955,910.

A. J. SACKETT.

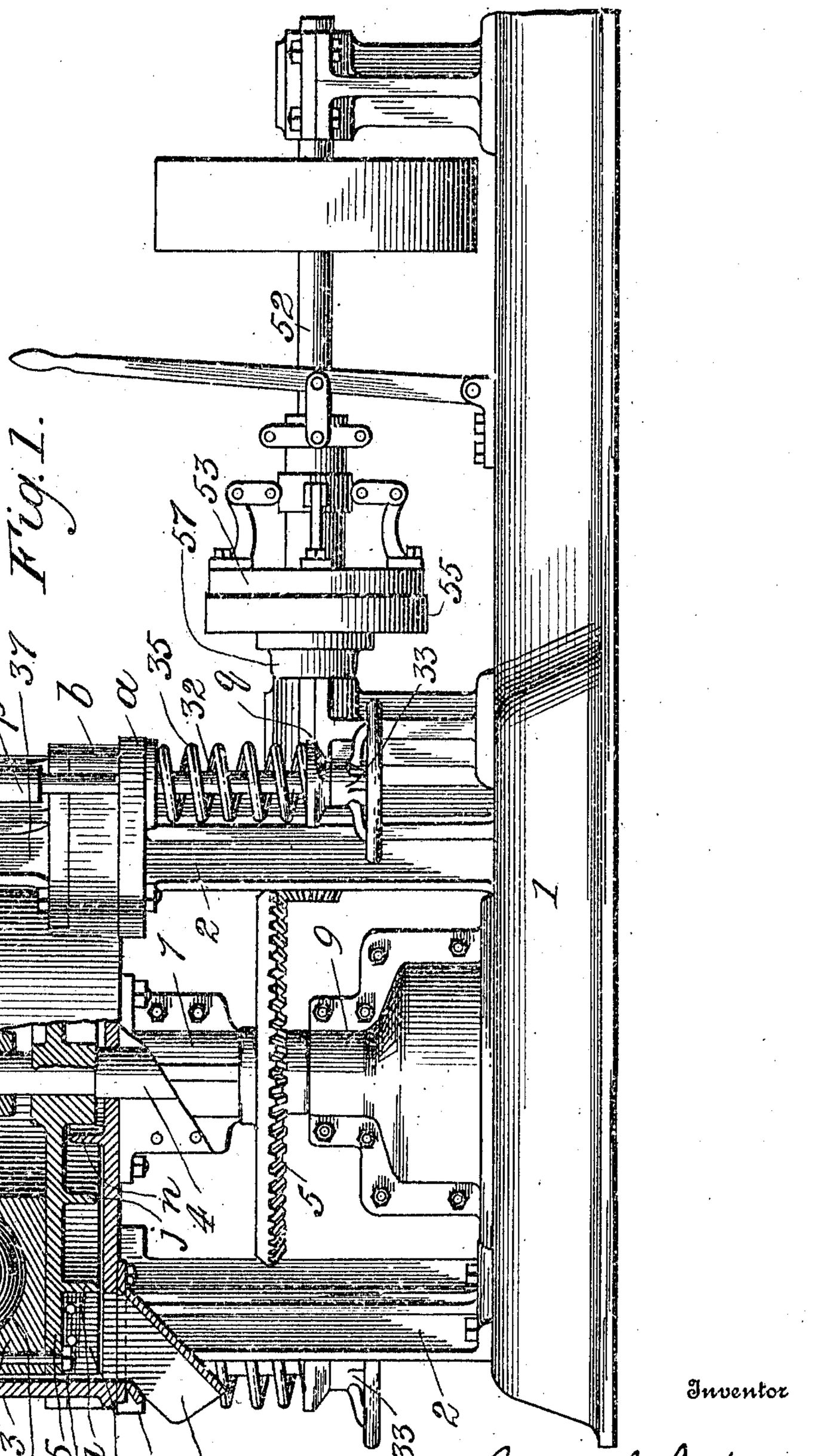
PULVERIZING MILL.

