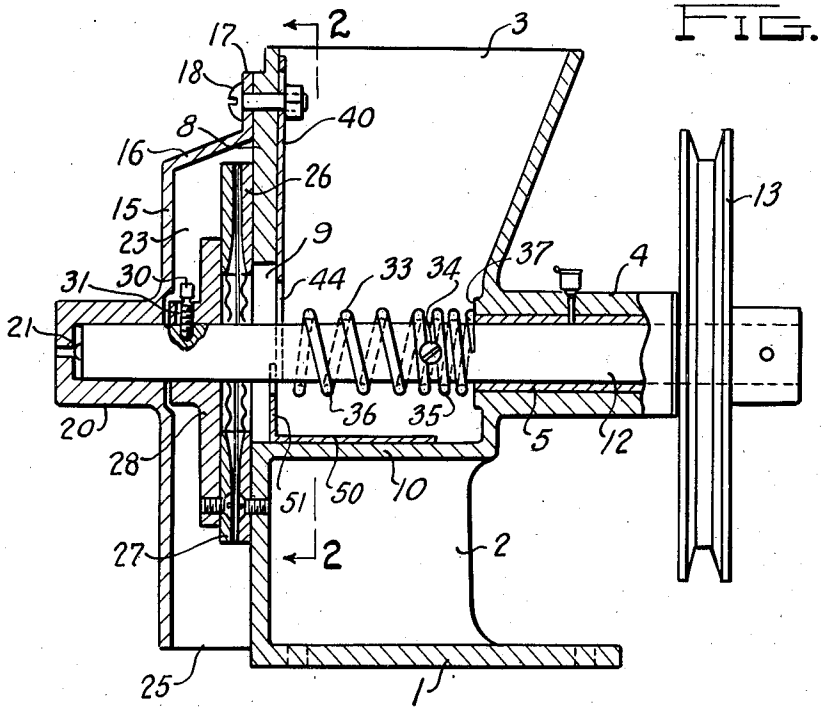
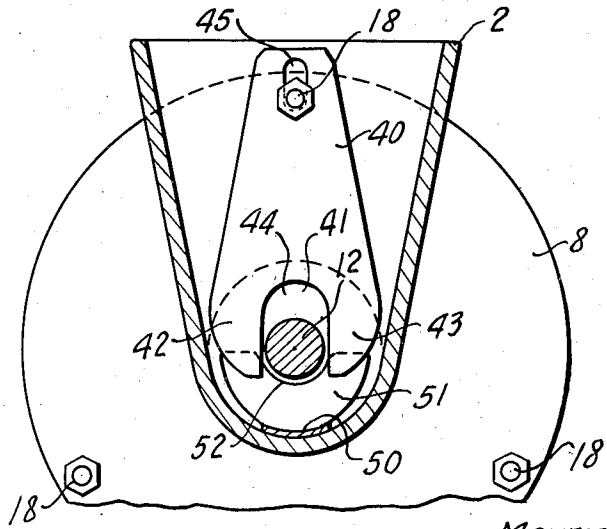


FIG. 2.



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FEED GRINDER

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1 Claim. (Cl. 241—247)

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This invention relates to a feed grinder and it has to do particularly with an improved construction for grinding grain, which may be used as animal feed, such as oats, or other grains or mixtures thereof.

Among the objects of the invention is the provision of a grinder which may be operated at a relatively high speed and may be driven by a source of power, such as an electric motor, of small size and of small power output, while at the same time giving a high rate production. Although a relatively small amount of grain goes through the grinding burrs during one revolution, the high speed of operation provides a high rate of production. A further object is to provide a simple and improved arrangement of feed screw construction which also performs the function of holding the burrs apart in a proper manner. This feed screw or worm is of simple construction and specifically may comprise helical windings of a wire-like strip of metal so that as the grinder decelerates to a stop, the feeding of the grain substantially ceases as the speed of operation decreases thus leaving the burrs empty and facilitating a re-start at a very light load.

A further object is to provide a simple and improved construction for controlling the size of the passageway through which the feed passes into the grinding burrs. As will be appreciated by those skilled in the art, one of the grinding burrs is fixed while the other is rotary and the rotary burr is relatively loosely mounted on the drive shaft so that it may shift relative to the fixed burr for the pasage of objects which might otherwise jam between the burrs. However, in a normal operation, the centrifugal force holds the two burrs in proper relative operating position. The control means for the outlet passage of the feed embodies a simple arrangement of a loose control part which may be used for exceedingly small sized electric motors but which may be dispensed with where a motor of larger size is available. It has been found that a feed grinder constructed in accordance with the invention materially reduces the consumption of power required to grind a given quantity of feed.

A feed grinder constructed in accordance with the invention is disclosed in the accompanying drawings:

Fig. 1 is a cross sectional view taken in accordance with the grinder and showing the hopper, the operating shaft, the feed screw and grinding burrs.

Fig. 2 is a sectional view taken substantially on line 2—2 of Fig. 1.

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The body of the feed grinder may be in the form of a casting having a base 1 with an upright portion 2 and formed in its upper portion with a hopper 3 for receiving the grain. Formed integrally with the base is a bearing extension 4 which may be provided with a suitable lining of bearing material 5. Also integral with the body is a wall portion 8 which forms one wall of the hopper and is integral with the upright portion 2 and which may be circular in formation as shown in Fig. 2. This wall portion is provided with an opening 9 positioned above the bottom 10 of the hopper.

