

Dec. 4, 1923.

1,476,143

D. BROWN

DRY PAN

Filed May 26, 1922

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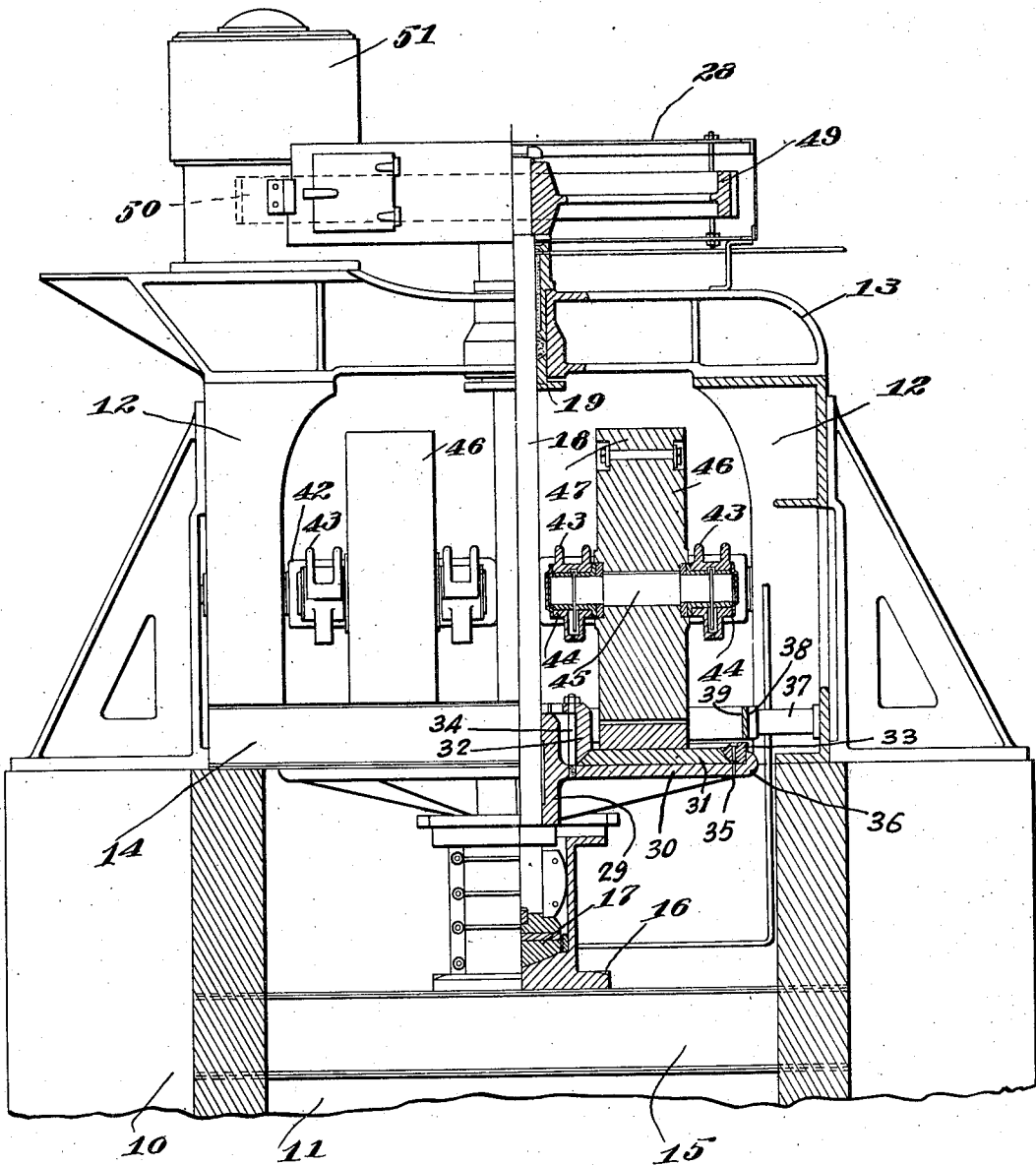


Fig. 1.