APPLICATION FILED FEB. 27, 1908.

Patented Apr. 26, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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4 SHEETS—SHEET 2.

Fig. 2.

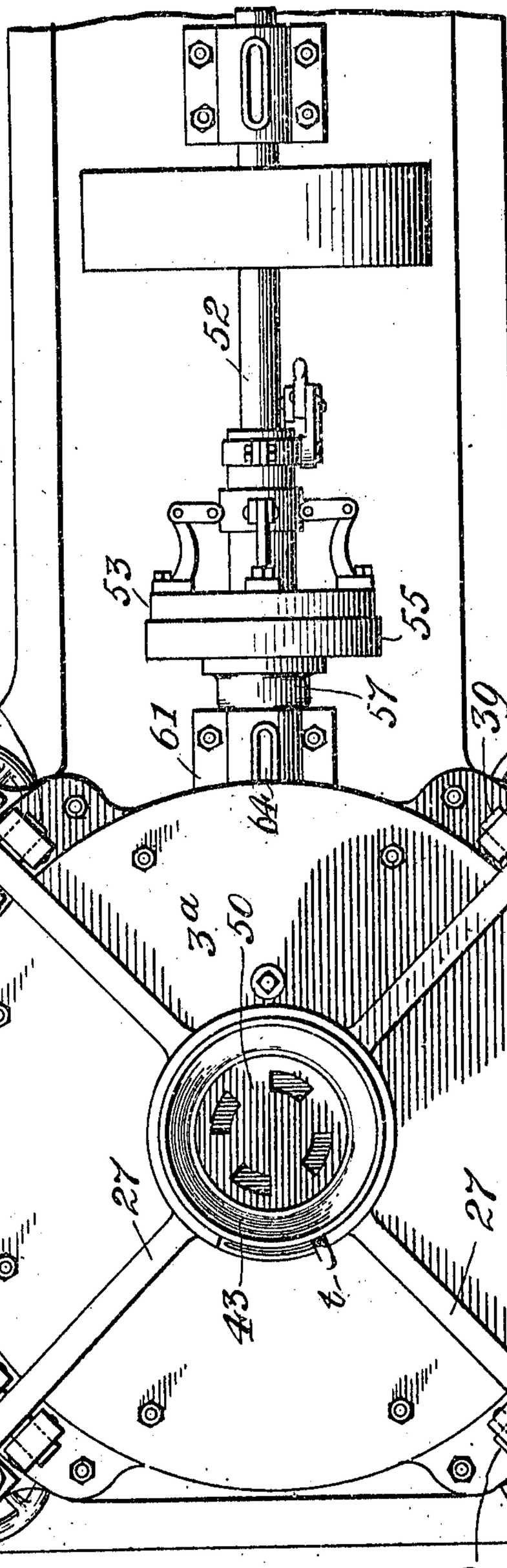
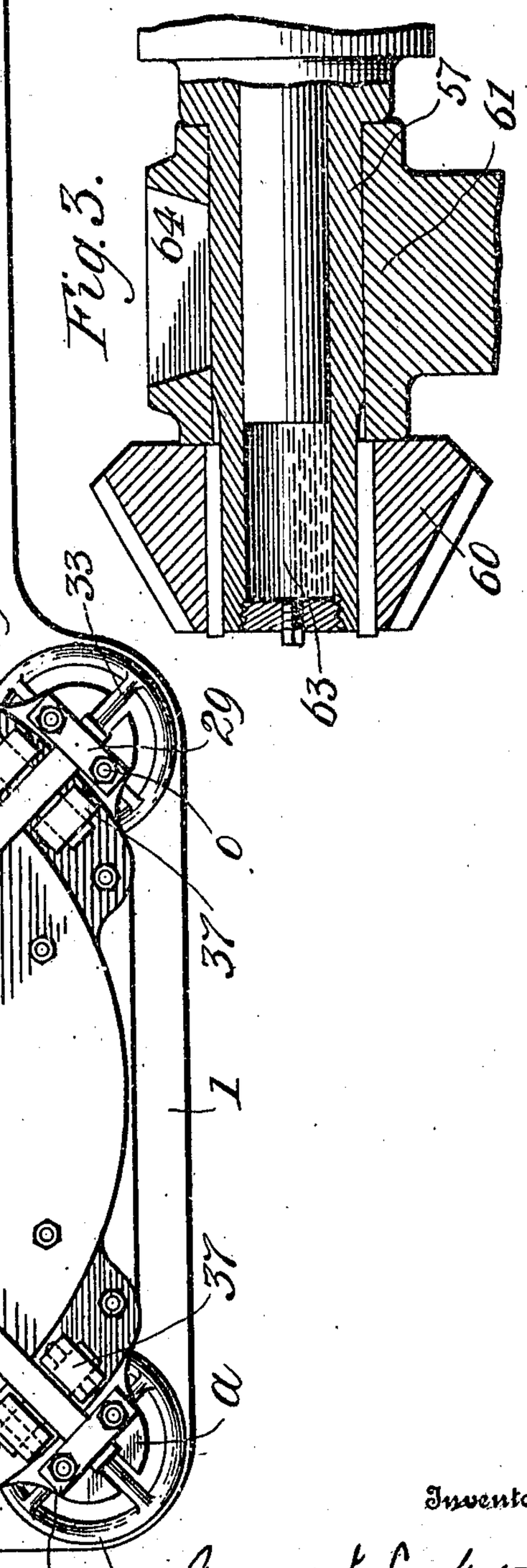


