Feb. 24, 1942. H. M. JOHNSTON 2,273,868

GRAIN GRINDER

Filed May 4, 1939 2 Sheets-Sheet 1

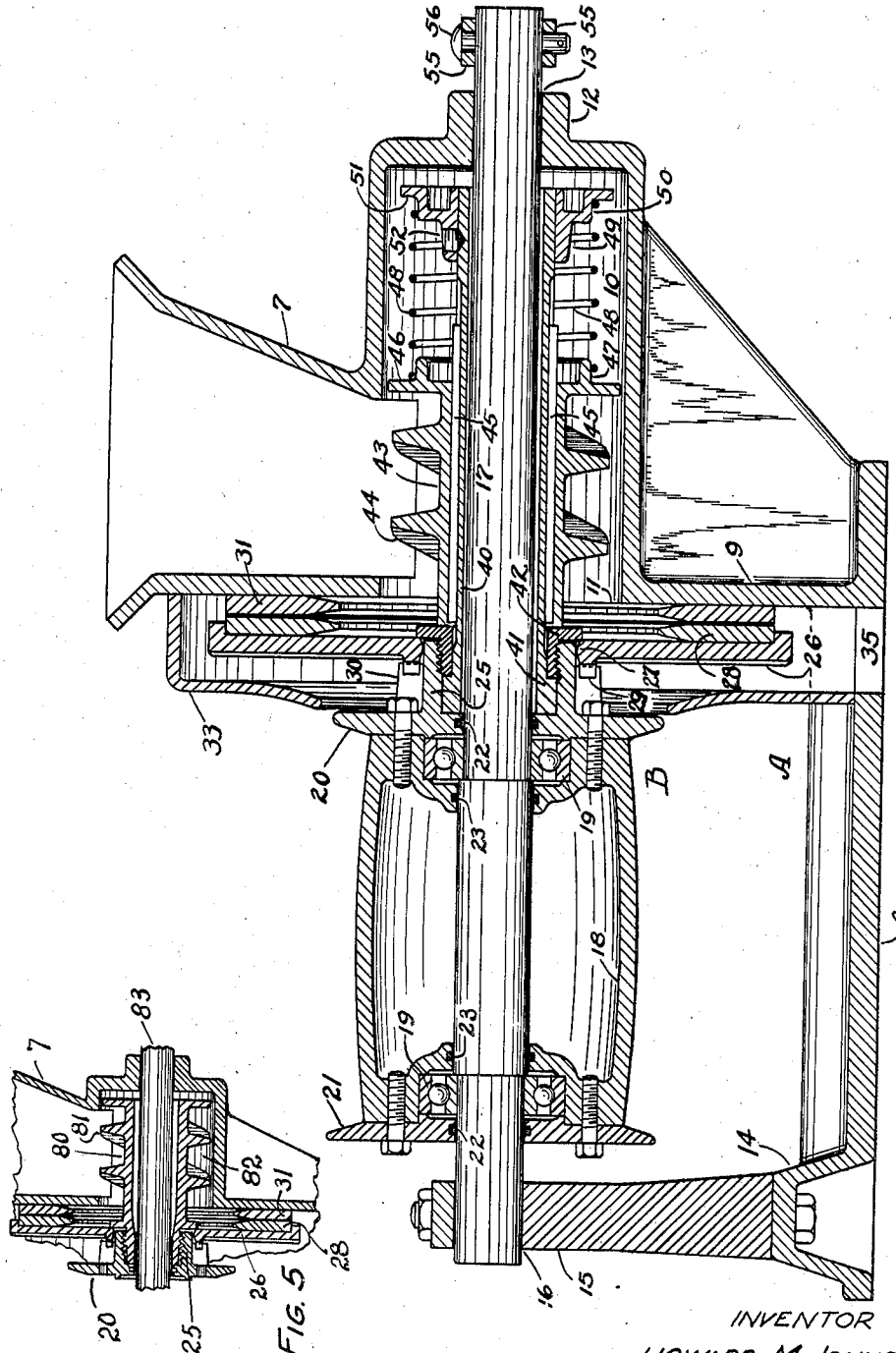


FIG. 1

FIG. 5

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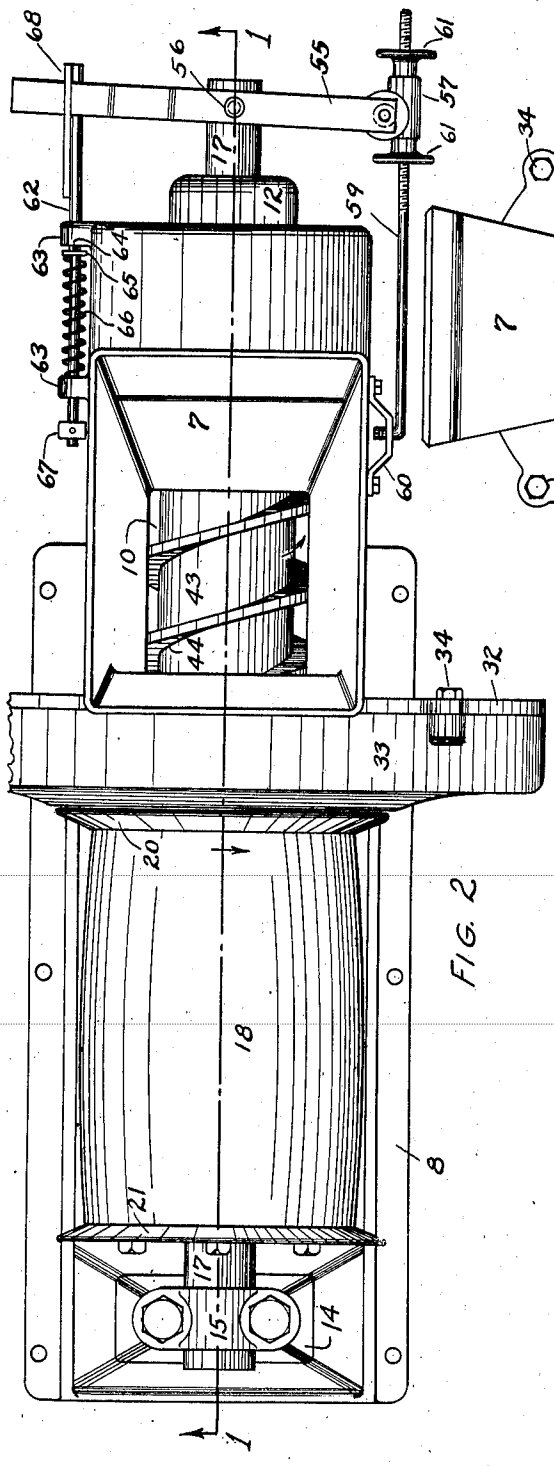


FIG. 2

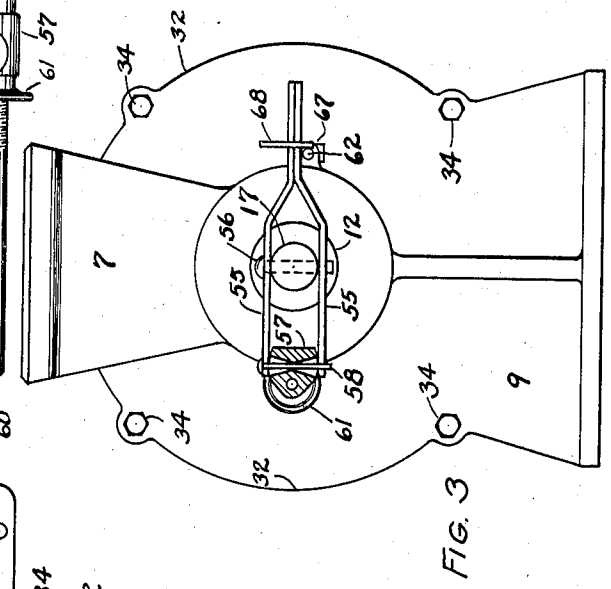


FIG. 3

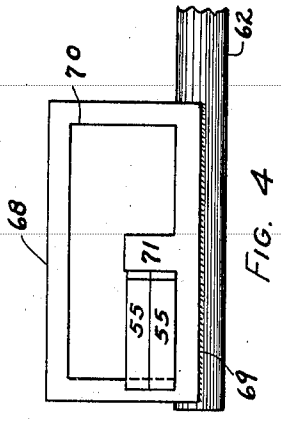


FIG. 4

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UNITED STATES PATENT OFFICE

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GRAIN GRINDER

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Application May 4, 1939, Serial No. 271,648

3 Claims. (Cl. 83—8)

The present invention relates to a device for grinding grains of all kinds such as corn, wheat, oats and the like and has for its objects, more efficient operation, greater safety, simplicity and convenience in handling.

