A. J. McCONE.

GRINDER.

APPLICATION FILED MAR. 29, 1915.

1,163,246.

Patented Dec. 7, 1915.

3 SHEETS—SHEET 1.

Fig. 1.

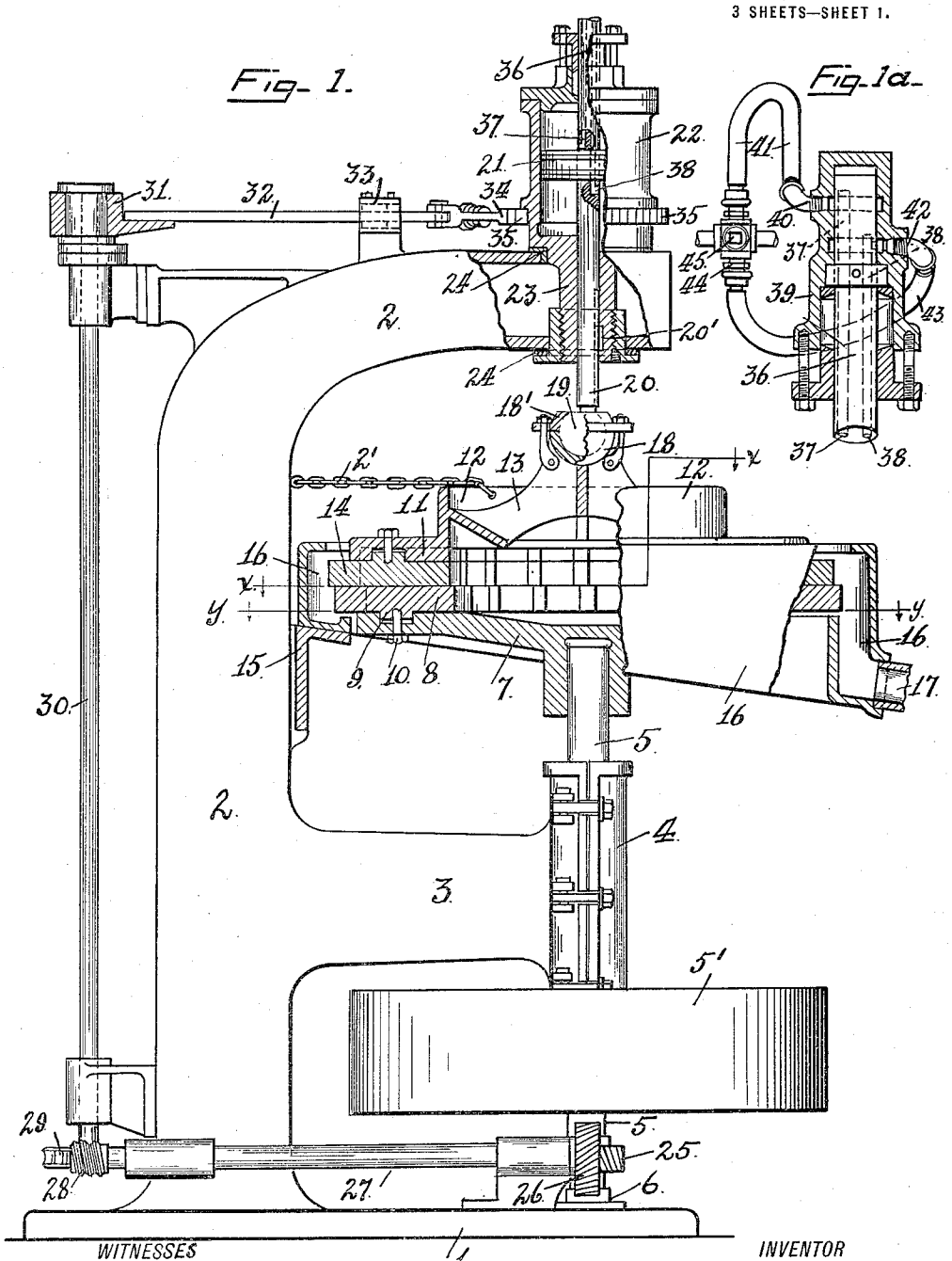


Fig. 1a.

WITNESSES

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3 SHEETS—SHEET 2.

Fig. 2.