Fig. 3.



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4 SHEETS—SHEET 3.

Fig. 4.

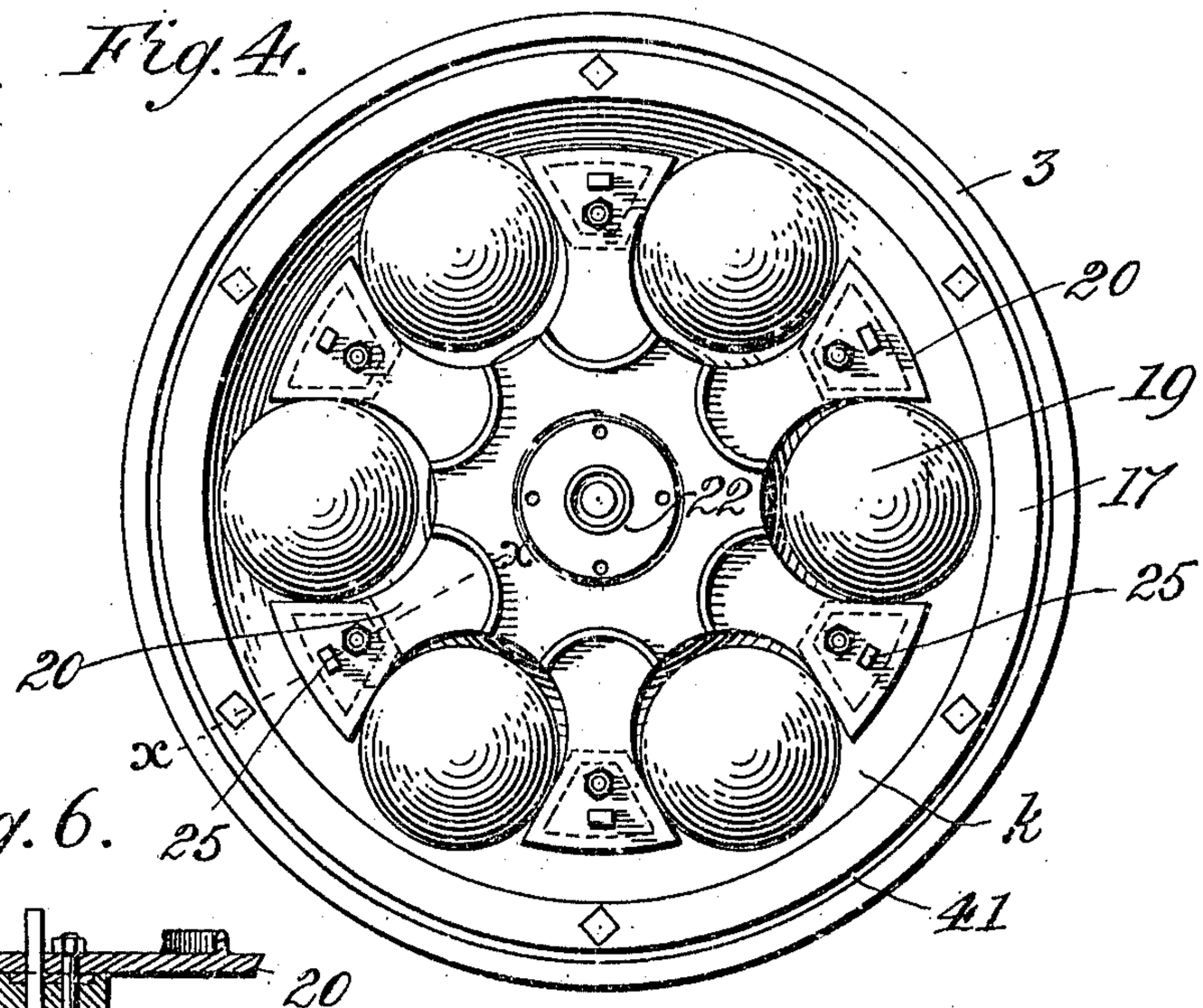


Fig. 6.

