Feb. 9, 1926. 1,572,722

A. E. JACOBSON

GRINDING MACHINE

Filed Sept. 10, 1924 2 Sheets-Sheet 1

Fig. 1.

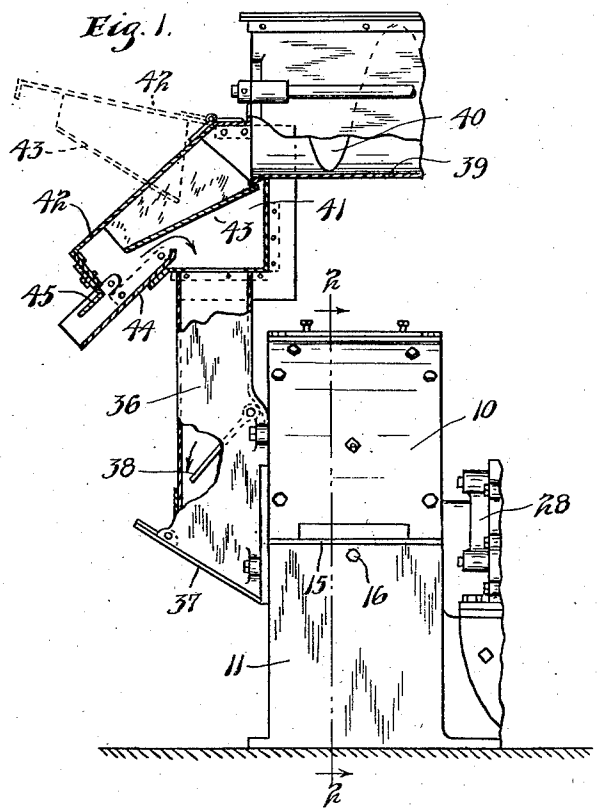


Fig. 5.

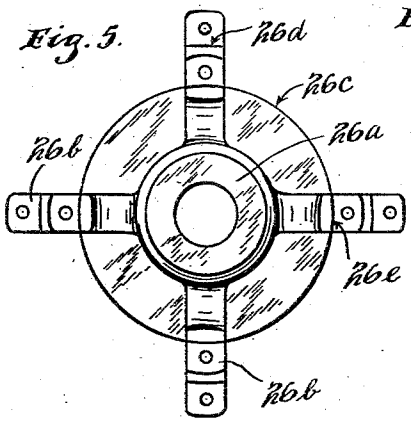
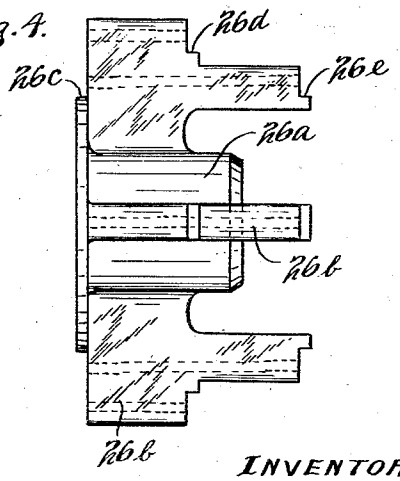


Fig. 4.



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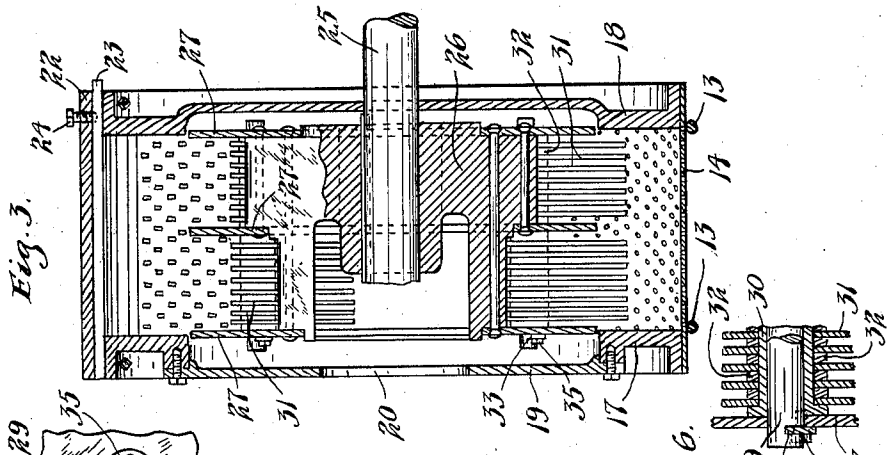


