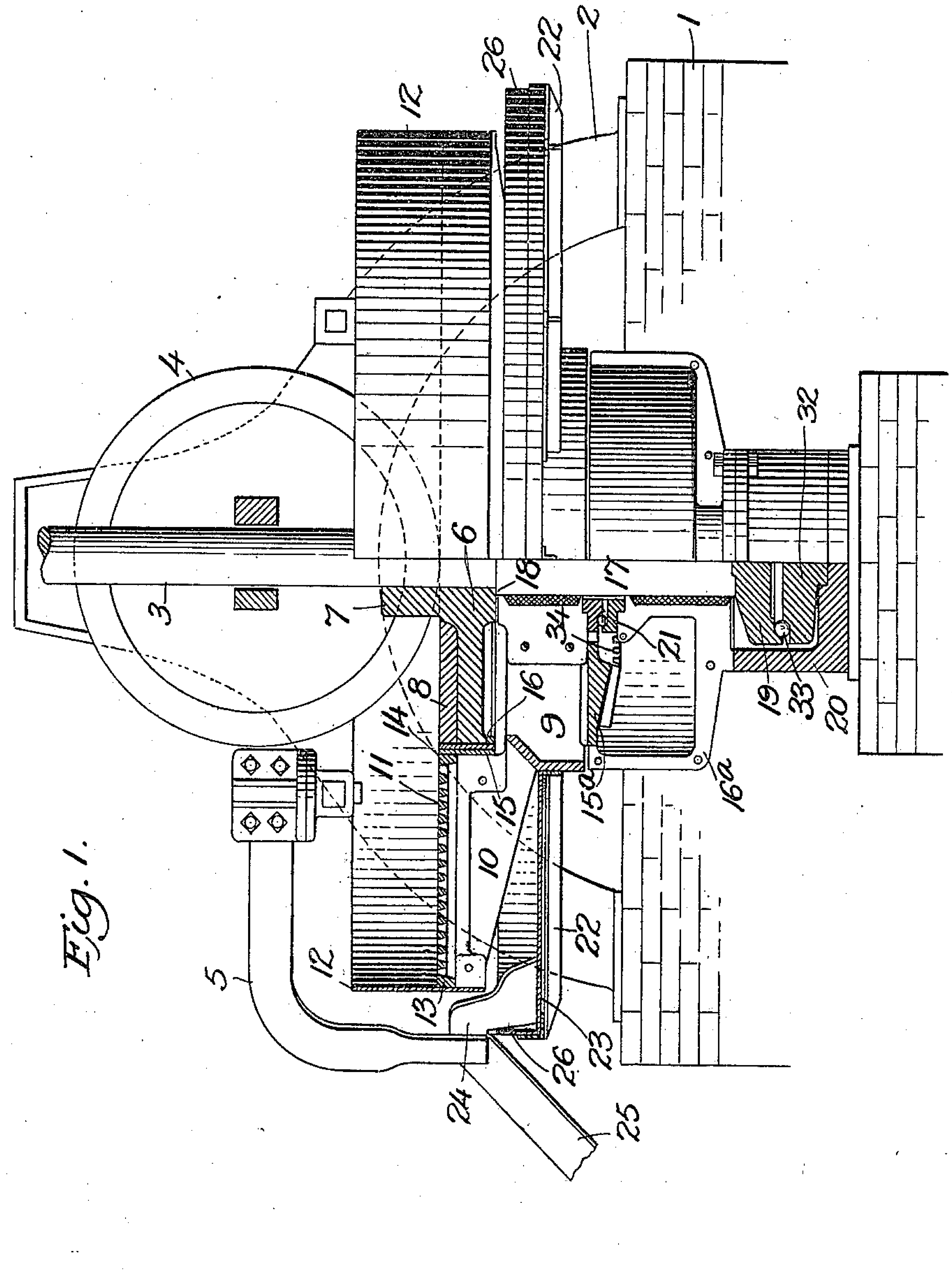
R. C. PENFIELD.

DRY PAN.

APPLICATION FILED JULY 13, 1909. RENEWED APR. 8, 1910.

974,818. Patented Nov. 8, 1910.