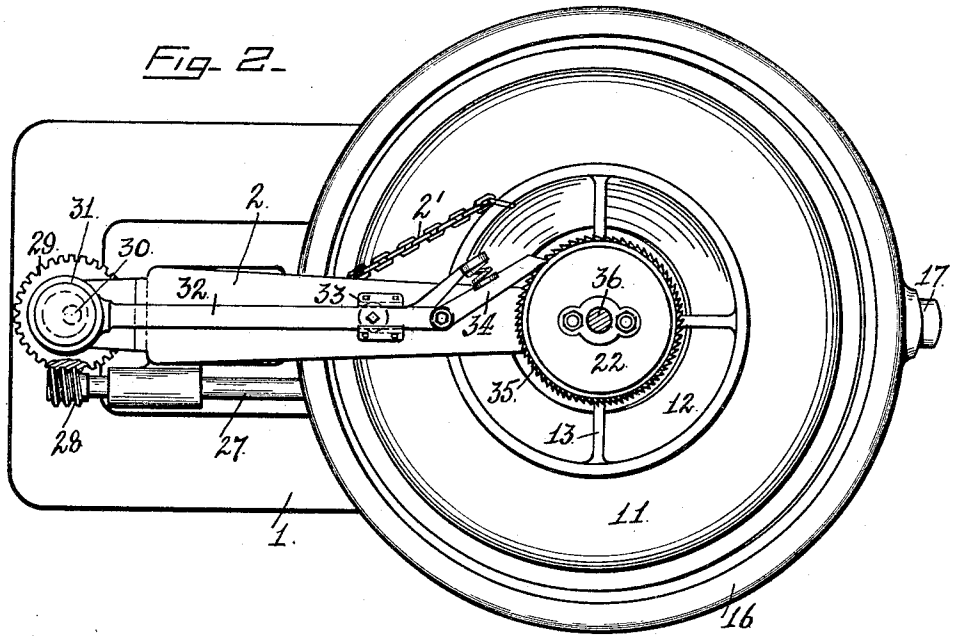
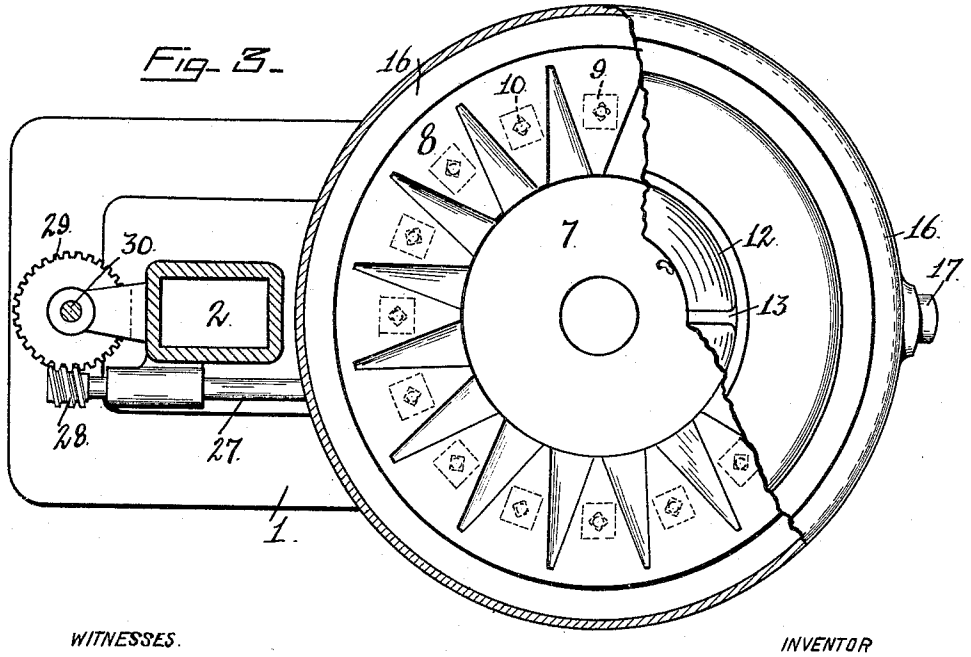