Fig. 3.

Fig. 6.

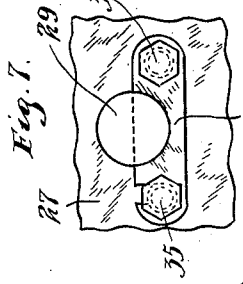


Fig. 7.

Fig. 2.

Fig. 8.

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Patented Feb. 9, 1926. 1,572,722

UNITED STATES PATENT OFFICE.

AXEL E. JACOBSON, OF MINNEAPOLIS, MINNESOTA.

GRINDING MACHINE.

Application filed September 10, 1924. Serial No. 736,908.

To all whom it may concern:

Be it known that I, AXEL E. JACOBSON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Grinding Machines; 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.

This invention relates to a grinding machine and particularly to such a machine adapted to grind grain, feed, and the like.

It is an object of the present invention to provide a grinding machine having novel and efficient grinding devices and improved means for feeding the material thereto.

It is also an object of the invention to provide a grinding machine comprising a casing and a grinding member therein including spaced disks having openings therethrough alined with an opening in one side of the casing, said grinding member acting as a fan to draw the material to be ground through said opening in the casing and through the apertures in said disks.

It is also an object of the invention to provide a grinding machine comprising a casing having a shaft extending through one side thereof and terminating adjacent the opposite side, said latter side having an opening through which material is drawn by the fan action of the grinding head.

It is more specifically an object of the invention to provide a grinding machine, as set forth in the preceding paragraph having a grinding head, including spaced disks, certain of which have central apertures therethrough for the passage of the material, said disks being secured to an openwork or spider member carried by said shaft.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to the same parts throughout the different views, and in which,

Fig. 1 is a view in side elevation of a portion of the device, certain parts being broken away, and others shown in vertical section;

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1, as indicated by the arrows;

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 2, as indicated by the arrows;

Fig. 4 is a view in side elevation of a spider member used;

Fig. 5 is a view in end elevation, as seen from the right of Fig. 4;

Fig. 6 is a view in vertical section of a portion of the beater assembly;

Fig. 7 is a view in end elevation showing the means for holding the beater shaft in place; and

Fig. 8 is a view in side elevation of a stud used in said mechanism, Figs. 3 to 8 being shown on an enlarged scale.

The present invention is an improvement upon the machine disclosed in applicant's prior Patent 1,374,207, granted April 12, 1921 and discloses more fully parts of the machine disclosed in applicant's co-pending application, S. N. 633,732, filed April 21, 1923, to which latter application reference may be had for parts not shown in the present application.

Referring to the drawings, a grinding machine is shown which is of the type shown in the co-pending application referred to. In the present case it will only be necessary to consider certain parts of the machine as shown in said co-pending application. The machine comprises a casing 10 of generally cylindrical form having substantially vertical side walls. The lower portion of the casing is formed by the end 11 of the main base of the machine, which portion 11 has curved end walls and an open bottom. Flanges 12 project inwardly at the upper portions of member 11 and are apertured to receive a pair of spaced curved rods 13 threaded at their ends to receive nuts bearing on top of the flanges 12. The rods 13 support a screen 14, the ends of which project upwardly at the outside of the lower portion of the top of casing 10. Said lower portion is formed with downwardly inwardly beveled surfaces against which the ends of screen 14 are clamped by sliding plates 15 having downwardly extending flanges and resting upon the top of the member 11. The members 15 are pushed inwardly against the screen by headed screws 16 threaded in the member 11. The base member 11 supports and has secured thereto front and rear rings 17 and 18, respectively. These rings are of channel shape in cross section, as clearly shown in Fig. 3 and the front ring