In the present invention I mount the rotating parts on a normally stationary shaft and use this shaft as a means for controlling the operating position of the rotating grinding plate. I also provide means whereby the rotating plate is spring held in its closest operating position against a fixed stop having means associated with the stop whereby the operating space between the plates may be manually adjusted. I also provide means whereby the space between plates may be temporarily greatly increased in a convenient manner and without changing the permanent adjustments.

A novel feature of my invention is the manner of mounting the driving pulley and operating means on a stationary shaft whereby the rotating parts may be light and easily balanced.

Another novel feature of my invention is the spring releasing means provided on the worm conveyer whereby this grain feeding device is spring held in its operating position thus to prevent clogging the grinding plates or injury by the presence in the hopper of a metal or hard substance that might otherwise injure the operating parts.

An important feature of the present invention is the means provided for temporarily moving the grinding plates a considerable distance apart and returning them without effecting the permanent adjustments, the means being adapted to preferably turn the shaft slightly at each movement so as to keep the shaft free to move longitudinally and provide means to hold the shaft against accidental turning.

To these and other useful ends, my invention consists of parts, combinations of parts, or their equivalents, and mode of operation, as hereinafter set forth and claimed and shown in the accompanying drawings in which:

Fig. 1 is a sectional view of the preferred design of my improved feed grinder taken on its vertical longitudinal center.

Fig. 2 is a top plan view of my improved grinder.

Fig. 3 is an end view of the grinder as illustrated in Figures 1 and 2.

Fig. 4 is a detail side view of the adjusting lever locking means.

Fig. 5 is a fractional sectional view of a modification.

As thus illustrated, the base of the grinder is designated in its entirety by reference character A and the rotating parts by reference character B. Member A comprises a base 8, a pedestal 9 on which is mounted a circular chamber 10, one end being open as at 11 and the other end being closed and having a boss 12, with a circular aperture 13. A hopper 7 is preferably integrally formed with chamber 10 and pedestal 9 as illustrated.

The other end of base A is provided with a pedestal 14 having thereon a shaft supporting member 15 with a circular aperture 16. A shaft 17 is rotatably and slidably mounted in apertures 13 and 16 in the position illustrated in Figure 1 and being concentric with chamber 10 and extending therethrough.

I provide a belt pulley 18 which is rotatably mounted on shaft 17 by means of ball or roller bearings 19—19 and being held into position by means of flanged end members 20 and 21. These bearings are mounted so as to prevent longitudinal movement of the pulley on the shaft.

Members 20 and 21 are provided with annular grooves 22—22 for the reception of packing material. The inner hub members of the pulley are also provided with grooves 23—23 for the reception of packing material thus to inclose the bearings in oil tight chambers.

I provide a threaded annular flange 25 on the inner surface of member 20, the outer front end being trued and adapted to support the disc 26. The inner part of the disc which comes in contact with member 25 is slightly convexed as at 27 so the disc 26 may rock to a limited extent and thus adjust itself dynamically.

A grinding plate 28 is secured to member 26 and driving lugs 29 are provided which operatively engage lugs 30 on on member 25.

A grinding plate 31 is mounted on the face of member 9 which is extended and made circular as at 32 and intersecting the front face of member 7 so as to form an annular seat for the plate and a surface to which housing 33 may be secured by means of bolts 34. Member 33 is made circular and shaped transversely as illustrated in Figure 1 having preferably an opening at its bottom which registers with an opening 35 in base 8 for the passage of the ground material. Thus it will be seen that the position of plate 28 relative to plate 31 will be determined by the position of shaft 17.

