W. R. CUNNINGHAM.

GRINDING MILL.

APPLICATION FILED FEB. 27, 1908.

931,279.

Patented Aug. 17, 1909.

2 SHEETS—SHEET 1.

Fig. 5.

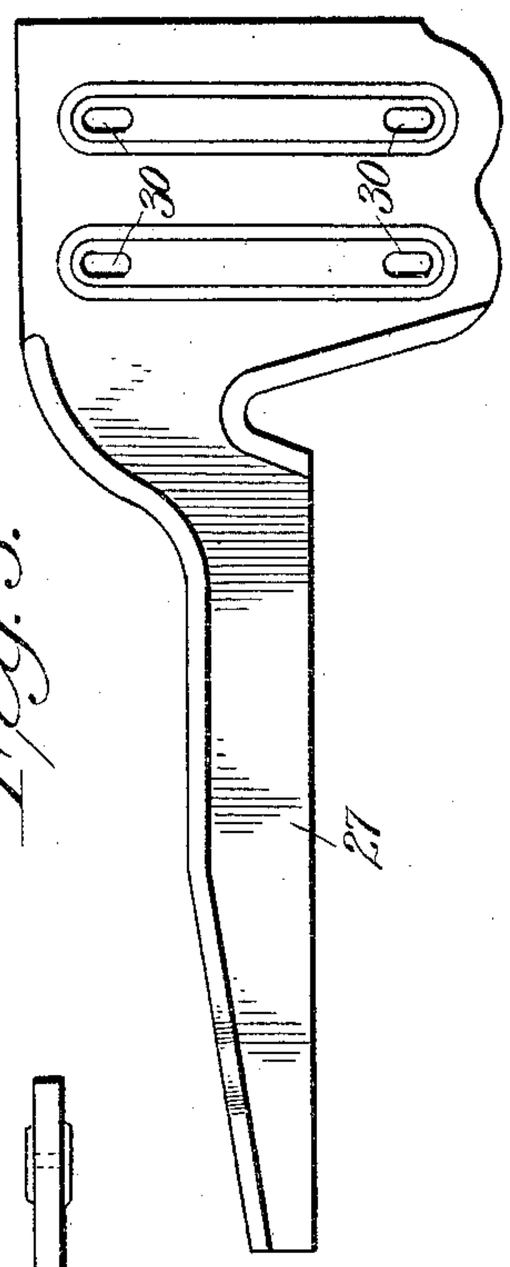


Fig. 6.