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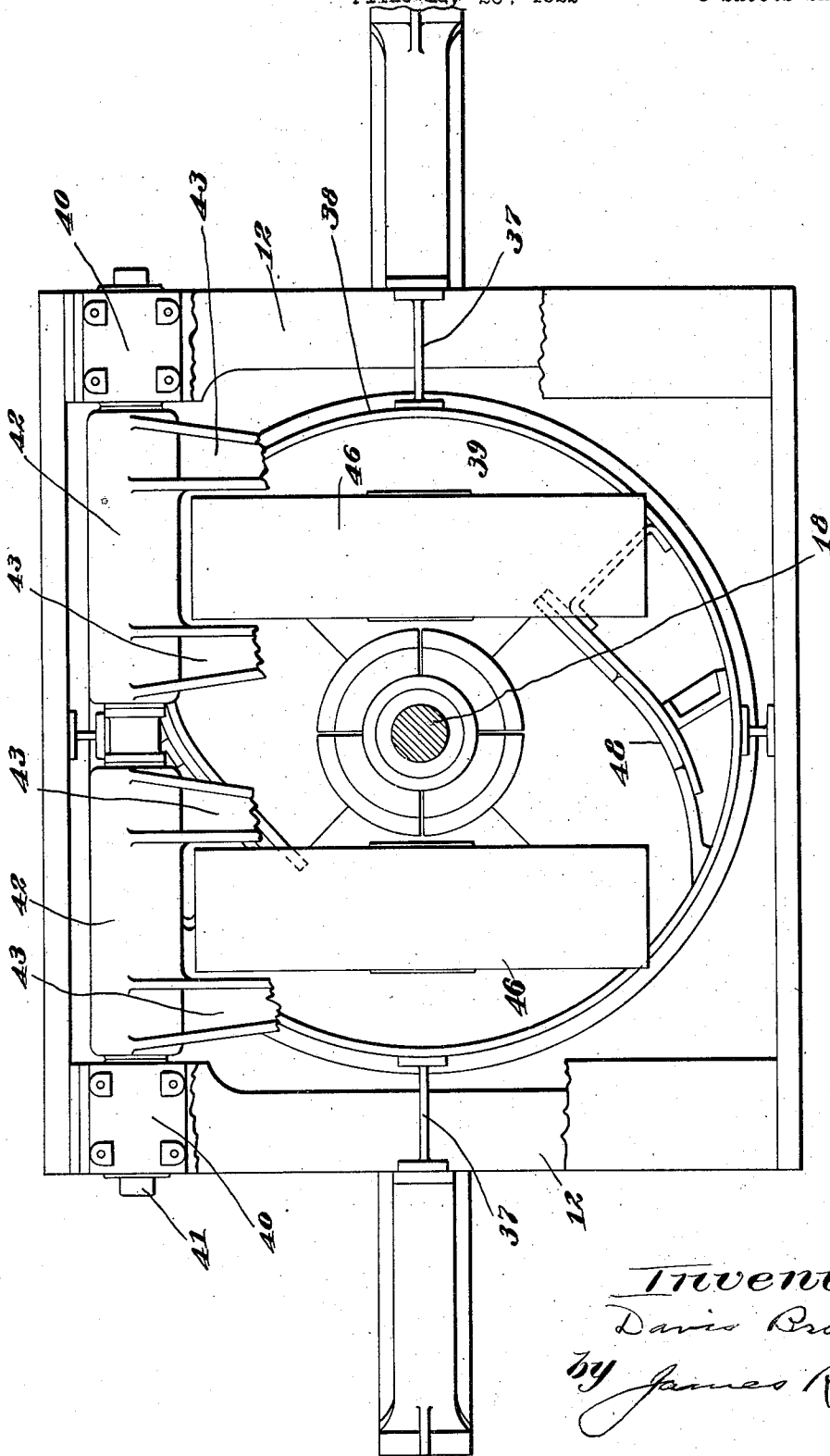


Fig. 2.