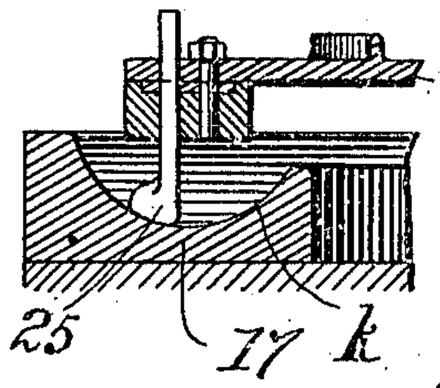
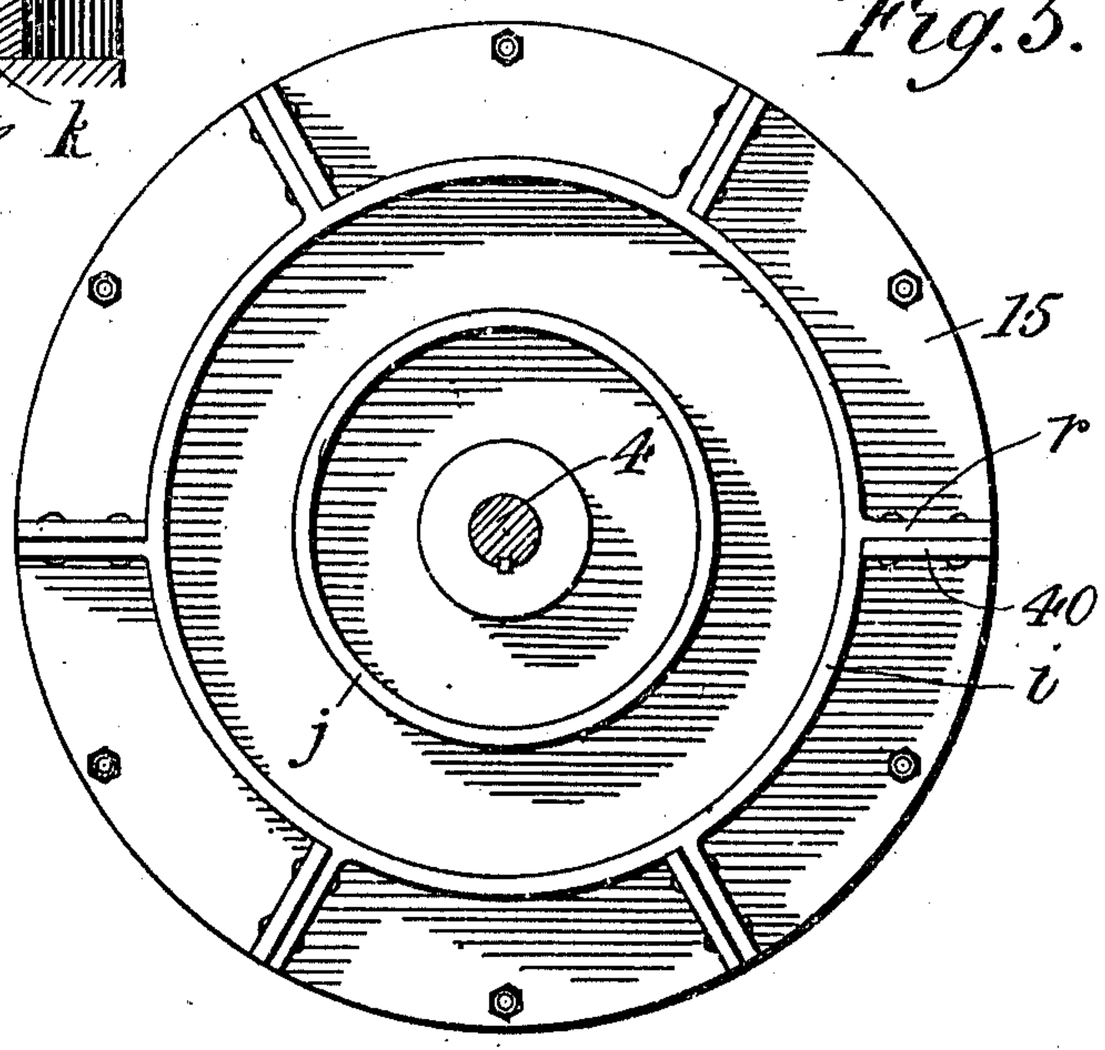


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 8.