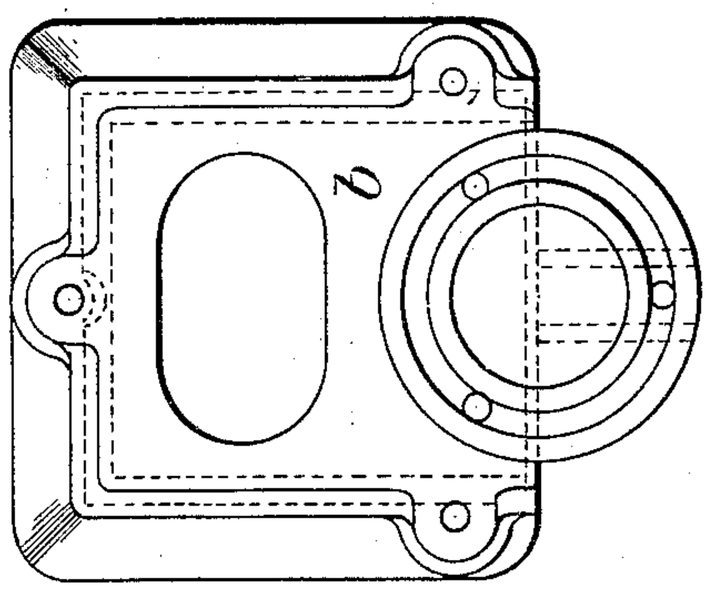
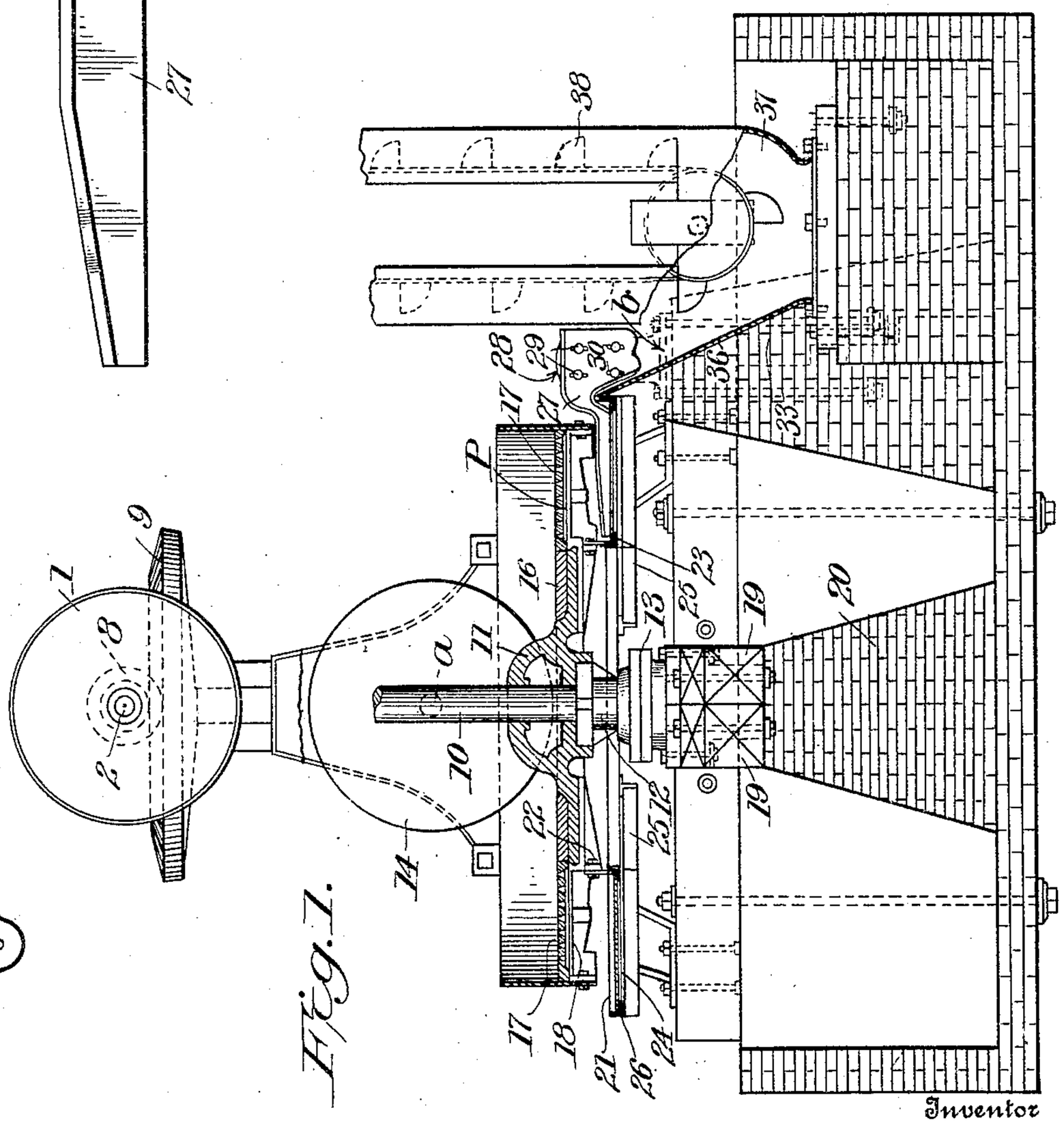


Fig. 4.

Fig. 7.



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2 SHEETS—SHEET 2.

Fig. 2.