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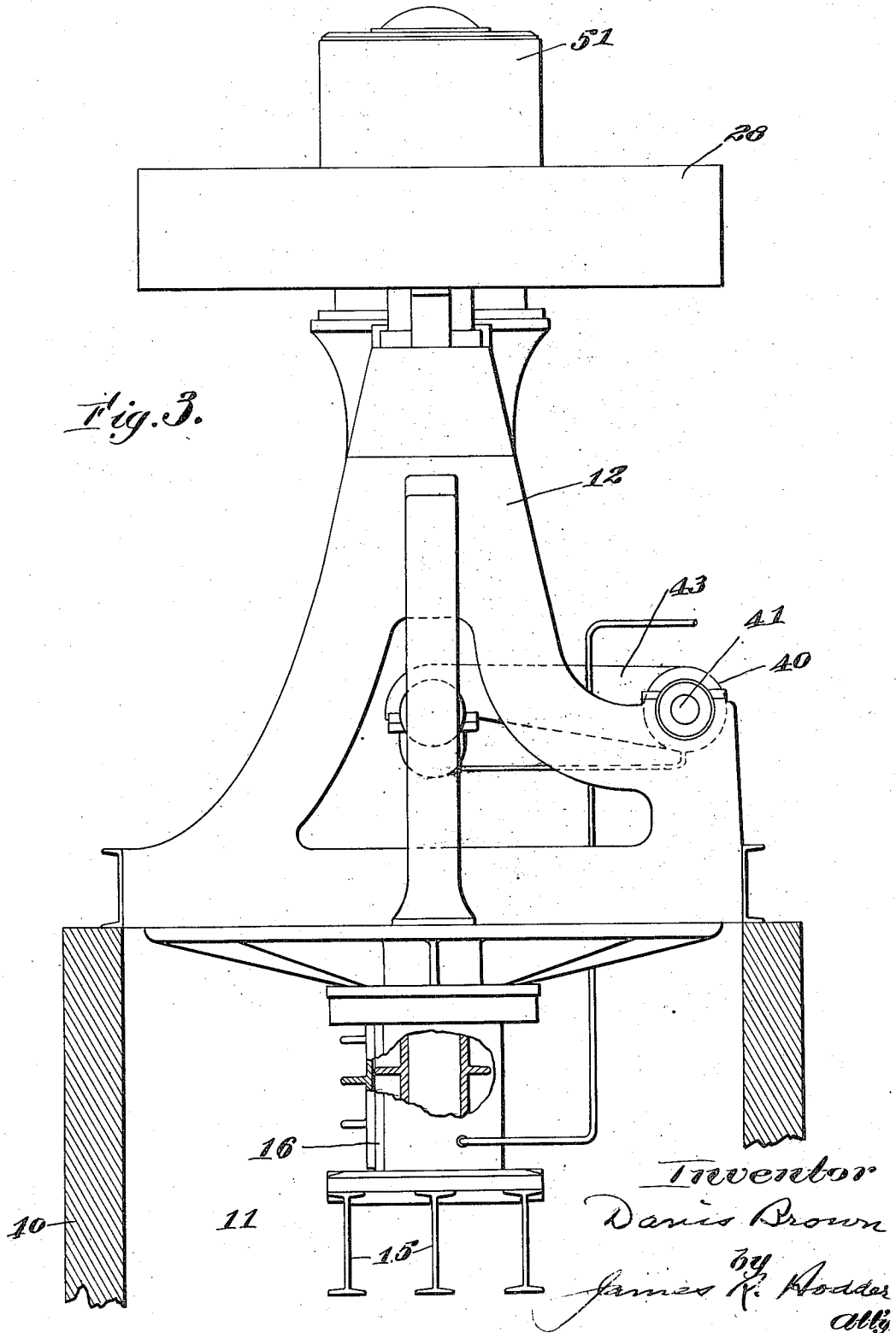