2 SHEETS—SHEET 1.



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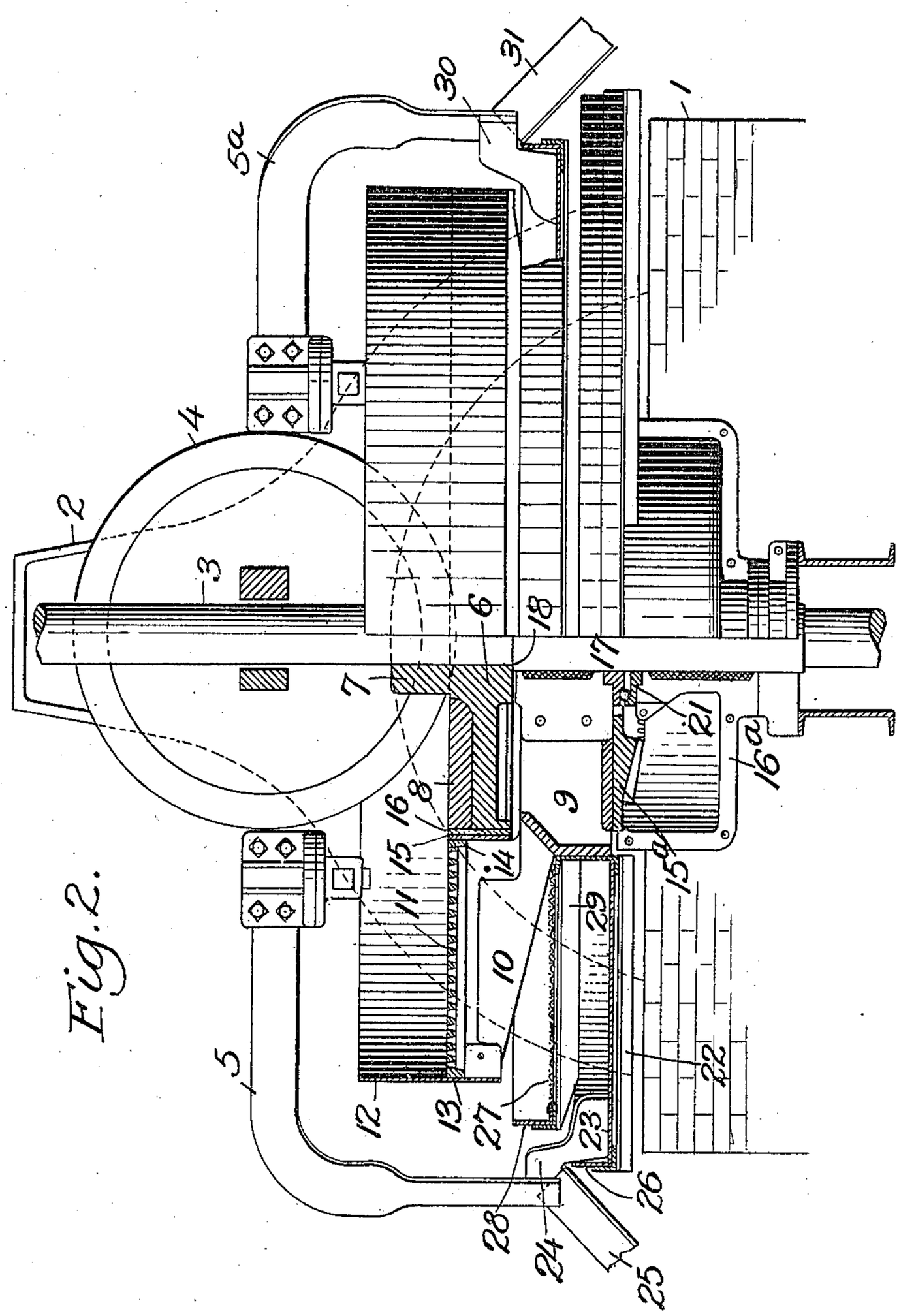

Fig. 2.

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DRY-PAN.

974,818. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed July 13, 1909, Serial No. 507,424. Renewed April 8, 1910. Serial No. 554,272.

To all whom it may concern:

Be it known that I, RAYMOND C. PENFIELD, a citizen of the United States of America, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Dry-Pans, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a rotary mill or dry pan for grinding and pulverizing clay and similar substances in the manufacture of bricks and in kindred arts, the pan being of that class wherein the material to be crushed is fed under rollers or mullers located at opposite sides of the axis of revolution of the pan.

In my co-pending application for Letters Patent, filed July 13, 1909, Serial No. 507,423, I have described a complete machine, and the present invention may be treated as an improvement as to various parts thereof.

The leading object of the present invention is to provide a novel and useful construction whereby solidity and strength are obtained with less material and labor than is commonly required in grinding or crushing mills as ordinarily constructed, and also to provide a pan of such form and ability as that it will be capable of performing a large amount of work with only slight liability of being broken or injured. Also, it has been customary in some forms of rotary dry pan, as, for instance, in the form illustrated and described in my co-pending application hereinabove referred to, to employ hoppers beneath the screening mechanism to receive the screened clay, and also to catch the tailings and permit the latter to be carried back to be reground, and in such a case the main driving shaft sometimes projects below the hopper or hoppers. In the present improvements, however, these hoppers are dispensed with, and the central driving shaft does not extend as far down as in the other construction.