has bolted thereto a plate 19 forming the front side wall of casing 10, which side wall has a central or axial opening 20 therethrough. The top portion of casing 10 is formed by a plurality of grinding plates 21 and 22. Said plates rest upon the rings 17 and 18 and are bolted thereto by bolts extending through the outer flanges of said rings. The plates 21 have roughened or corrugated grinding surfaces thereon while plate 22 carries a plurality of transversely extending grinding bars 23 held in place by the screws 24. The rear ring 18 is provided with an integral central plate forming the rear wall of the casing and a shaft 25 extends through this rear wall passing through an aperture therein, in which it snugly fits, said shaft being supported in bearings 28 in the base of the machine, the main portion of which is not shown. The shaft 25 is adapted to be driven by a belt or motor from the customary belt pulley, as shown in applicant's co-pending application. The shaft 25 has keyed thereto an openwork or spider member 26. This member (see Figs. 2 to 5) comprises a central hub 26^a and radially extending arms 26^b. At one end the member 26 has a projecting ring or flange forming a shoulder 26^c and the arms 26^b are stepped, respectively, to form shoulders 26^d and 26^e. The member 25 has securred thereto a plurality of disks 27, said disks having central or axial apertures or holes of the same diameter as the diameter of the surfaces of the shoulders 26^c, 26^d, 26^e, and said disks are secured, respectively, to said shoulders, as clearly shown in Fig. 3, said disks being secured to the arms 26^b by rivets passing through said arms and having their heads countersunk in said disks. With this structure it will be seen that the combined structure of the shaft 25, spider 26 and disks 27 is closed at the rear by the rear disk 27 and the spider, but that there are openings between the arms 26^b and through the apertures in the front disks 27. The apertures in the front disks 27 are alined with the opening 20 in the front wall 19 there being an unobstructed circular opening through front disk 27 and an unobstructed annular opening through the intermediate disk 27.

Outward of the openings in the disks the same are bored to receive shafts 29 extending therethrough and extending somewhat beyond the outer surface of the outer disks. Said shafts carry between said disks headed bushings 30 on which are pivotally mounted a series of spaced beater blades 31 having spacing washers 32 therebetween. The outer sides of the outer disks 27 have swinging plates 33 bolted thereto having a hook slot at one end adapted to embrace a shoulder portion 34 of headed studs 35 secured in said disks. The hook plates 33 are disposed to pass partially across the apertures in the disks 27 and enter slots in the shafts 29 and thus hold the shafts in place. The studs 35 are tightened to hold plates 33 in position and centrifugal force also tends to hold said plates in place should studs 35 become loose.

Secured to the front of the casing 10 is a vertical chute 36 having an open side communicating with the opening 20 in the front wall of the casing. The lower part of the chute is formed as a swinging door 37 and said chute also has pivoted to one side thereof and extending thereacross an adjustable air baffle 38. The material is fed to the machine through a trough 39 having therein a screw conveyor 40. The conveyor 40 delivers the material from the trough into a casing 41 disposed directly above the chute 36, which casing has a swinging top section 42 carrying therebeneath a chute or spout 43. The upper end of spout 43 normally is disposed beneath the discharge over and above an inwardly and upwardly extending bottom plate 44 of the casing 41. The lower front wall of casing 41 carries an adjustable angle plate 45 movable toward and from the bottom plate 44. The top plate 42 is adapted to be swung upwardly, as indicated in dotted lines in Fig. 1 and is frictionally mounted so that it will stay in any adjusted position.