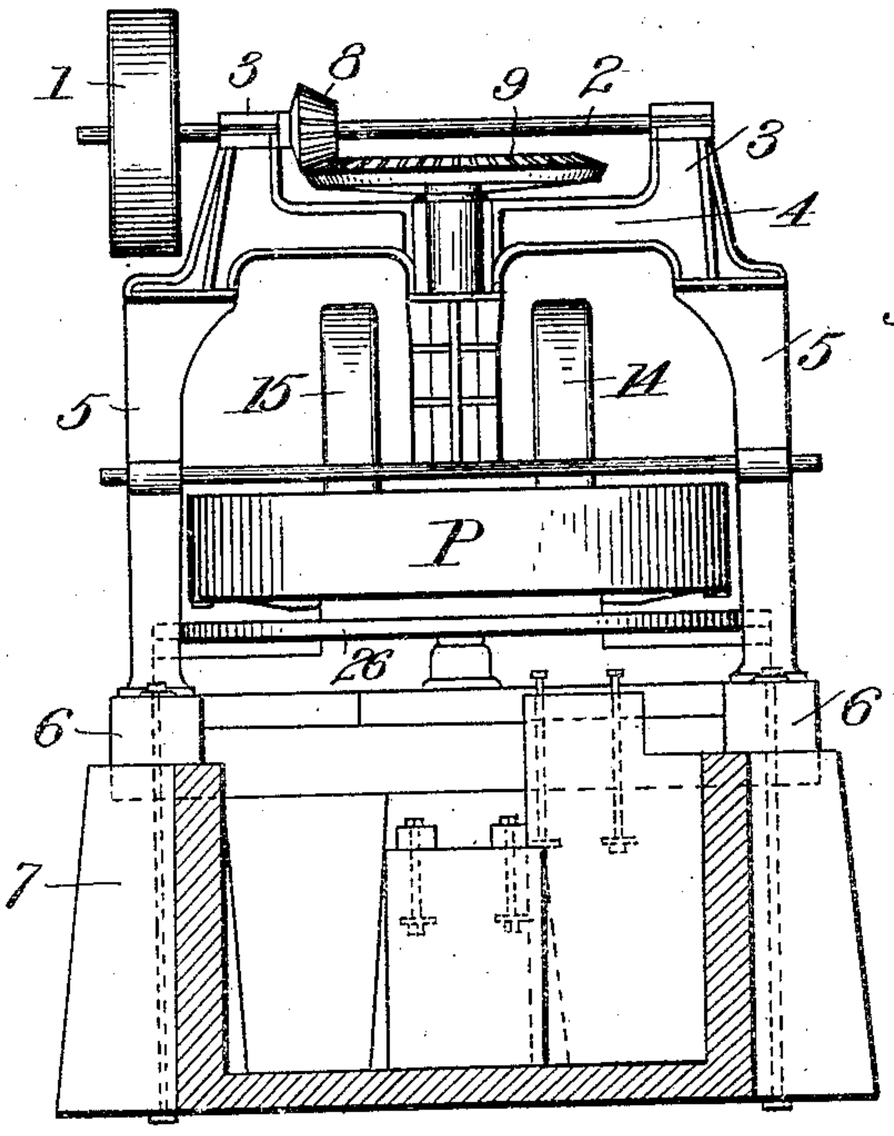


Fig. 9.

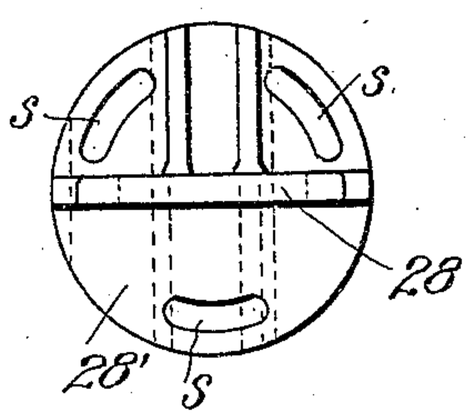


Fig. 8.

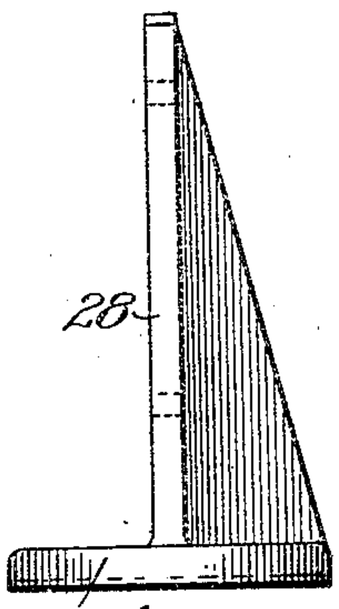
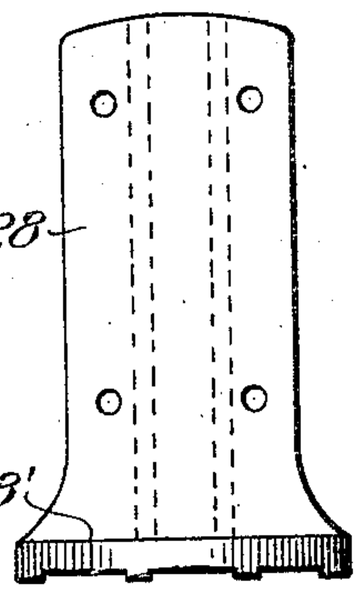


Fig. 10.



