May 22, 1928. 1,670,714

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ATTRITION GRINDER

Filed Jan. 4, 1924

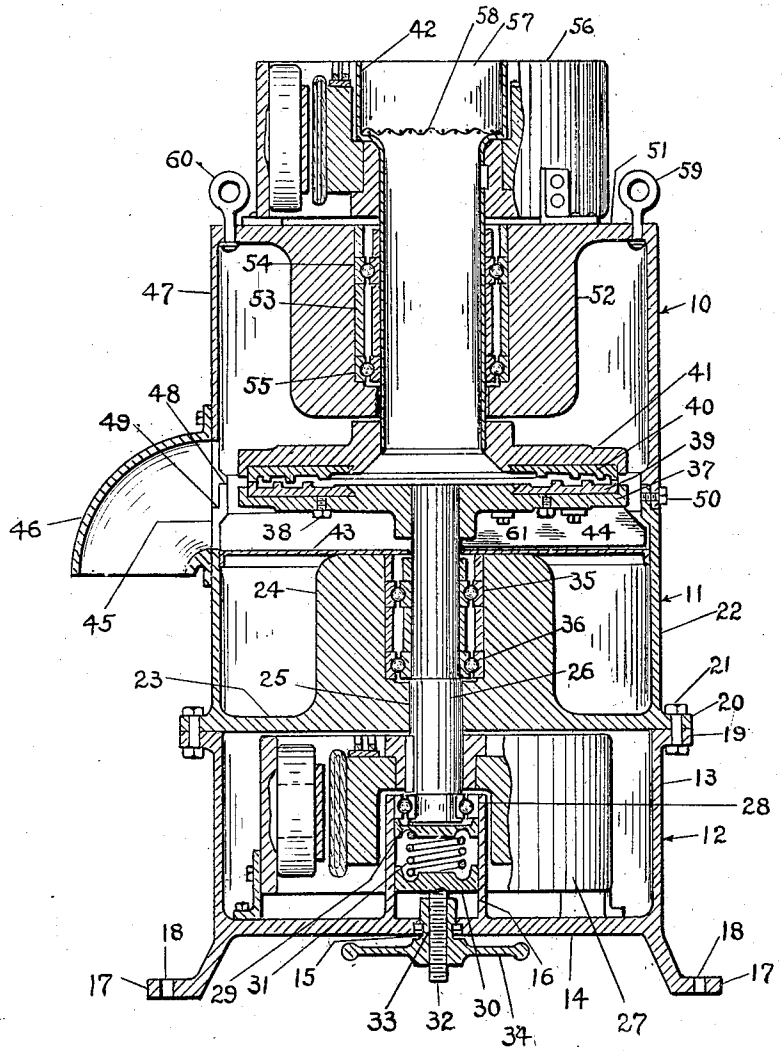

Fig. 1.

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Patented May 22, 1928. 1,670,714

UNITED STATES PATENT OFFICE.

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ATTRITION GRINDER.

Application filed January 4, 1924. Serial No. 684,360.

This invention relates to milling machines or attrition grinders in general and more especially to attrition grinders for use in grinding cracked corn, whole wheat, rye and other flour.

Among the objects of the present invention it is aimed to provide a vertical attrition grinder in which the grinding plates are disposed in horizontal planes.

It is also an object of the invention to provide in a vertical attrition grinder, means for independently rotating the grinding faces, either at the same rate of speed, at different rates of speed one to another, or in different directions.

It is still a further object of the invention to provide means whereby the grinding surfaces may be conveniently and yieldably adjusted one to another.

As a further object of the present invention it is aimed to provide a hopper or receiver for the material to be ground having a support that is rotated and at the same time screens the material being received, to separate out any foreign substance that may be injurious to the working parts of the machine and which foreign substance it may be desirable to eliminate from the materials being milled.

With the machines heretofore in use considerable difficulty has been encountered in so disposing and adjusting the grinding faces, and feeding the material to be ground so that the wear may be evenly distributed. To this end it is an object of the present invention to provide an attrition grinder having grinding faces disposed in horizontal planes and a feeding conduit centrally located to the grinding faces, so that the material may be received at the inner centrally located zone of the grinding faces and gradually fed out radially in all directions, so as to insure an even distribution of wear upon the grinding faces.