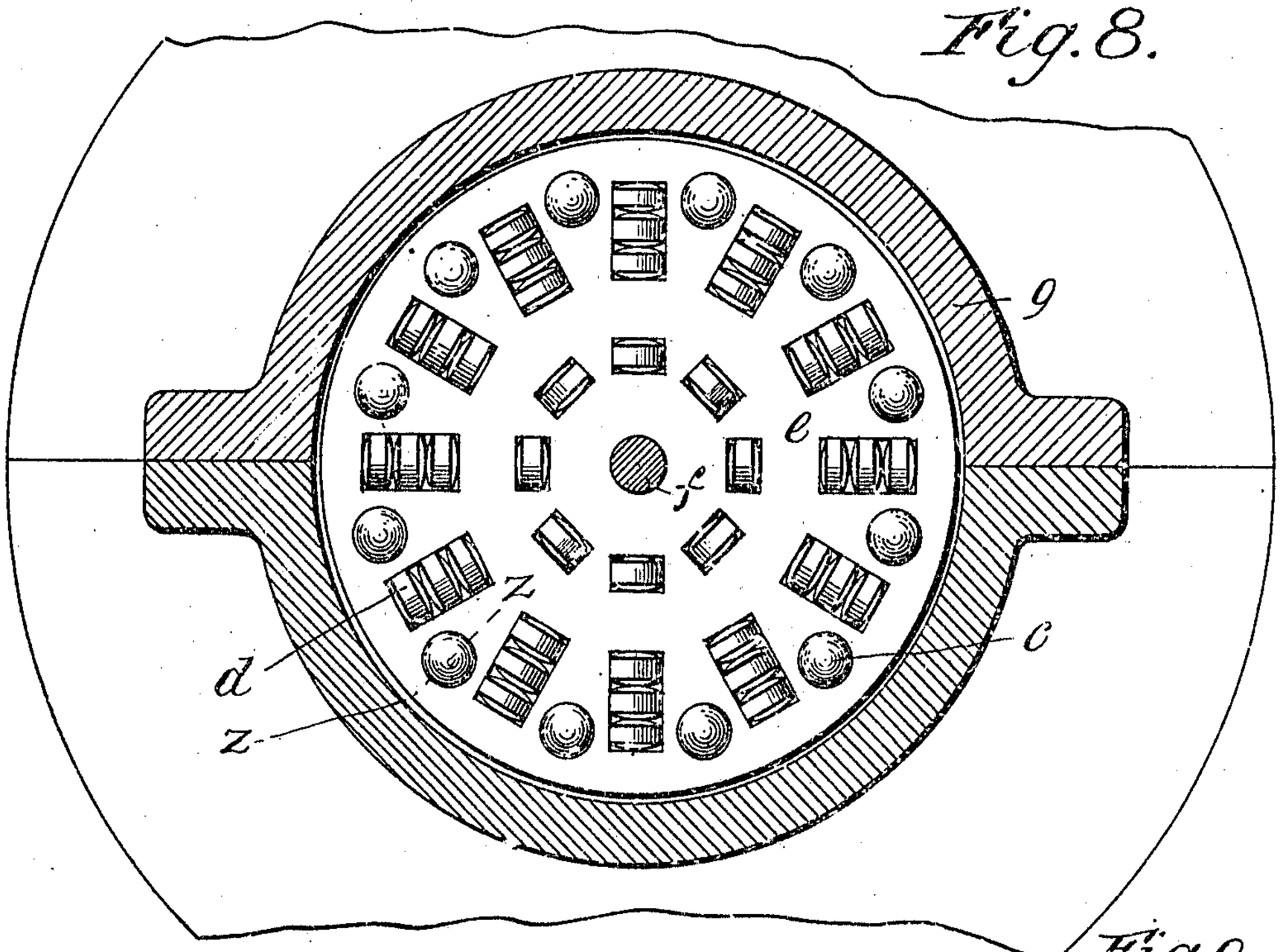

Fig. 9.

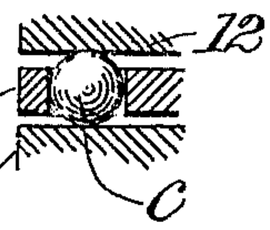

Fig. 7.

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UNITED STATES PATENT OFFICE.

AUGUST J. SACKETT, OF BALTIMORE, MARYLAND.

PULVERIZING-MILL.

955,910. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed February 27, 1908. Serial No. 418,026.

To all whom it may concern:

Be it known that I, AUGUST J. SACKETT, of the city of Baltimore and State of Maryland, have invented certain Improvements in Pulverizing-Mills, of which the following is a specification.

This invention relates to certain improvements in a pulverizing-mill adapted for the reduction of materials such as phosphate rock, for which Letters Patent No. 777,922, and 829,173 were granted to me on the 20th day of December, 1904, and the 21st day of August, 1906, respectively, to which reference should be made.

In the description of the said invention which follows reference should be made to the accompanying drawings, forming a part hereof, and in which,—

Figure 1 is a partly sectional side elevation of the improved mill, and Fig. 2 a plan of the same. Fig. 3 is an enlarged section showing a portion of the driving shaft together with its driving pinion, and certain adjacent parts of the mill. Fig. 4 is a top view of certain parts of the mill shown in Fig. 1. Fig. 5 is an underside view of a rotary disk shown in Fig. 1, and Fig. 6 an enlarged section of Fig. 4, taken on the dotted line *x—x*. Fig. 7 is an enlarged side section of the step which supports the central shaft of the mill, and Fig. 8 a section of the same taken on the dotted line *y—y*. Fig. 9 is a section of Fig. 8 taken on the dotted line *z—z*.