In operation, the material to be ground, such as grain of various kinds, will be fed through the trough 39 by the conveyor 40 and will drop into the spout 43. Power being applied to the machine the shaft 25 and the grinding head comprising member 26, disks 27 and the beaters carried thereby, will be rapidly rotated. This grinding head, owing to its construction, acts as a fan and creates a strong draft through the opening 20 in the side wall of the casing and hence through the chute 36. The material discharged at the lower end of spout 43 tends to drop down on the bottom plate 44 but is carried by the air current up over the top edge of the plate 44 and down into the chute 36, from which it is drawn into the casing 10 through the opening 20. Any heavy foreign material, such as stones or nails will drop onto the plate 44 and be discharged from the machine. Heavy articles may also collect in the bottom of chute 36 and on the door 37. The amount of air entering the chute through the casing 41 may be regulated by adjustment of the plate 45. When certain materials are being ground the use of the separating casing 41 is undesirable and at this time the top plate 42 is swung upwardly, as shown in dotted lines in Fig. 1 and the material is discharged directly from trough 39 into chute 36.

The material entering the casing 10 passes through the opening in the front disk 27 and

part of this passes between this disk and the next disk. Part of the material is also drawn through the intermediate disk or disks so that the material is nicely distributed between the various disks and then passes outwardly radially and is engaged by the beaters 31. The material is ground by the beaters 31 and by the same in co-operation with the cylindrical surface of the casing 10 and the ground material is discharged through the screen 14, the exit of the material being assisted by the draft of air forced through said screen by the fan action of the grinding head. The air baffle 38 can, of course, be adjusted to give the desired action on the material in the chute 36. It will also be noted that the beater units on the bushings 30 between each pair of disks can be released by swinging the hook plates 33 out of the slots in the ends of shafts 29 and then removing said shafts longitudinally through the disks.

From the above description it is seen that applicant has provided a simple, efficient and rugged grinding mill, the parts of the mill are comparatively few and simple and there are few adjustments to be made and little attention is necessary for maintenance. The device has been amply demonstrated in actual practice and is being commercially made and sold.

It will, of course, be understood, that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of applicant's invention, which, generally stated, consists in a device capable of carrying out the objects above set forth, such as shown and described and defined in the appended claims.

What is claimed is:

1. A grinding machine having in combination, a substantially cylindrical casing having one closed side and an axial opening in its other side, a shaft extending axially of said casing through said closed side, a rotary grinding head in said casing comprising a plurality of spaced disks disposed at right angles to said shaft, said disks except the one adjacent the closed side of the casing having central openings therethrough, and means secured to said shaft having spaced arms disposed between and secured to said disks and affording openings through said latter disks for material entering said axial opening to pass therethrough, said means and the disk adjacent the closed side of said casing forming an imperforate side of said grinding head.

2. A grinding machine having in combination, a substantially cylindrical casing having one closed side and an axial opening in its other side, a shaft extending axially of said casing through said closed side, a rotary grinding element in said casing comprising a plurality of spaced disks disposed at right angles to said shaft, the one of said disks adjacent said opening in said casing having a central opening therethrough forming an unobstructed passage adjacent the center thereof and adjacent said axial opening in the casing.

3. A grinding machine having in combination, a cylindrical casing having substantially vertical side walls, one of which has an axial opening therein, a shaft extending through the other side of said casing, a grinding member in said casing comprising spaced disks carrying beaters therebetween, the disk remote from said side opening being imperforate, the other disks having central apertures therethrough alined with said axial opening in said side wall, said grinding head comprising a spider secured to said shaft having arms projecting toward said axial opening whereby an unobstructed annular opening is provided through said other disks acting as a fan to draw material to be ground into said opening and through said apertures.

4. A grinding machine having in combination, a cylindrical casing with substantially vertical side walls, one of which has an axial opening therein, said casing having an imperforate grinding surface in its upper portion and a screen in its lower portion, a rotary grinding member in said casing comprising spaced disks carrying swinging beaters therebetween, a shaft projecting into said casing, and an openwork member secured to said shaft to which said disks are secured having a hub disposed some distance from said axial opening and arms projecting radially from said hub and toward said axial opening and secured to the one of said disks adjacent said axial opening, the disks adjacent said side wall having central apertures therethrough whereby openings are formed through the disks and said openwork member, said grinding head acting as a fan to draw air and material through said opening in the side wall and through said disks and openwork member.