The invention contemplates, therefore, an improved arrangement of the grinding surfaces whereby the clay or other material may be readily supplied thereto and more speedily and perfectly ground or reduced, and also it includes a novel arrangement of the screen device in combination with a plow and removal chute, whereby the unscreened contents of the screen may be removed.

It furthermore includes a dust pan construction having a plow and removal chute for conveying away the screened clay.

The invention also comprises numerous details and peculiarities in the construction, arrangement, and combination of parts substantially as will be hereinafter described and then pointed out in the claims.

In the accompanying drawings, illustrating my invention, Figure 1 is a vertical sectional side elevation of my improved dry pan. Fig. 2 is a similar view, illustrating an alternative form of the invention.

Similar characters of reference designate corresponding parts throughout the different figures of the drawings.

1 denotes a pier or foundation of brick, concrete or other suitable material on which the mechanical elements of the pan are mounted for operation. The side frames 2 of the main frame of the machine are securely mounted on the foundation 1, as indicated in the drawings. These frames may have any desired shape and arrangement. It is unnecessary in this description to give a detailed explanation of the mechanism for actuating the pan, supporting the mullers, and contributing generally to the efficient cooperative action of the different parts. Suffice it to say that the usual mullers 4 are employed and a central drive shaft 3 having the lower portion 17 of enlarged diameter, the lower end of which shaft is supported in an anti-friction bearing, consisting essentially of a step-casting 20, a revolving plate 32 therein, a series of balls 33 placed in a raceway in plate 32, and another plate 19 to which the end of the drive shaft is connected, said plate 19 having a corresponding raceway which receives the balls 33 so that in this manner an efficient ball bearing or anti-friction device is provided at the lower end of the main driving shaft 3. On shaft 3, at the point where the lower section of larger diameter 17 begins, is a shoulder 18 which assists in supporting the main grinding base 6 having a hub 7 fitted upon the main shaft 3 and keyed or otherwise fixedly secured thereto.

The main grinding base 6 is provided with a suitable number of grinding plates 8 carried thereby in the usual way. Below the main grinding base 6 is a screen supporting frame comprising a central member 9 which is supported revolubly on the section 17 of main shaft 3. This central member 9 is sus-

tained by a frame 16ª which forms a part of or rests upon the step casting frame 20 for the lower end of the main driving shaft. A suitable ball bearing 21 is interposed between the frame 16ª and the revolving member 9 of the screen supporting frame. Said revolving member 9 is furthermore provided with a gear wheel 34 which is adapted to be actuated by some convenient gear mechanism (not shown). The revolving central member 9 of the screen supporting frame is provided with a series of radial projecting arms 10 having an outer ring 13 and an inner concentric ring 14, between which the screen plates 11 are supported. The arrangement of arms 10 carried by the central member 9 provides a skeleton frame which permits the screened material falling through the screen plates 11 to readily drop upon whatever means may be placed beneath the screen to receive such material. Further, the screen is provided with an outer cylindrical rim 12 which forms the outside rim of the pan and revolves with the screen. The screen thus has a revolution independent of the grinding base and its plates, being independently driven, and hence the rate of revolution of the screen may be different from that of the grinding base and will usually be slower in order that the material may be better screened than it would be if it had a rate of revolution as rapid as that of the screening base. The grinding base, therefore, may be run very rapidly and more efficient grinding performed in consequence; while the screen revolves at a less speed and permits the material to pass more freely through it than if it rotated more swiftly. The outer periphery of the grinding base 6 is provided with a wearing plate 16, and the adjoining edge of the screen 11, or its supporting frame, is provided with a similar wearing plate 15. These two wearing plates 15 and 16 operate in contact with each other, and may be renewed and new ones substituted as required.

Referring to Fig. 1, which illustrates one form of my present invention, it will be seen that there is a plain horizontal dust pan 23 located below the screening mechanism 11. This dust pan is in lieu of a hopper or receptacle which I sometimes employ in other forms of the invention. Dust pan 23 is carried by arms 22 rigidly supported by the same central member 9 which carries the screen mechanism. Hence the dust pan revolves jointly with the screen. The pan 23 is provided with an encircling rim or flange 26. The main frame of the grinding pan is furthermore provided with a depending arm 5 which carries a plow 24 that projects into the pan 23 alongside of the rim 26, but clears the lower surface of pan 23, so that the latter may revolve beneath said plow 24. The plow forms an obstruction to the material which may be in the pan 23 so that said material will pile up against the plow during the revolution of the pan. Alongside of the plow 24 is a chute 25 into which the material is directed by the plow and thus removed from the pan. The material which is ground by the main grinding base 6, and its plates 8, passes off the plates on to the screen 11 and through the openings thereof, falling upon the dust pan 23. During the revolution of this dust pan, the material piles up against the plow 24 and is thereby plowed or removed by being fed over into the screened clay chute 25, from which it may be passed to any suitable point.