Still another object of the invention is to provide an attrition grinder having grinding faces disposed in horizontal planes, from the peripheral edges of which the resulting milled material is discharged, and having an inclined discharging chute to receive the resulting milled material, and direct the same to the discharge.

In the present invention, it is also aimed so to dispose and locate the several active parts to provide a compact machine utilizing the available space and parts to the best advantage, with a minimum loss in space, material and energy expended.

It is a further object of the invention to produce a machine of maximum efficiency, at a minimum cost of production.

These and other features, capabilities and advantages of the invention will appear from the subjoined detail description of one specific embodiment of the invention illustrated in the accompanying drawings, in which,

Fig. 1 is a vertical section of the attrition grinder.

In the embodiment illustrated the attrition grinder is shown as comprising three main housing members consisting of suitably formed castings 10, 11, and 12. For convenience of description, the castings 11 and 12, will be referred to as constituting the lower housing portion, and the casting 10 as forming the upper housing portion.

The casting 12 preferably has an annular wall 13, a floor or base portion 14, in which there is a central opening 15, and surrounding the opening 15 an upwardly extending annular journal box forming wall or fixed sleeve 16. The casting 12 is also preferably provided with suitable anchoring means such as the feet 17, extending downwardly from the lower annular edge thereof and provided with bolt openings 18, to receive bolts for securing the feet 17, and the casting 12 to the floor or suitable supporting platform. The upper edge of the wall 13 is provided with an annular flange 19 to receive the flange 20 of the casting 11, in which flanges 19 and 20 there are formed registering bolt openings to receive the bolts 21 for anchoring the castings 11 and 12 to one another.

The casting 11 as illustrated is provided with an annular wall 22, a base 23 having an enlarged central portion 24, extending upwardly from the base 23, and through which central portion 24, there is provided a shaft receiving central opening 25 to receive the shaft 26 which is connected to the motor 27 which is preferably secured to the base 14. The lower end of the shaft 26 forming as it does in the present instance the shaft in the motor 27 is provided with suitable ball bearings 28, disposed in the upper end of the journal box 16. The ball bearings are yieldably supported in place by means of the disk 29, resiliently spaced from the disk 30 by the spring 31. The lower disk 30 is further provided with a screw-threaded stud 32, operating in the rotatable sleeve 33 an-

chored to the floor 14. The sleeve 33 projects below the floor 14 and has secured thereon a suitable hand wheel 34 whereby the lower disk 30 can easily be adjusted in a vertical direction and thereby in turn yieldably adjust the disk 29 supporting the ball bearings 28, to provide a yieldable vertical adjusting means for the shaft 26. The enlargement 24 is also preferably provided with the ball bearings 35 and 36 to aid the free running of the shaft 26 in its shaft receiving opening 25. The yieldable vertical adjusting means for the shaft 26 just described forms an important part of the present invention.

The upper end of the shaft 26 is illustrated as having secured thereto the lower grinding face support 37 which by means of the bolts 38 has secured to the upper face thereof the annular grinding plate 39 to cooperate with the downwardly facing grinding plate 40 secured to the upper grinding face support 41 which is in turn secured to the sleeve or tubular receiver 42.

The casting 11 has a platform 43 disposed therein and secured to the annular wall 22, in position to receive the milled material from the outer annular edges of the grinding face supports 37 and 41, to direct the same to the discharge opening 45 formed in the wall 22, and communicating with the discharge spout 46 secured to the upper casting 10. For insuring the discharge of the ground material from the platform 43 to the spout 46, there is provided the scraper plate 44 secured to the bottom of the grinding plate support 37 by any suitable means such as the bolts 61. It will be understood that the ground material will be discharged on the outer portion of the platform 43, and that with the centrifugal force transmitted to it by the rotative sweep of the scraper arm 44, the ground material when reaching the spout 46 will readily discharge therethrough.