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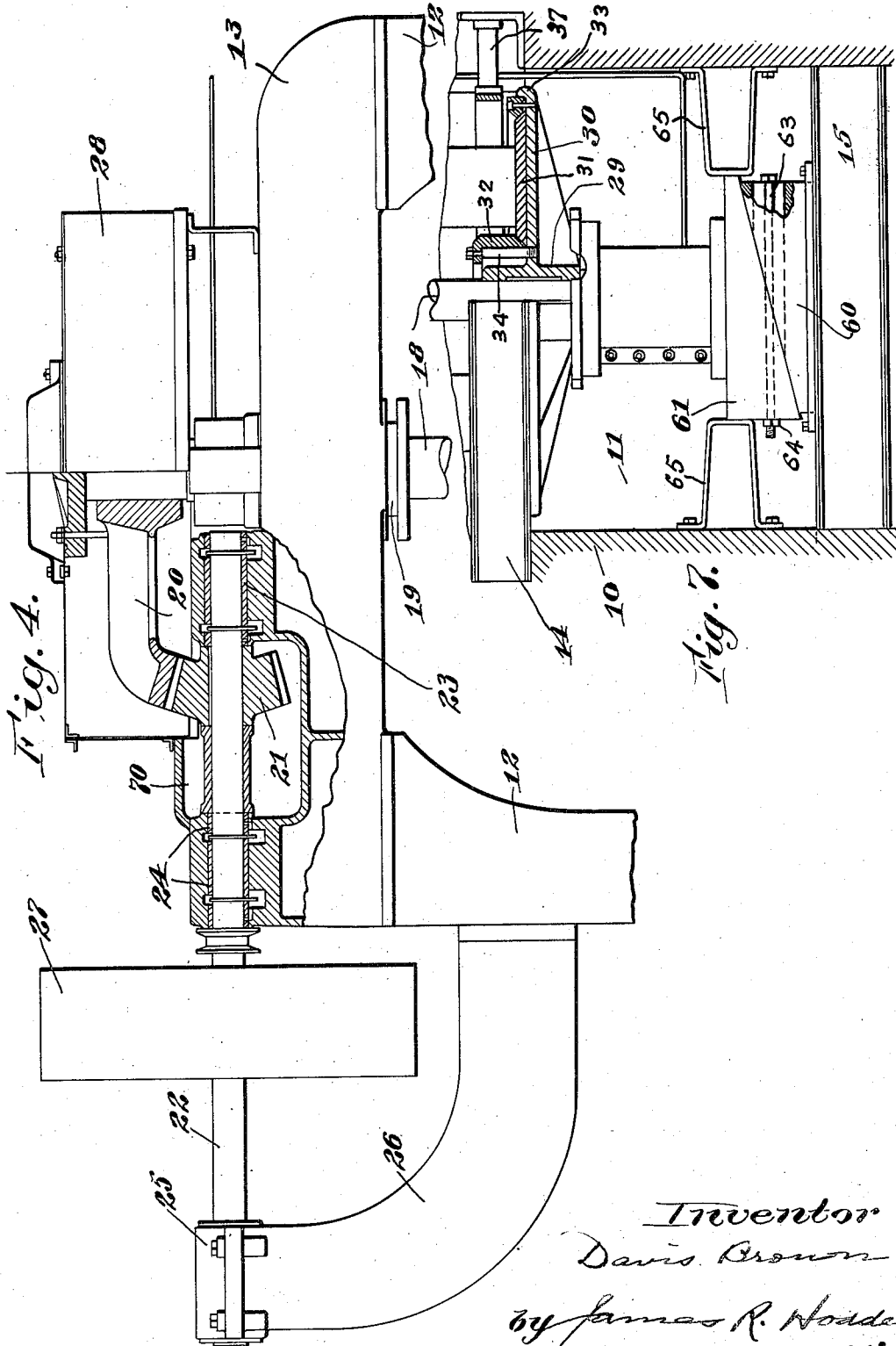