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

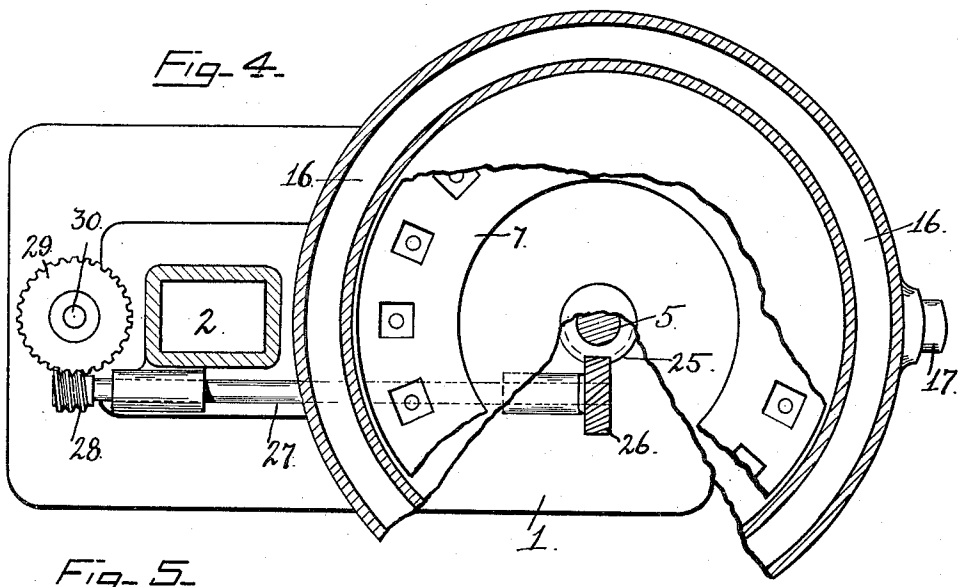
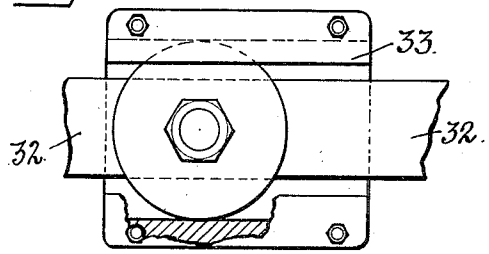


Fig. 5.



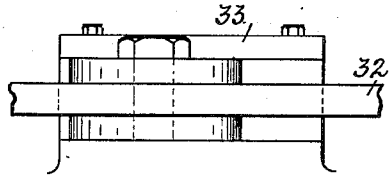


Fig. 6.

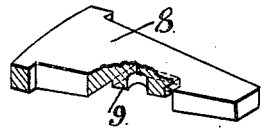
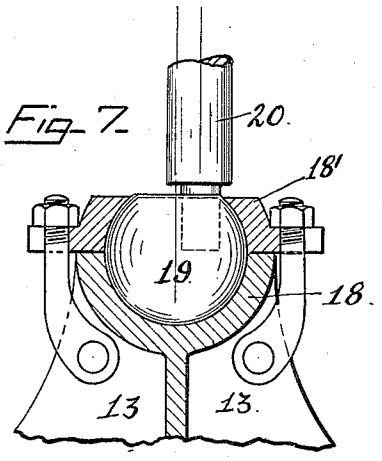


Fig. 8.

Fig. 7.



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ALEXANDER J. McCONE, OF LOS ANGELES, CALIFORNIA.

GRINDER.

1,163,246. Specification of Letters Patent. Patented Dec. 7, 1915.

Application filed March 29, 1915. Serial No. 17,742.

To all whom it may concern:

Be it known that I, ALEXANDER J. McCONE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Grinders, of which the following is a specification.

My invention relates to that class of grinders in which the shoe or wearing face of a rotating grinding member is held against the die or wearing face of a non-rotating grinding member, the material being fed in the axis of one of said members and thence passing outwardly between the wearing faces and discharging peripherally.

The object of my invention is to provide a grinder of this class in which the necessary adjustment of one of the grinding members relatively to the other in order to avoid the grooving and scoring of their wearing faces is effected automatically by simple, practical and precise means; and in which the necessary pressure to drive and hold the wearing faces of said members together is constantly imposed by fluid-pressure means, both means being intimately associated and working together upon the non-rotating member.

To this end my invention consists in the novel grinder which I shall hereinafter fully describe, by reference to the accompanying drawings in which—

Figure 1 is an elevation, partly in section, of the grinder. Fig. 1ª is a sectional elevation, enlarged, of the upper end of the piston rod 36 showing its fluid-pressure connections. Fig. 2 is a top plan of the grinder. Fig. 3 is a section on the line *x*—*x* of Fig. 1. Fig. 4 is a section on the line *y*—*y* of Fig. 1, parts being broken away. Fig. 5 is a plan view, enlarged, showing the support 33 on the column for the push lever 32. Fig. 6 is a side view of the same. Fig. 7 is a view, enlarged, of the eccentric ball connection to adjust the non-rotary grinding member. Fig. 8 is a perspective view of a portion, broken, of the wearing shoe 8.