Referring now to the drawings 1 is the hollow base of the mill, and 2, 2 are columns erected on the base 1, which serve to support the stationary cylindrical box 3; and for the convenience of construction, the columns 2 are provided with flanges *a* at their upper ends, which are bolted to lugs *b* formed on the exterior surface of the box 3.

4 is the central vertical shaft of the mill, having thereon the tight beveled gear wheel 5. The shaft 4 rotates in an upper bearing 7 fastened to the underside of the box 3, and a lower bearing 9 is secured to the base 1. At its bottom end the shaft 4 is made tight to a circular flange 10 which is supported from the base 1 by means of the plates 12 and 13, and a system of anti-friction balls and rollers respectively denoted by *c* and *d*, which are placed in pockets is a loose disk *e* situated between the two plates, and hereinafter more particularly described. The vertical shaft 4 is centralized by a pin *f* which projects from the flange 10 and extends through the plates 12 and 13, and the loose disk *e*, and enters the base 1.

In order to produce sufficient friction between the flange 10 and the upper plate 12 to insure the rotation of the latter in the operation of the mill, without the employment of positive fastening devices, and at the same time slightly cushion the shaft, there is interposed between the said parts, a sheet of thick paper *g;* and the same expedient is employed between the base and the lower plate 13, the sheet of paper being denoted by *h*.

By reference to Figs. 8 and 9 it will be seen that the rollers *d* are placed in radially extending slots in the disk *e*, and the balls *c* in holes.

15 is a disk situated in the box 3 and fastened to the central rotary shaft 4. On its lower side it is provided with annular flanges *i* and *j* for purposes hereinafter described, and on its upper surface carries the lower grinding ring 17. This ring has a circular channel *k* in which are placed a suitable number of loose grinding balls 19, shown as six in number. The balls 19 are regularly spaced by means of a pocketed disk 20 the hub of which is loose on the central shaft 4.

The pocketed disk 20 is sustained in vertical position by a flanged cap 22 bolted thereto, and which bears upon but not attached to the upper end of the central shaft 4; and to reduce wear of the said parts, anti-friction balls are placed between them as shown in Fig. 1.

The balls 19 are yieldingly held down by the cover 3^a of the box 3, which contains a channeled ring 23 similar to the ring 17 before described; and around the space between the box and its cover, is fastened a strip *m* of some woven fabric which prevents the escape of dust from the mill.

25, 25 are plows carried by the pocketed disk 20. They project into the channel *k* in the lower grinding ring 17, and serve to stir the materials therein during the grinding operation.

To yieldingly hold down the cover 3^a with its ring 23 on the balls 17, the said cover is provided with four radial arms 27 which extend beyond the circumference of the cover; and over the ends of these arms are

placed head blocks 29 connected by bolts *o*, to the under blocks 30 which are beneath the arms.

The blocks 30 have sockets *p* in which are fastened in any suitable manner, the downwardly extending bolts 32 which pass through slots in the flanges *a* of the column 2, and are threaded and provided with tension-adjusting hand wheels 33 which serve as nuts.

Seated on the handwheels 33, are cupped, loose washers *q*, and between them and the under-side of the flanges *a*, are placed spiral springs 35 which are under compression.

To prevent rotation of the cover 3ª of the box 3 independently of the restraining influence in that direction of the bolts 32 and their attachments, there are erected on the lugs *b* of the box 3, standards 37 each having two rollers 39 which are in contact with the lateral surfaces of a radial arm 27. These rollers while performing the function for which they are adapted, do not prevent the lifting of the cover which at times take place in the operation of the mill.

By slotting the flanges *a* of the columns 2 where the bolts 32 pass through them as shown in Fig. 2, the said bolts with their attachments can be easily removed from the radial arms 27, in case it is necessary to take off the cover 3ª of the box 3 for any purpose, by first removing all tension on the spiral spring 35.