In Fig. 2, I have represented a somewhat different construction, where it will be seen that a secondary screen is interposed between the primary screen 11 and the dust pan 23. Said secondary screen is designated 27, and it has an encircling rim or flange 28. Screen 27 is supported by a series of radial arms 29 which provide a skeleton frame and which are affixed to the central member 9. In this case, therefore, the primary screen, the secondary screen, and the dust pan are all carried by the same frame and all rotate in unison. In the form of the invention in Fig. 2, I employ not only a frame 5 carrying the plow 24, which works in the dust pan to remove material therefrom into a chute 25, but I also use another frame 5ª carrying a plow 30, working in the secondary screen 27 and removing the material therefrom into a chute 31. The material removed from the secondary screen in this manner by plow 30 will be coarser material which has not been sufficiently reduced and which, therefore, will be carried back from the chute 31 by some suitable means to the grinding devices to be reground. The material, however, which succeeds in passing not only the primary screen 11, but also the secondary screen 27, and is being received upon the dust pan 23, will be sufficiently reduced for use and can be taken immediately from the chute 25 and carried to the point where it is to be utilized.

By these various devices, therefore, shown in Figs. 1 and 2, I present another method for increasing the capacity of the pan, for the primary screen is coarse and the secondary screen is much finer. Hence the coarser material that will not pass the finer screen can be returned to be further reduced. The dust pan, however, receives the finest material which is ready for use. The arrangement is simpler and more beneficial for many locations than the hopper construction which is employed elsewhere in other of my forms of pan construction.

Many changes may be made in the construction and arrangement of the various

parts without exceeding the scope of my invention, and I reserve the liberty of varying the details as may be found necessary.

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

1. In a dry pan, the combination of a grinding element, a screen having an independent movement relative to said grinding element, a pan beneath the screen, and a stationary plow in said pan.

2. In a dry pan, the combination of a grinding element, a screening element having an independent movement relative to said grinding element, a dust pan revolving with the said screening element, a stationary plow in the dust pan, and means for receiving the plowed material.

3. In a dry pan, the combination of a grinding element, a screening element having an independent movement relative to said grinding element, a dust pan having an encircling rim and carried by the screen below the latter, and a stationary wing or obstruction in the dust pan contiguous to the rim thereof.

4. In a dry pan, the combination of a grinding device, a primary screen having a different rate of revolution, a secondary screen revolving with the primary screen, a dust pan, a stationary device for removing the coarse material from the secondary screen, and a stationary device for removing the screened material from the dust pan.

5. In a dry pan, the combination of a grinding device, a screening device moving independently of the grinding device, and a pan having a plain surface located below the screen and revolving about the same axis, said pan having a rim, and a stationary plow in the pan forming an obstruction for the material to allow the latter to flow over the edge of the pan.

6. In a dry pan, the combination of a grinding base and its plates, mullers, a primary screen with an encircling rim, a screen supporting frame, a pan carried by said frame and having a rim thereon, a plow located in a stationary position in the latter pan, and a clay removal chute adjacent to the plow.

7. In a dry pan, the combination of a grinding base, its plates, mullers, a primary screen having an encircling rim, a screen supporting frame revolving with the screen at a rate of revolution different from that of the grinding base, a secondary screen carried by the same frame and having an outer rim, a stationary plow located alongside of said screen rim, a removal chute adjacent to the plow for the coarser material, and a screened clay receiving pan beneath said secondary screen and revolving therewith.

8. In a dry pan, the combination of grinding mechanism, a screen moving independently of the grinding mechanism and having an encircling rim, a dust pan beneath the screen and revolving therewith, stationary means for causing the contents of the said pan to overflow the rim at one or more points, and means for receiving the material thus removed from the pan.

9. In a dry pan, the combination of grinding devices, a first screen having an encircling rim and revolving independently of the grinding devices, a second screen below the first and having a rim, a dust pan below the latter screen and also having a rim, and means for removing the coarse material from the second screen and the fine material from the pan, this removal taking place independently from the two elements.

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

RAYMOND C. PENFIELD.

Witnesses:

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C. B. SCHROEDER.