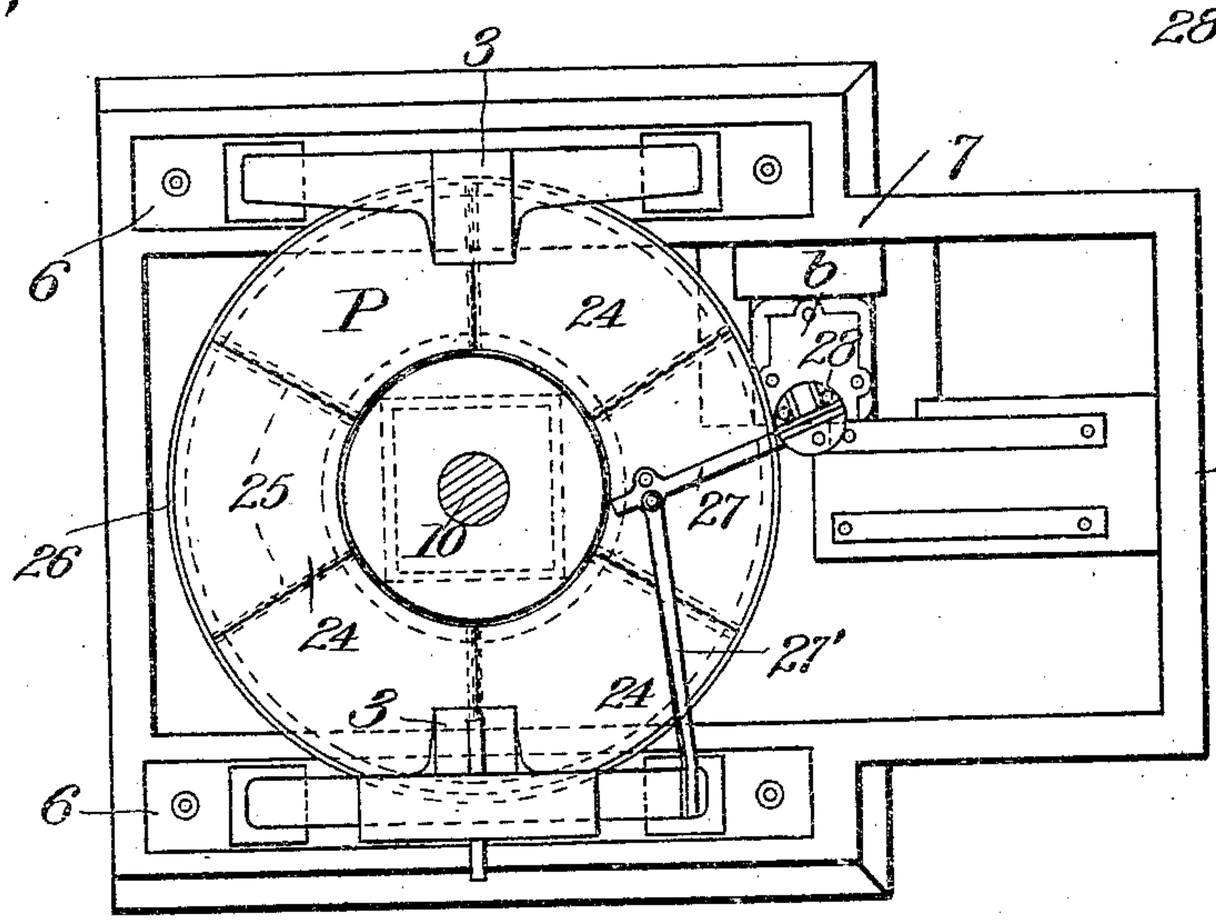
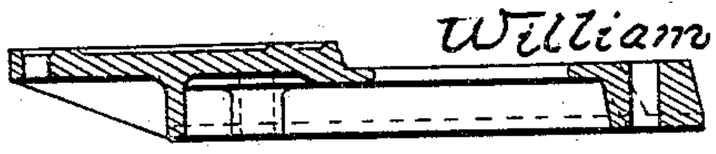


Fig. 3.