Member 25 is provided with a machined and threaded chamber for the reception of tube 40, the tube having a flange 41 integral with its

rear end and each being machined true. Thus member 40 will be firmly and concentrically held into position on member 20 by threaded member 42, the flange of which is made large enough to act as a retainer for disc 26.

I slidably mount on tube 40 a sleeve 43 having thereon spiral members 44 which are adapted to engage the rough material which is thrown into hopper 7 and move it toward the grinding plates when the pulley and spirals turn in the direction indicated by arrow in Figure 2. Keys 45—45 are fit snugly into keyways in tube 40 but freely into key-ways in member 43. Thus sleeve 43 is free to move endwise but cannot turn relative to sleeve 40.

I provide a flange 46 on the rear end of member 43 having an annular ring 47 thus to provide a suitable seat for one end of spring 48. I provide a sleeve 49 having a seat 50 and flange 51 for the free reception of the other end of spring 48. Sleeve 49 is secured to the end of tube 40 in any convenient manner. For example, a set screw as at 52 may be used for the purpose.

Thus it will be seen that the grinding mechanism cannot become seriously clogged because spring 48 yieldingly holds the spirals 44 against the material. In other words, the pressure of material against the grinding parts is limited by spring 48. Furthermore, if a hard substance should accidentally be thrown into hopper 7, this yielding movement of the spiral feeding mechanism will protect the device against injury.

Referring now specifically to Figures 2, 3 and 4 wherein my improved means for adjusting and controlling the grinding plates is clearly illustrated. Shaft 17, as has already been noted, is rotatably and slidably mounted on its supports and that its longitudinal position determines the space between the grinding plates.

I provide lever members 55 which are pivotally mounted on shaft 17 by means of a bolt 56. Members 55 embrace a head 57 and are pivotally mounted thereto by means of bolt 58. The opening in member 57 through which member 58 passes is flared as indicated in Figure 3. Member 57 is mounted on a rod 59 which is hingedly supported at its front end on a bracket 60 as clearly illustrated in Figure 2. This rod is screw threaded for a considerable distance for the reception of hand adjusting nuts 61—61 by means of which member 57 may be locked in any desired position on the rod.

I provide a rod 62 which is slidably mounted in lugs 63—63 having a pin 64, a washer 65 and a spring 66 whereby rod 62 is spring held rearwardly in a definite position.

I provide preferably a vertically elongated member 67 (see Figure 3) which is secured to the end of member 62 and in slidable contact with the frame of the grinder so as to hold member 62 from turning. A bracket 68 is welded to the projecting end of rod 62 as at 69. This bracket is cut-away as at 70 having a centrally positioned projection 71. Members 55 are adapted to lie snugly on either side of member 71. The space between the top of member 71 and the bracket is great enough to permit members 55 to pass over this member so they may find anchorage on either side of projection 71.

Thus it will be seen that member 57 may be secured in a position so when members 55 are in the position illustrated in Figures 2 and 4 grinding plates 28 and 31 will be say $\frac{1}{16}$" apart and that when this adjustment is made, the plates will be positively held against moving closer together but in case of unusual pressure, spring 66 will permit plate 28 to move away from plate 31.

It will be seen that in case it is desired to manually move plate 28 a considerable distance away from plate 31, all that is necessary is to lift the free ends of arms 55 and move them in front of member 71. If it is desired to hold them permanently separated, arms 55 may be dropped to their locked position but if it is necessary to only temporarily separate the grinding plates, all that is necessary would be to simply lift the free ends of arms 55 and push them forward and then return them to their operating position.

It will be noted that when the free end of lever 55 is lifted over projection 71, shaft 17 will be slightly turned on its supports and rod 59 will move downward at its free end, the other end acting as a hinge in bracket 60 for the purpose, shaft 17 acting as an axis for member 55. Thus it will be seen that since this hand adjusting means will be frequently used, one will be assured that the automatic release provided by spring 66 will always be able to operate because the shaft will be kept free.

With my improved manually operated means and yielding feed spiral one can always be assured that the mill is in safe operating condition. It will be noted that the operator may, if he so desires, move the grinding plates apart by simply pressing hard enough on the free end of lever 55 to overcome the pressure of spring 66.