Mounted in the bearing 5 is a shaft 12 upon which is disposed a suitable pulley or the like by means of which the shaft is operated. As shown herein, there is a pulley 13 arranged to receive a V-belt driven by suitable power means such as an electric motor (not shown). This shaft projects through the bottom of the hopper, as indicated and through the opening 9. A cap 15 having a peripheral wall 16 has a flange 17 which is attached to the wall 8 as by means of several bolts. As indicated at 18, this cap is provided with a bearing formation 20 for receiving the end of the shaft and the shaft may be provided with a thrust bearing in the form of a ball 21 for engaging the end of the bearing formation 20.

The cap and the wall 8 cooperate to provide a chamber 23 for the grinding burrs and the cap is formed to provide an outlet 25 for the ground feed. One of the grinding burrs is indicated at 26 and it is secured to the wall 8, as by means of screws, as indicated. This is the fixed grinding burr. The other grinding burr 27 is secured, as by means of screws as shown, to a hub member 28 which is secured to the shaft 12. This is the rotary burr. As indicated in Fig. 1, the hub is secured to the shaft by a screw 30 which has a clearance with respect to the hub by means of passing through a relatively large opening 31. Thus, the burr 27 can wobble or shift with respect to the shaft. The burrs are provided with suitable roughened or toothed faces as indicated and as appreciated by those skilled in the art.

The feed screw, as mentioned above, is of simple construction and it preferably takes the form of a length of metal stock of wire-like shape, round in cross section and fashioned helically. This feed screw fairly snugly fits the shaft. The screw is generally indicated at 33 and is secured to the shaft as by means of a screw 34. The rear section of the screw is formed with the convolutions of helix relatively close to each other, as shown at 35, while the forward section

of the screw has the convolutions relatively widely spaced as shown at 36. The rear end of the screw 33 seats upon an abutment face 37 in the hopper and thus serves to urge the shaft 12 in a direction, which is to the left as Fig. 1 is viewed, thus serving to properly space the grinding burrs. The closeness of the convolutions 35 facilitates attaching the helical wire screw to the shaft and also provides for the spring or yielding action in the spacing of the burrs. The screw 34 passes between two of the convolutions 35 and the worm can be axially adjusted by turning it on its axis when the screw 34 is loose. The forward section of the screw where the convolutions are more widely spaced provides the major function of advancing or feeding the material in the hopper.

As will be understood by those skilled in the art, the machine is set into operation with the burr 27 rotating relative to the fixed burr 26 and when feed is placed in the hopper 3 it is advanced by the feed screw through the opening 9. The feed is forced outwardly by this feeding action so that it is caused to pass between the burrs to grind or crush the grain.

However, means are provided for regulating the size of the passage between the hopper and the grinding burrs through which the feed is to pass. This is accomplished by a regulating plate 40 which may be held in position by one of the bolts 18 as indicated and which fits against the wall 8 of the hopper. This plate has an inverted U-shaped notch 41 and the opposite legs of the formation, as shown at 42 and 43, fit down on opposite sides of the shaft 5, and thus serves to constrict the size of the passage for the grain. The clearance of the bight portion of the U-shaped notch, with reference to the shaft 5, provides a passage 44 which can be regulated by the vertical adjustment of the plate due to the fact that it has an elongated opening 45 for receiving the bolt 18.

Where an exceptionally small electric motor is to be used, the size of the opening may be further reduced and throttled by a member disposed in the bottom of the hopper. This member is in the form of an L-shaped piece of metal having a bottom portion 50 for lying on the bottom of the hopper and an upstanding part 51 provided with a notch 52 so as to partially surround the shaft 12. This preferably is a loose

element and may not otherwise be secured in position except that the upstanding part 51 may be disposed between the lower edges of the plate 40 and the wall 8 to thus be held in position. It will clearly be seen by reference to both Figs. 1 and 2 how these two plates constrict the passage 9 and how the passage may be variably throttled by the vertical adjustment of the plate 40. The auxiliary member 50—51 may be used where electric motors of one-fourth horse power or less are available. Where motors of one-third horse power or larger are available the auxiliary throttling piece may be removed, while for still larger motors in the vicinity of three-fourths horse power or larger are available, both throttling elements may be removed.

I claim:

A feed grinder comprising a hopper, a shaft extending through the hopper near the bottom thereof, a fixed grinding burr outside the hopper, a cooperating grinding burr mounted on the shaft, said hopper having a passage around the shaft for the passage of feed from the hopper to the grinding burrs; a feed screw in the form of a metallic wire fashioned into helical convolutions and surrounding the portion of the shaft in the hopper, the rear end of the feed screw having relatively closely spaced convolutions, the forward end of the feed screw having relatively widely spaced convolutions, the rear end of the feed screw engaging the wall of the hopper to yieldably hold the burrs spaced apart, and means for securing the feed screw to the shaft for holding the feed screw and shaft against relative axial and rotary movement whereby the feed screw holds the shaft against axial displacement.

MAURICE D. PENDERGAST.

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