Fig. 7.



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By T. Walter Fowler,

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UNITED STATES PATENT OFFICE.

WILLIAM R. CUNNINGHAM, OF BUCYRUS, OHIO, ASSIGNOR TO THE AMERICAN CLAY MACHINERY CO., OF BUCYRUS, OHIO, A CORPORATION.

GRINDING-MILL.

No. 931,279. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed February 27, 1908. Serial No. 418,093.

To all whom it may concern:

Be it known that I, WILLIAM R. CUNNINGHAM, a citizen of the United States, residing at Bucyrus, in the county of Crawford and State of Ohio, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a specification.

This invention relates to grinding-mills and particularly to that class of such mills which is used for the grinding of clay or like material, and the particular feature of the invention resides in an automatic unloading mechanism, or attachment which is connected with or forms a part of the grinding pan.

An essential object of the present invention is to provide means whereby the operator can adjust the scraper from outside the machine, at any time without stopping the revolution of the pan, the arrangement being such that the scraper is subject to inspection at all times and it can be elevated or lowered or adjusted to any angle to suit the necessary conditions to remove the ground material after it passes through the usual screen-plates of the pan.

With these and other objects in view, the invention consists of the parts, and the constructions, arrangements of parts which I will hereinafter describe and claim.

In the accompanying drawings forming part of this specification and in which similar reference characters indicate like parts in the several views, Figure 1 is a side elevation partially in section, of a grinding-mill embodying my invention. Fig. 2 is a front elevation. Fig. 3 is a top plan view of the mill. Figs. 4, 5 and 6 are details of the scraper and scraper holder. Figs. 7, 8, 9 and 10 are details of the scraper holder stand and base.

The type of machine herein shown is well known in this art but its general construction and operation I will hereinafter refer to that the present improvements may be better understood.

The machine comprises a driving-pulley, 1, which is mounted upon a horizontal shaft, 2, at the upper end of the machine, said shaft being mounted in appropriate bearings, 3, fixed to a frame, 4, which extends transversely across the top of the main frame between the side-frames, 5, thereof, said side-frames being bolted to suitable timbers, 6, which in turn are secured to some solid foundation, 7.

Fixed to the driving-shaft, 2, is a bevel-pinion, 8, which meshes with and drives a large beveled-gear, 9, which is mounted upon the upper end of a vertical shaft, 10, and to which is secured at the lower end the base-plate, 11, which will be of some appropriate character.

Secured to the base-plate, 11, is a vertical stub-shaft, 12, which carries the bearing-plates in a step, 13, which step supports the vertical shaft, 10. Suitable timbers, 19, are adapted to support the step, 13, said timbers resting upon the center foundation, 20, which latter is adapted to support the vertical shaft and all of the parts thereto attached.

The grinding-mullers, 14 and 15, are mounted upon horizontal shafts, *a*, in a manner common to this class of machines, or in any suitable manner, said mullers being adapted to operate over the usual wearing-plates, 16, in the bottom of the grinding-pan, P, between which mullers and plates the material is forced by the pan revolving under the mullers, said pan being also provided with the usual bottom screens, 17, which are supported by arms, 18, equally spaced around the bottom of the pan and adapted to support sections of the screen-plates. In practice we may provide eight of these supporting arms, 18, but more or less of said arms can be used, if desired.

Suspended under the screen-plates, 17, and the bottom of the grinding pan, P, and bolted to the arms, 18, or if preferred to the base-plate, 11, is a revolving dust-collecting pan, 21, on which the ground material passing through the screen-plates is received, as shown in Fig. 1. This pan has a central opening through which the vertical shaft passes and surrounding this opening is a vertical ring, 22, the upper edge of which is bolted to the arms, 18. To the lower edge of the ring, 22, is riveted the vertical flange of the inner angle-iron, 23, and to the horizontal flange of said angle-iron is riveted or otherwise fixed the imperforate metal bottom, 24, which is preferably made in segments joined together by T-irons, 25, as shown in Fig. 1. A similar angle-iron, 26, is secured around the outer periphery of the bottom, 24, the horizontal flange of the iron being secured to the bottom, 24, and the vertical flange forming an upstanding wall to

prevent the ground clay from passing off of the bottom by centrifugal force, until said material has been carried around to the scraper, 27, which I will now describe.