1 is a base from which rises a column 2 having a horizontal arm 3 carrying a bearing 4 in which is mounted the vertical driving shaft 5. The lower portion of the shaft 5 carries a driving pulley 5′ and the foot of said shaft is carried in a step 6 on the base 1. To the head of said shaft is fixed the rotating grinding member 7, which is provided with an annular wearing shoe 8, said shoe being here shown as being of the deeply serrated form known in this type of mill, and secured firmly by means of a boss 9 of each tongue portion fitting in a socket in the grinding member and bolted therein as shown at 10.

Above the rotating grinding member is the non-rotating grinding member 11, the middle of which is formed with a feed hopper 12, having spaced arms 13. The member 11 is provided with a wearing die 14, similar to the wearing shoe 8 of the rotating member 7 and similarly secured.

Carried by a bracket 15 on the column 2 is a launder 16 which encircles the periphery of the grinding members and is provided with a drain 17 to conduct the ground material to the classifier, or copper-plates or other destination. The upper grinding member 11 is kept from rotating by suitable means, here shown as a chain 2′ connecting it with the column 2.

The mill, thus far described, is, in general, a well known type of grinder, in which the material is fed through the hopper 12 of the upper or non-rotating member, and, under its hydrostatic head and centrifugal force is compelled to pass outwardly between the shoe and die of the grinding members and into the launder. In this type of grinders, it is essential to provide for varying or changing the relative position of the grinding members in the plane of their wearing faces, in order to prevent the grooving or scoring of their shoes and dies and to cause these latter to wear and to remain level, fair and ungrooved; and it is also essential to apply pressure to drive and hold the wearing faces of the grinding members together, said pressure being usually applied to the upper or non-rotating member. It is in these essentials that my improvements consist, and I carry them out by an automatic adjustment of the non-rotating member relatively to the rotating member in the plane of their wearing faces, and by fluid-pressure constantly applied to said non-rotating member, the means by which the two results are effected being sufficiently intimately associated to enable them to perform their functions simultaneously without interference.

The hopper arms 13 of the upper grinding member carry a central socket 18, fitted with a removable section 18′ to admit the

ball 19, carried eccentrically upon the lower end of a shaft 20. The upper end of the shaft 20 is secured to a piston 21, which operates within a cylinder 22, said cylinder having a neck 23 which is mounted rotatably in the upper end of the column 2 upon the seats 24. The shaft 20 has lineal movement in the cylinder neck 23 but is keyed therein at 20′ against independent axial movement, so that the movement of the cylinder on its axis carries the shaft with it. It will, therefore, be seen that when cylinder 22 is moved on its axis, the shaft 20 being carried with it, will, through its eccentrically mounted ball 19 shift the upper grinding member horizontally relatively to the lower grinding member, the chain connection 2′ permitting this adjustment. Now, to provide for a relatively slow automatic adjustment of this character, I have on the lower portion of the driving shaft 5 a worm 25 which meshes with a worm gear 26 on a horizontal counter-shaft 27 carried by the foot of the column 2.

The other end of the counter-shaft 27 carries a worm 28 which meshes with a worm gear 29 on a vertical shaft 30, carried by the column 2. The upper end of the vertical shaft 30 carries an eccentric 31, to which is fitted by one end a push lever 32, guided at 33 on the column 2. The other end of the lever 32, carries a pawl 34 which engages a ratchet 35 on the cylinder 22. Though the time of the adjustment of the upper grinding member may be varied, I have found in practice that a cycle of movement once in four to six minutes is beneficial, the rotating member revolving 200 to the minute.