Thus it will be seen that I have provided a grinder wherein the operating parts are carried on a stationary shaft, that they may be made light and conveniently balanced, that the grinder will, at all times, be protected against injury and that the operator will, at all times, have the device under complete control.

It will be noted that tube 40 does not contact shaft 17, that the rotating parts of the mill are supported entirely on two spaced bearings, thus reducing the weight of the turning parts to a minimum and making it more convenient to balance these parts which will remain balanced for an indefinite period.

In Figure 5 I illustrate a modification wherein parts that are identical to those shown in the other figures are designated by like numerals. In this design, a tube 80 carries spirals 81 and is screw threaded directly into annular member 25 and will not, therefore, be yieldingly held against the material being fed into the grinding plates in which case chamber 82 will be considerably shorter than chamber 10. Shaft 83 will also be considerably shorter than shaft 17 but mounted and controlled as illustrated in the other figures. The objects of this modification are to simplify the construction and reduce cost.

Clearly many minor detail changes may be made without departing from the spirit and scope of the present invention as recited in the appended claims.

Having thus shown and described my invention, I claim:

1. A grinder of the class described, comprising a frame having spaced bearings, a shaft rotatably and slidably mounted in said bearings, a hopper adjacent one of said bearings having a circular in cross section outlet through the center of which said shaft extends, a driving pulley rotatably mounted on said shaft in a fixed longi-

tudinal position by means of spaced bearings, a grinding plate carried by the inner end of said pulley, another grinding plate secured to said hopper and frame adjacent said outlet, spiral conveyor means secured to the inner end of said pulley and surrounding said shaft but having no contact therewith, one end of said shaft protruding through its bearing, a lever being transversly pivoted to said protruding shaft end midway its length, a horizontally positioned rod having its forward end horizontally pivoted to said frame, one end of said lever being adjustably secured to the rear end of said rod, a second rod slidably mounted on said frame having a spring and a stop adapted to hold the rod in a fixed rearward position but permit it to move forward against the pressure of its spring, means on the rear end of said second rod adapted to optionally engage the other end of said lever and hold it normally in its operating or inoperating positions, means on said last means adapted to require a transverse movement of the lever when moved from one position to the other.

2. A grinding device of the class described, comprising a frame having spaced bearings and a shaft rotatably and slidably mounted therein, a hopper having at its bottom an open end circular in cross section chamber through which said shaft extends, a driving pulley rotatably mounted in a fixed longitudinal position on said shaft by means of spaced bearings and being positioned adjacent the open end of said chamber, a disc having an annular grinding plate mounted on the inner end of said pulley, a stationary annular grinding plate secured to said frame and hopper adjacent the open end of said chamber, a tube within said chamber surrounding said shaft without contact therewith and being secured to the inner end of said pulley and having thereon a slidably mounted spiral conveyor, a flange on the rear end of said conveyor and a flanged collar on the rear end of said tube, a spring mounted between said conveyor and collar flanges adapted to yieldingly urge said conveyor toward said pulley, manually operated means adapted to turn and then move said shaft longitudinally to thereby temporarily increase the space between the grinding plates, adjusting means associated with said last means whereby the normal operating position of said plates may be optionally obtained.

3. A grinding device of the class described, comprising a frame having spaced bearings and a shaft slidably mounted therein, a hopper adjacent one of said bearings and having at its bottom an open end circular in cross section outlet chamber through which said shaft extends, a driving pulley rotatably mounted in a fixed longitudinal position on said shaft by means of spaced bearings and being positioned adjacent the open end of said chamber, a disc having an annular grinding plate mounted on the inner end of said pulley, a stationary annular grinding plate secured to said frame and hopper adjacent the open end of said chamber and first plate, a tube within said chamber surrounding said shaft without contact therewith and being removably secured to the inner end of said pulley and having thereon a spiral conveyor, one end of said shaft protruding through its bearing and having a lever hingedly mounted thereon intermediate its ends, a bolt having its forward end anchored to the device, one end of said lever being adjustably secured to the rear end of said bolt, the other end having means to yieldingly hold it in its normal rearward position, means whereby one end of said lever may be manually moved forwardly of said shaft independent of said yielding and adjusting means.

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