Appropriately mounted and supported on the foundation is a base frame or mounting, *b*, for the scraper holder, 28, herein shown in the form of a vertical standard having a base flange, 28′, of disk form and a vertical flange with outstanding web, the said base being provided with curved slots, *s*, which will afford means of adjustment as I will presently describe. To the scraper-holder is adjustably mounted the scraper, 27, the adjustment being obtained by means of bolts, 29, passing through elongated holes, 30, in the heel or outer end of the scraper and also through holes in the scraper-holder. As herein shown, the scraper-holder is secured to the base or mounting, *b*, and foundation, 32, by means of vertical bolts, 33, which are appropriately tied in the foundation by any of the methods used for securing or anchoring like parts. When the scraper is thus secured to the scraper-holder, it may be adjusted horizontally to the proper angle for scraping the ground material from the revolving pan over the vertical edge of the outer angle-iron, 26, said adjustment being effected by means of the curved-slots in the base-flange of the scraper-holder, and the bolts and suitable nuts which secure the holder after adjustment. The scraper is shown as being wider at its outer end where it is connected with the holder, and from this point it is of reduced width and passes through the peripheral opening between the pans and over the vertical flange of the angle-iron 26, the lower edge of the blade being arranged parallel with the floor, 24, and said blade having a depression in its bottom to receive said flange, as shown at the right hand side of Fig. 1. A brace, 27′, connects the inner portion of the scraper to some fixed part, as shown.

Connecting with the discharge from the pan is an apron, 36, leading the discharged material into the boot, 37, of an elevator, 38, which is herein shown of the endless chain bucket-form adapted to elevate the ground material and deliver it at some point outside of the pan. It will also be observed that the elongated holes in the outer end of the scraper afford means for adjusting the scraper the proper height to register with the revolving pan and after also lowering the scraper as the lower horizontal edge thereof wears.

The suspended lower pan, 21, is made considerably larger in diameter than the grinding pan with its screen-plates, the bottom edge of the latter pan being sufficiently removed from the upper surface of the lower pan to provide the peripheral opening through which operates the scraper. By making the dust-pan, 21, of larger diameter than the grinding pan, I am enabled to mount the scraper, 27, so that it will appropriately and effectively remove the ground material; the increased diameter of the dust-pan also prevents the ground material by centrifugal force, from passing over the vertical wall of the exterior angle-iron before it reaches the scraper.

The operation of the machine may be generally described as follows: The material passing under the mullers, 14 and 15, and between the mullers and the wearing plates, 16, is ground and by centrifugal force passes over the screen-plates 17 the finer particles passing through the screen-plates and falling upon the bottom plate, 24. As the grinding pan revolves and the suspended plate, 22, being bolted to the revolving grinding pan, it also revolves, carrying the ground material after it is received on the suspended bottom plate, 24, to the scraper, 27, the material being then directed by the scraper into the elevator, 38 and being thence conveyed away.

Among the advantages for the present construction over other grinding mills of which I have knowledge attempting to accomplish this same work, I may mention that with the form of grinding mill commonly used, the pan corresponding to my suspended pan, 24, would be held stationary to the foundation or to the members of the frame-work of the pan. The ground material would fall upon this stationary plate, and scrapers could be attached to the arms, 18, and would carry the ground material around to the opening in the stationary pan or bottom, from which it would pass through a chute into the elevator. The disadvantage of this old construction was that as the scrapers would wear the operator had to stop the pan, and it was very difficult to adjust the scrapers to take up the wear and in some cases the material after it was ground would pack and solidify on the stationary receiving table, crowding the scrapers upward, often breaking the arms or crowding the screen-plates out of position, causing them to break. With the present construction the operator is permitted to adjust the scrapers at any time without stopping the pan, as they are subject to inspection at all times. The scrapers can also be elevated or lowered or adjusted to any angle to suit the necessary conditions to remove the ground material after it passes through the screen plates.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a machine of the character described having a revoluble grinding-pan, a dust-collecting pan suspended below and spaced from the grinding-pan, and connected to the latter so as to revolve therewith, and a stationary

scraper projecting from the outside inwardly through the space between the two pans and operable to discharge the ground material outwardly as the pans revolve relative to the scraper.