Fig. 4.

Fig. 7.

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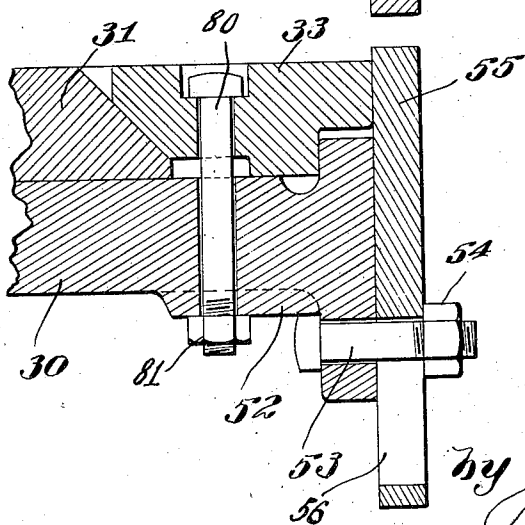
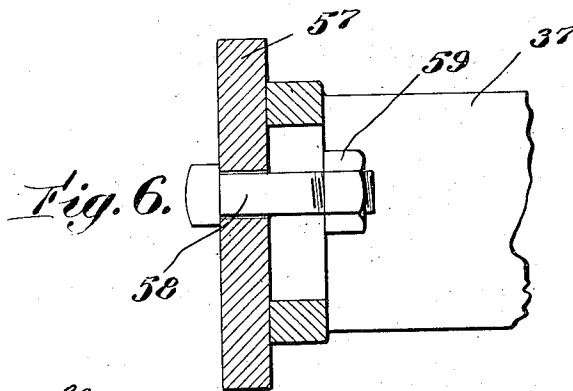
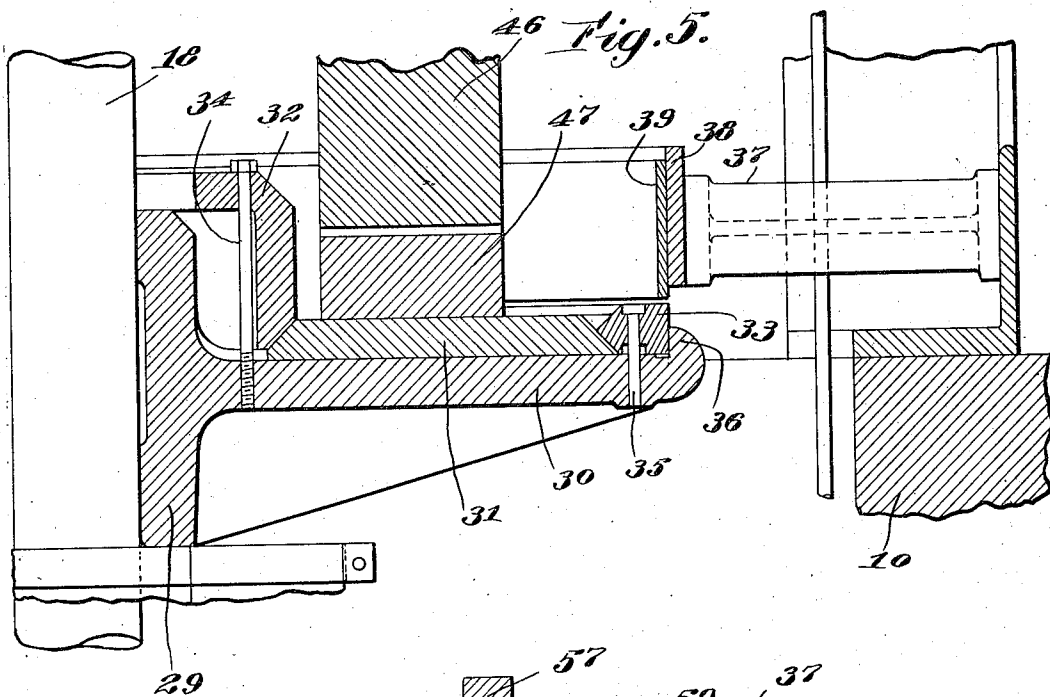
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Filed May 26, 1922

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE.