5. A grinding machine having in combination, a casing having substantially vertical side walls, one of which is imperforate and one of which has a central opening therethrough, a shaft extending through said imperforate wall and snugly fitted therein and terminating adjacent the other side wall, a grinding member carried by said shaft comprising disks spaced longitudinally of said shaft, the one of said disks adjacent said side having said central opening having a central aperture therethrough alined with the said opening in said casing wall, and means carried by said shaft and extending inwardly from said disk for supporting the same and leaving its central opening unobstructed, and grinding mem-

ber constituting a fan for drawing material through said opening and apertures.

6. A grinding machine having in combination, a substantially cylindrical casing having one closed side and an axial opening in its other side, a shaft extending axially of said casing through said closed side, a rotary grinding element in said casing comprising a plurality of spaced disks disposed at right angles to said shaft, the one of said disks adjacent the closed side of the casing being imperforate and the other disks having central openings therethrough alined with the axial opening in the side of said casing, and means secured to said shaft and supporting said disks and forming an unobstructed circular passage through the disk adjacent said axial opening, and an unobstructed annular passage through the disk adjacent said disk.

7. A grinding mill having in combination, a casing having a feed opening thereinto, an upwardly extending chute leading to said opening and means above said chute comprising vertically spaced downwardly inclined members, the lower end of said upper member extending an appreciable distance over the upper end of said lower member, whereby the perpendicular from the lower edge of said upper member intersects the lower member an appreciable distance from its upper end, means for feeding the material to be ground onto said upper member, a grinding member in said casing comprising beaters constituting a fan to draw air through said opening whereby the material to be ground passing off said upper member will be lifted upward over the upper edge of said lower member and be drawn through said opening into said casing and heavy foreign material will pass downward onto said lower member.

8. The structure set forth in claim 7, said second mentioned casing having a hinged top plate carrying said spout adapted to be swung upwardly whereby material will be received directly into said chute.

9. A grinding mill having in combination, a grinding casing having a feed opening thereinto, a chute leading to said opening, a member above said chute adapted to receive the material having an inclined bottom terminating at its upper end adjacent said chute and a discharge opening at the lower end thereof, an inclined swingable spout in said member on which the material is charged having an end portion overlapping and vertically spaced from said inclined bottom, a grinding member in said first mentioned casing constituting a fan adapted to draw air through said first mentioned chute and said discharge opening and through the material discharged from said last mentioned chute whereby said material is drawn into said first mentioned casing and chute and heavy foreign articles pass out of said member on said inclined bottom.

10. The structure set forth in claim 9, and an adjustable means for varying the size of said discharge opening in said member whereby the material drawn into said casing may be varied.

11. A grinding mill having in combination, a casing having a feed opening thereinto, a chute leading to said opening, a member above said chute having vertically spaced overlapping inclined members, the upper one of which receives the material, a grinding member in said first mentioned casing constituting a fan adapted to draw air between said inclined members and carry the material to be ground into said first mentioned chute, any heavy foreign articles being discharged from the lower inclined member said upper inclined member being swingable out of alinement with said chute.

12. The structure set forth in claim 1, said central openings in said other disks being of different sizes according to the location of said disks relative to said axial opening, the disks most remote from said axial opening having the largest openings therethrough.

13. A grinding machine having in combination, a substantially cylindrical casing, a shaft extending axially of said casing, a grinding head carried by said shaft and comprising a plurality of spaced disks having openings therethrough at their central portions, a head secured to said shaft having spaced means extending to and secured to said disks so that unobstructed openings through said disks are formed adjacent the centers thereof.

In testimony whereof I affix my signature.

AXEL E. JACOBSON.