2. In a machine of the character described having a revoluble grinding-pan, a dust-collecting pan suspended below and spaced from the grinding-pan and having a diameter greater than that of said grinding-pan, said dust-collecting pan being connected to the grinding-pan so as to revolve therewith, and a stationary scraper projecting inwardly from the outside of the pan through the space between the two pans and adapted to discharge the ground material as the pans rotate relative to said scraper.

3. In a machine of the character described having a revoluble grinding-pan, said grinding-pan having a screen-surface, a dust-collecting pan parallel with and suspended below and spaced from the grinding-pan, said dust-collecting pan having an open center and having concentric inner and outer vertically-extending flanges forming an annular trough underlying the screen surface of the grinding-pan and adapted to receive the screened-material, means connecting the dust-collecting pan with the grinding-pan whereby the two pans rotate in unison, and a scraper projecting from the outside of the pan inwardly through the space between the two pans and adapted to direct the ground material through said space to the outside of the pans as said pans rotate relative to the scraper.

4. In a machine of the character described the combination with a revoluble grinding-pan, said pan having a screen-surface, of a dust-collecting pan suspended below and spaced from the grinding-pan and connected to the latter so as to revolve therewith, a scraper projecting through the space between the two pans and into the range of travel of the material carried by the second-named pan, a support for the scraper exterior to the pans, and means for adjusting the support in horizontal planes to vary the inclination of the scraper.

5. In a machine of the character described the combination with a revoluble grinding-pan, said pan having a screen-surface, of a dust collecting pan suspended below and spaced from the grinding-pan and connected to the latter so as to revolve therewith, a scraper projecting inwardly through the space between the two pans and into the range of travel of the material carried by the second-named pan, a support for the scraper exterior to the pans, and means for adjusting the support in a horizontal plane to vary the inclination of the scraper, said means comprising a turnably-mounted vertical standard to which the outer end of the scraper is secured.

6. In a machine of the character described the combination with a revoluble grinding pan, said pan having a screen-surface, of a dust-collecting pan suspended below and spaced from the grinding-pan and connected to the latter so as to revolve therewith, a scraper projecting inwardly through the space between the two pans and into the range of travel of the material carried by the second-named pan, a support for the scraper exterior to the pans, and means for adjusting the support in a horizontal plane, said means comprising a vertical standard to which the outer end of the scraper is secured, said standard being adjustably-mounted so that it may be turned in a horizontal plane to vary the inclination of the scraper, a base or support for the standard, said standard having a base-flange or disk with curved slots, and anchoring bolts passing through said slots and base for securing the standard in its axial adjustment.

7. In a machine of the character described, the combination of a grinding pan having a screen surface in its bottom, a dust-collecting pan suspended from and below the grinding pan and having an annular trough in which the screened material is received, a scraper projecting inwardly through the space between the two pans and into the range of travel of the ground material in said trough, a stand exterior to the pans, means for mounting the stand so that it may be turned in a horizontal plane to vary the inclination of the scraper, and means engaging the scraper and stand for vertically adjusting the scraper relative to the bottom of the dust-collecting pan.

8. In a machine of the character described the combination with a revoluble grinding pan, said pan having screen plates in its bottom and having arms secured to said bottom, of an annular ring fixed to said arms and depending therefrom, a dust-collecting pan fixed to the lower edge of said ring whereby the two pans revolve in unison, said dust-collecting pan being of larger diameter than the grinding pan and having inner and outer flanges forming an annular trough in which the ground material is received, a scraper projecting inwardly through the space between said pans and into the range of travel of the ground material in said trough, means exterior to the pans for supporting the outer end of the scraper, said means being turnable in a horizontal plane for varying the inclination of said scraper, and means whereby the scraper may be adjusted vertically on its support relative to the bottom of the second-named pan.

9. The combination with a revoluble grinding pan having a screen-surface, and mullers operable in said pan, of a dust-collecting pan suspended directly from and spaced below the grinding-pan and having

an annular trough underlying the screened-surface of the latter, said pans being revoluble in unison, and said dust-collecting pan being of larger diameter than the grinding-pan, and a stationary scraper adjustably mounted exterior to the pan and having its inner portion projecting inwardly through the space between the two pans and into the range of travel of the ground material in said trough.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM R. CUNNINGHAM.

Witnesses:

SAMUEL E. AUCK,

JNO. S. DE LASHMUTT.