DAVIS BROWN, OF BUCYRUS, OHIO, ASSIGNOR TO HADFIELD PENFIELD STEEL COMPANY, OF BUCYRUS, OHIO, A CORPORATION OF OHIO.

DRY PAN.

Application filed May 26, 1922. Serial No. 563,904.

To all whom it may concern:

Be it known that I, DAVIS BROWN, a citizen of the United States, and resident of Bucyrus, in the county of Crawford and State of Ohio, have invented an Improvement in Dry Pans, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present invention relates to grinding machines, and more particularly to an improved dry pan grinding machine designed for crushing, grinding and screening hard clay, shale and similar material preparatory to the manufacture of brick and other clay products.

For successfully preparing many kinds of fire clay and shale used in the manufacture of clay products, dry pans have become a necessity. As the material to be ground or fined must be fed to the grinding apparatus in a practically dry condition, such apparatus is subjected to excessive wear, necessitating frequent renewal and adjustment of parts, and as such apparatus is heavy in construction and expensive to install, the cost of upkeep must be kept at a minimum. Heretofore, one of the most expensive items of upkeep cost has been the adjustment and renewal of the screen plates, these being liable to clog if the material contains the least moisture, and even when the material is dry, the screen plates have been subjected to excessive wear and clogging, with the result that the apparatus cannot be operated at capacity.

In the attempt to remedy this defect, the diameter of the rotary table containing the screen plates has been gradually increased, and this has of necessity greatly increased the consumption of power. This increase in the size of the table, and therefore the size of the apparatus, has reached the point where too great a floor area is demanded for the economical layout of a plant, uses too much power for economical operation, and in addition, the cost of such apparatus has increased in proportion to the increase in size.

In my present invention I obviate the objectionable feature above set forth, and in carrying out my invention I have dispensed entirely with the heretofore necessary screen

plates, and by this means am enabled to reduce the diameter of the pan to such an extent as to double the number of revolutions per minute, increase the weight of crush-members, and obtain quadruple the rate of grinding. This construction makes a more compact machine capable of carrying a heavier weight than prior machines and therefore I am enabled to use heavier mullers with consequent quicker and better grinding of the material. By making the top of the revoluble pan of chilled or hardened steel plates, the wear is infinitesimal as compared with the wear on the ordinary screen plates, and by surrounding such revoluble pan with a vertically adjustable rim and associating therewith a stationary rim and between which rims the ground material must pass, or an adjustable rim over the edge of the revolving disc. I can safely dispense with the screen plates and at the same time obtain a more uniform product and a free feeding of such product from the machine. These rims not only act to allow the finished product to be fed from the machine, but also retain the coarser particles for further reduction by grinding, scrapers or ploughs being employed to guide such coarser particles back under the mullers for this purpose.

As these machines are necessarily very heavy, and as they require considerable power for their efficient and successful operation, I have so designed the driving mechanism therefor, in the belt driven type of machine, that the driving pinion runs in an oil bath, this being accomplished by placing such driving pinion beneath the driven gear, reversed from former constructions. Again, I have provided an improved step bearing for the vertical driving shaft having a ball and socket, such bearing being self centering and self aligning. Further, I have so designed the mounting of the muller shafts and all other bearings that the same may be oiled while the machine is in operation.

Other features of the construction and arrangement of parts constituting my improved apparatus will appear as the description of the invention progresses.

In the accompanying drawings,

Fig. 1 is a front elevation, partly in section, of a dry pan grinding apparatus embodying my invention;

Fig. 2 is a plan view, certain portions of the apparatus being broken away for clearness of illustration;

Fig. 3 is a side elevation;

Fig. 4 is an enlarged detail of the upper portion of the apparatus, partly in section, showing the improved form of driving of a belt type apparatus;

Fig. 5 is a vertical sectional elevation through the revoluble table showing one method of adjusting the outlet from the revoluble table;

Fig. 6 is a vertical sectional elevation through the revoluble table showing another method of adjusting the outlet of the revoluble table, and.

Fig. 7 is an elevation showing still another method of adjusting the outlet from the revoluble table.