The fluid pressure on the upper grinding member is effected through the piston 21 to which the upper end of the shaft 20 is secured. This piston carries an upwardly extending rod 36, which passes out through the upper end of the cylinder. The rod 36 is formed or drilled with two longitudinal ports, one of which, designated by 37, communicates with the cylinder above the piston, and the other, marked 38, communicates with the space below the piston. The upper end of the rod 36 is fitted with a bearing cap 39 having a connection 40 for a flexible pipe 41. This connection communicates with the port 37 in the rod 36. The bearing cap 39 has another connection 42 for a flexible pipe 43, said connection communicating with the port 38 in the rod. The two flexible pipes 41 and 43 unite in a common pipe 44 controlled by a four-way cock 45. Fluid pressure being admitted to port 37 will drive the piston down, the pressure under the piston relieving through port 38. Thus the required pressure may be had to drive and hold the grinding members together, and this may be kept constant without any further attention or adjustment. This same pressure arrangement is made also to serve the purpose of directly lifting the upper grinding member of the mill when necessary. This is effected by the operation of the four way cock 45 admitting pressure to the port 38 and relieving through the port 37.

I claim:—

1. In a grinder, the combination of a rotatable grinding member and driving shaft therefor; an opposing non-rotatable grinding member, each member having a wearing face; and means for universally adjusting the non-rotatable member relatively to the rotatable member comprising an axially turnable and longitudinally slidable shaft, a universal eccentric connection between said shaft and the non-rotatable member, and means for automatically imparting movement to the turnable and slidable shaft.

2. In a grinder, the combination of a rotatable grinding member and driving shaft therefor; an opposing non-rotatable grinding member, each member having a wearing face, and means for universally adjusting the non-rotatable member relatively to the rotatable member comprising a rotatable and slidable shaft having a ball eccentrically mounted upon one end, a socket in the axis of the non-rotatable member, in which the ball is universally mounted, power transmitting connections from the driving shaft of the rotatable member to rotate the eccentric shaft, and means for imparting longitudinal movement to said eccentric shaft.

3. In a grinder, the combination of a rotatable grinding member and driving shaft therefor; an opposing non-rotatable grinding member, each member having a wearing face, and means for universally adjusting the non-rotatable member relatively to the rotatable member comprising a rotatable and slidable shaft having a ball eccentrically mounted upon one end, a socket in the axis of the non-rotatable member, for universal engagement with said ball, and power transmitting connections from the driving shaft of the rotatable member to rotate the eccentric shaft, said power transmitting connections including gears and shafts, a push lever, an eccentric applied to one end of the lever, and a pawl and ratchet device between the other end of the lever and said turnable shaft, and means for imparting longitudinal movement to said eccentric shaft.

4. In a grinder, the combination of a rotatable grinding member and driving shaft therefor; an opposing non-rotatable grinding member, each member having a wearing surface; and means for universally adjusting the non-rotatable member relatively to the rotatable member comprising an axially turnable and longitudinally slidable shaft, a universal eccentric connection between said shaft and the non-rotatable member, power transmitting connections from the driving

shaft of the rotatable member to rotate the eccentric shaft, and fluid-pressure means for imparting longitudinal movement to said eccentric shaft.

5. In a grinder, the combination of a rotatable grinding member and driving shaft therefor; an opposing non-rotatable grinding member, each member having a wearing surface; and means for universally adjusting the non-rotatable member relatively to the rotatable member comprising an axially turnable and longitudinally slidable shaft, having a ball eccentrically mounted upon one end, a socket in the axis of the non-rotatable member adapted to universally engage said ball, power transmitting connections from the driving shaft of the rotatable member to rotate the eccentric shaft, and fluid-pressure means for imparting longitudinal movement to said eccentric shaft.

6. In a grinder, the combination of a rotatable grinding member; an opposing non-rotatable grinding member movable to and from the rotatable member and also movable with relation to the rotatable member in the plane of the grinding faces of said members; an axially turnable and lineally movable shaft having an eccentric connection with the non-rotatable member; a piston on said shaft; an axially turnable cylinder in which said piston operates, said cylinder and shaft being locked together for simultaneous axial movement; means for turning the cylinder on its axis; and controllable fluid connections to move the piston in either direction.

7. In a grinder, the combination of a rotatable grinding member, and driving shaft therefor; an opposing non-rotatable grinding member movable to and from the rotatable member and also movable with relation to the rotatable member in the plane of the grinding faces of said members; an axially turnable and lineally movable shaft having an eccentric connection with the non-rotatable member; a piston on said shaft; an axially turnable cylinder in which said piston operates, said cylinder and shaft being locked together for simultaneous axial movement; power transmitting connections from the driving shaft of the rotatable member to rotate the cylinder; and controllable fluid-connections to move the piston in either direction.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALEXANDER J. McCONE.

Witnesses:
WM. F. BOOTH,
D. B. RICHARDS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."