The annular flange *j* before referred to as extending from the under side of the disk 15, in connection with an upwardly extending similar flange *n* on the bottom of the box 3, (see Fig. 1) prevents ground material underneath the disk, reaching the upper bearing 7 of the central shaft 4. The other annular flange *i* is provided with radial extensions *r* (see Figs. 1 and 5.) to which scrapers 40 are fastened. These scrapers in the rotation of the disk 15 carry the ground material which falls to the bottom of the box 3, to the delivery spout 42 shown only in Fig. 1.

The ground material is thrown from the annular channel *k* in the lower grinding ring 17 by centrifugal force, and passes over the circumference of the said ring to the space 41 situated between it and the inner surface of the box 3, and thence to the bottom of the box where it is caught by the scrapers 40 and discharged from the box in the manner before described.

Materials to be ground are placed in the hopper 43 and pass thence through a grated disk 45 situated over a central opening 47 in the cover 3ª to the upper surface of the pocketed disk 20 which guides them to the grinding balls 19. A suitable gate 50 having a handle *t* (shown only in Fig. 2) is used to regulate the feed to the mill.

The cap 22 before referred to as covering the top of the vertical shaft 4 has an upwardly extending flange *u* which in connection with a downwardly extending annular flange *v* formed as a part of the cover 3ª prevents dust from the mill entering the cap which is made tubular for the conveyance of lubricating oil to the exterior of the central shaft where the same is in loose contact with the hub of the spacing disk 20. Oil is fed to the interior of the cap 20 from a suitable cup 51 by means of a pipe leading therefrom as shown in Fig. 1.

52 is the main driving shaft of the machine, carrying the constantly rotating member 53 of a friction clutch. 55 is the other member of the clutch which is fastened to a sleeve 57 (see Fig. 3) carrying the beveled pinion 60 which is in mesh with the beveled gear wheel 5. The bearing for the sleeve is denoted by 61.

In order that the clutch may be properly lubricated, the driving shaft 52 does not extend to the closed end of the sleeve 57 (see Fig. 3) thereby forming an oil chamber 63 from which oil passes around the driving shaft to between the frictional surfaces of the two members of the clutch. The exterior of the sleeve is lubricated from the oil cup 64 formed as a part of the bearing 61.

I claim as my invention:—

1. In a pulverizing mill, a stationary box having a bottom with a shaft-bearing on its underside and an annular upwardly extending flange on its upper side, a central rotary shaft which is journaled in the said bearing, a disk situated within the stationary box and secured to the rotary shaft, the same having a downwardly extending annular flange on its underside, situated exteriorly of the flange on the box, and a channeled grinding ring fastened to the rotary disk, combined with grinding balls which are supported by the said channeled ring, a non-rotative inverted channeled ring which rests on the grinding balls, and means to place a yielding pressure on the inverted channeled ring, substantially as specified.

2. In a pulverizing mill, the combination of a box, a central rotary shaft within the box, a disk secured to the rotary shaft, a channeled grinding ring which is rotated with the central shaft, a multiplicity of grinding balls supported by the channeled ring, a pocketed spacing disk to retain the balls at a uniform distance apart, the said disk being loose on the central shaft and adapted to have a rotary motion independently of the same, a hollow cap secured to the spacing disk whereby it is supported from the end of the central shaft, substantially as specified.

3. In a pulverizing mill, a box, a central rotary shaft which enters the box from the bottom, a disk situated within the box and secured to the rotary shaft, a channeled

ring fastened to the rotary disk, grinding balls supported by the channeled ring, and a non-rotative inverted channeled ring which rests on the balls, combined with a pocketed disk which is loose on the rotary shaft, carrying plows which enter the channel of the lower channeled ring and which disk serves to space the balls, the said disk being suspended by the central shaft and adapted to have a slight vertical motion independently of the said shaft, substantially as specified.

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