Referring to the drawings, 10 designates a base of concrete or other material in which is formed a circular pit 11, of suitable diameter and depth. Secured to the top of the base 10 and on either side of the pit 11 are heavy A-shaped end frames 12, joined together at their top by a cross frame 13, and at their bottom by the channel cross ties 14, as shown in Fig. 1. Near the bottom of the pit 11 and centrally located therein is a structural iron frame or bed 15, to the top surface of which is secured a step bearing base 16, a self centering ball and socket bearing 17 being mounted therein, and on which rests the lower end of a vertical shaft 18 that extends upward through a bearing 19 in the cross frame 13. A bevel gear 20 secured to the shaft 18, near the top thereof, meshes with and is driven by a bevel pinion 21 secured to a horizontal shaft 22 that is mounted in bearings 23 and 24 in the cross frame 13 and in a bearing 25 in a bracket 26 that is secured to one of the A-shaped end frames 12. The pinion 21 is enclosed by a casing 70 formed integral with the cross frame 13, and this casing 70 is filled with oil, so that the pinion 21 runs in a bath. A pulley 27 secured to the shaft 22, between the bearings 24 and 25, may be connected to a suitable source of power by the usual belt. On the top of the cross frame 13 and enclosing the gears 20 and 21 is a sheet metal cover 28 for the purpose of excluding dust and other foreign substances.

Secured to the shaft 18, at a point immediately above the step bearing 17, is a hub 29, this hub being also secured to the lower central portion of a disc 30. This disc 30 is adapted to receive a plurality of sector shaped wearing plates 31, the inner and outer peripheries of these plates 31 being bevelled as shown, the inner one to receive the bevelled edge of member 32, while the outer periphery receives the inner bevelled periphery of a ring 33, the members 32 being secured to the disc 30 by bolt 34, while

the ring 33 is secured to the disc by bolts 35, the outward movement of such ring 33 being prevented by lips 36 formed on the outer end of the disc 30.

Secured to the inner lower faces of the A-shaped members 12 and to the cross bars 14 and extending inwardly therefrom toward the shaft 18, are a plurality of spacing devices 37 having secured to their inner ends a ring 38 in which is adjustably mounted a sectional ring 39 of an outside diameter equal to the outside diameter of the ring 33 and normally spaced apart therefrom.

The ring 39 is an adjustable sectional ring while 33 designates a clamping ring for retaining the wearing plates 31 in position, the clamping of the plates 31 being accomplished by means of the members 32 and 33 and the bolts 34 and 35. Other means of providing adjustment of the space between the rings 33 and 39, or their equivalent, will be hereinafter described.

Each of the A-shaped members 12 is provided at one side with a bearing 40 in which is mounted a shaft 41, having secured thereto sleeves 42 from each of which extend inwardly a pair of arms 43 that are formed integral with the sleeves 42 and are provided at their ends with bearings 44. In each pair of bearings 44 is mounted a shaft 45 secured to a muller 46, the arrangement of bearings 44 and shaft 45 being such that either muller may be removed without disturbing the other, and also it is possible to set, the mullers close to the vertical shaft 18, thus reducing the diameter of the pan or disc. The muller 46 is a heavy casting fitted with a hard white or chilled iron tire 47 that is readily removed when worn. Secured to the inner surface of the ring 39 and diametrically opposite each other, are scraper plates 48 for deflecting the material back under the mullers 46 until such material is thoroughly fined.

In addition to the driving means for the apparatus as above described with reference to Fig. 4, I provide the driving means illustrated in Fig. 1 and which comprises essentially a spur gear 49 secured to the upper end of the shaft 18 and meshing with a pinion 50 (shown in dotted lines) of a motor 51 secured on the cross frame 13. Various other methods of driving the apparatus will suggest themselves to those skilled in the art.