The casting 10 comprises essentially an annular wall 47 which is preferably connected to the casting 11 by the shouldered flanges 48 and 49 formed on the opposing edges of the castings 10 and 11 respectively and secured in position by the bolts 50. The shouldered flanges 48 and 49 as illustrated facilitate the removal of the casting 10 whereby access to the grinding plates 39 and 40 is readily had for the purpose of examination, replacement, repair and the like. The shouldered flanges contribute materially to facilitate the proper alining of the castings 10 and 11 and therewith of the grinding plates 37 and 39, to prevent injury to the several working parts. The annular wall 47, as an integral part thereof, is provided with the upper enclosure portion 51, having the downwardly extending enlargement 52 provided with a centrally extending sleeve receiving opening 53 to receive the sleeve 42. For aiding the sleeve 42 in its rotation, the enlargement 52 is provided with suitable ball bearings 54 and 55.

For rotating the tubular member 42 and therewith the upper grinding face support 41 attached thereto, there is provided the motor 56 preferably secured to the upper portion 51 of the casting 10. The upper end of the tubular member 42 is enlarged as illustrated to form a hopper or receiver mouth 57 through which the material to be milled is fed to the milling faces.

The tubular member 42 is provided with a coarse mesh screen section 58 to separate out foreign substance and the like that may be fed in with the material to be milled, thus to protect the grinding faces if the substance should be in the nature of metal pieces or the like and at the same time to separate out from the material to be milled, any substances that are desired to be eliminated therefrom. Since the tubular member 42 is rotated and therewith the screen 58 also rotated, the rotative action will contribute materially to expedite the feeding of the material through such screen, both on account of the agitation subjected to the screen by such rotative action and also on account of the centrifugal force to which the material so received will be subjected to spread the material so received in all directions over the screen.

As an additional securing or steadying means, the upper portion 51 of the casting 10 is provided with link bolts 59 and 60 which may be secured to suitable overhead or overhanging supports or the like, not illustrated.

It is obvious that various changes and modifications may be made to the details of the construction without departing from the spirit of the invention set forth in the claims hereto appended.

I claim:

1. In combination, a rotary vertical hopper-forming upper tubular shaft; and opposed upper and lower grinding plates, the upper plate having a central opening and being mounted on the lower end of the tubular shaft; and a rotary screen disposed across said shaft.

2. In combination, a rotary vertical hopper-forming upper tubular shaft having an enlarged upper end forming an intermediate shoulder; a transverse rotary screen resting on said shoulder; and a pair of opposed grinding plates, the upper plate having a central opening and mounted on the upper end of said shaft.

3. In combination, a housing including a lower compartment carrying a substantially upright lower shaft, and an upper compartment removably mounted on the lower compartment carrying an upper shaft; and op-

posed grinding members mounted on the adjacent ends of said shafts respectively; said upper compartment, upper shaft and upper plate being removable together, said compartments being separable at the grinding plane.

4. In combination, a housing including a lower compartment carrying a vertical lower shaft and an upper compartment removably mounted on the lower compartment at a horizontal meeting plane carrying a hopper-forming upper shaft; said housing being cut away to form an outlet at said plane; opposed grinding plates mounted on the adjacent ends of said shafts respectively adjacent to said plane and receiving material therebetween from the upper shaft; and a chute removably secured to the upper compartment for the discharge of material therefrom.

5. In combination, a housing compartment having a lower wall having a central upwardly projecting enlargement having a lower bearing bore therein; an upper compartment having an open lower end mounted on the first named compartment and having a downwardly projecting enlargement having an upper bearing bore therein; a vertical shaft rotary in the lower bore; an upper shaft in said upper bore; opposed upper and lower grinding plates mounted on the adjacent ends of said shafts respectively; and thrust bearings on said shafts in said bores; said enlargements being of heavy metal, and each having a length and diameter greater than half the diameter of the plates.

6. In combination, a support having a lower member having a lower bearing bore therein, and a heavy upper enlargement having an upper bearing bore therein; a vertical shaft rotary in the lower bore; a thrust bearing cooperating with the lower shaft; an upper shaft in said upper bore; a thrust bearing in the upper bore cooperating with the upper shaft; opposed grinding plates mounted on the adjacent ends of said shafts respectively.

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