Referring now to Fig. 6, wherein is shown a modification of the means for adjusting the space between the rings 33 and 39, or the equivalent of such rings, which may perhaps, be better described as rotating and fixed members respectively, 52 designates a modified flange on periphery of pan 30, carrying the segment 31 and the equivalent of the ring 33, the lip 36 being modified to support said modified ring 33 against out-

ward movement. The modified ring 33 is secured to the pan 30 by bolt 80 and nut 81. Secured to the outer flange of pan or disc 30, by bolts and nuts 53 and 54 respectively, is a ring 55, the bolts 53 passing through slots 56 in said ring 55. Secured to the inner ends of the devices 37 is a ring 57 equal in diameter to the diameter of the ring 55 and secured in position by bolts 58 and nuts 59, the bolts 58 passing through slots in the device 37. By moving the rings 55 and 57 relatively to each other, the distance between the same may be adjusted, and when adjusted the bolts and nuts above described securely hold such rings in the desired position.

Another modification of the means for adjusting the space between the fixed and rotatable members is illustrated in Fig. 7; where the construction illustrated in Fig. 5, and described above, is utilized, but secured to the top of the frame members 15 in the bottom of the pit 11 is a wedge shaped member 60, and resting on the bevelled surface of this member 60 is the bevelled surface of a second wedge shaped member 61. The member 60 is provided with a vertical slot 62 to receive and allow a threaded bolt 63 to move vertically. The member 61 is provided with a perforation to receive the threaded bolt 63 and this bolt is provided with a nut 64 and by means of which the members 60 and 61 may be moved relatively to each other in a vertical plane. Member 60, being secured to the top of the frame member 15 in the bottom of the pit, is incapable of movement, but the members 61, the bevelled face of which is longer than the bevelled face of the member 60, may be moved in a vertical plane, braces 65, secured to the sides of the wall 10 confining the member 60 to movement in said vertical plane. The step bearing base 16 is secured to the top of the member 60, and the mechanism carried thereon is similar to the mechanism carried on the step bearing 16 illustrated in Figs. 1, 2 and 5, and described above. In addition therefore, to the means for adjusting the width of the space between the members 33 and 38, I provide the addition means just described with reference to Fig. 7.

Various changes in the size, shape and arrangement of the parts described above will readily suggest themselves to those skilled in the art and it is to be understood therefore, that I do not limit myself to the exact construction described and illustrated, other than as set forth in the appended claims.

Having thus described my invention, what I claim as new, is:—

1. In an improved dry pan grinding machine, the combination of a vertically mounted rotatable pan, a rim on the periphery of said pan, a stationary rim located above and defining, with said first rim, an opening through which ground material may pass, and means for moving said rims relatively to each other to vary the width of said openings.

2. In an improved dry pan grinding machine, the combination of a vertically mounted rotatable pan, a rim mounted on the periphery of said pan and having its upper surface located in a plane parallel to that of the pan, a stationary rim equal in diameter to the diameter of the first said rim and defining, with the first rim, an opening through which ground material may pass, and means for moving the first said rim toward and from the stationary rim, to vary the width of said opening.

3. In an improved dry pan grinding machine, the combination of a base, a vertically arranged shaft rotatably mounted thereon, a dry pan secured to said shaft and having its top surface located in a horizontal plane, a rim on the periphery of said dry pan, means for adjusting said rim in a vertical direction, a second rim located above and in alinement with the first said rim, and means for adjusting said rims toward and from each other.

4. In an improved dry pan grinding machine, the combination of a vertically mounted rotatable pan, a rim on the periphery of said pan, a second rim mounted above said first rim and spaced apart therefrom, and means for adjusting each rim toward and from the other to vary the distance between them.

5. In an improved dry pan grinding machine, the combination of a base, wedge shaped members mounted one on the other, on the base and slidable with respect to each other, a vertically arranged shaft rotatably mounted on the topmost wedge shaped member, a dry pan carried by said shaft, a peripheral rim having its upper edge positioned above the surface of the dry pan, a second rim located above the first rim and spaced apart therefrom, and means for moving the wedge shaped members relative to each other to vary the distance between the rims.

In testimony whereof, I have signed my name to this specification.

DAVIS BROWN.