974,816.

R. C. PENFIELD.

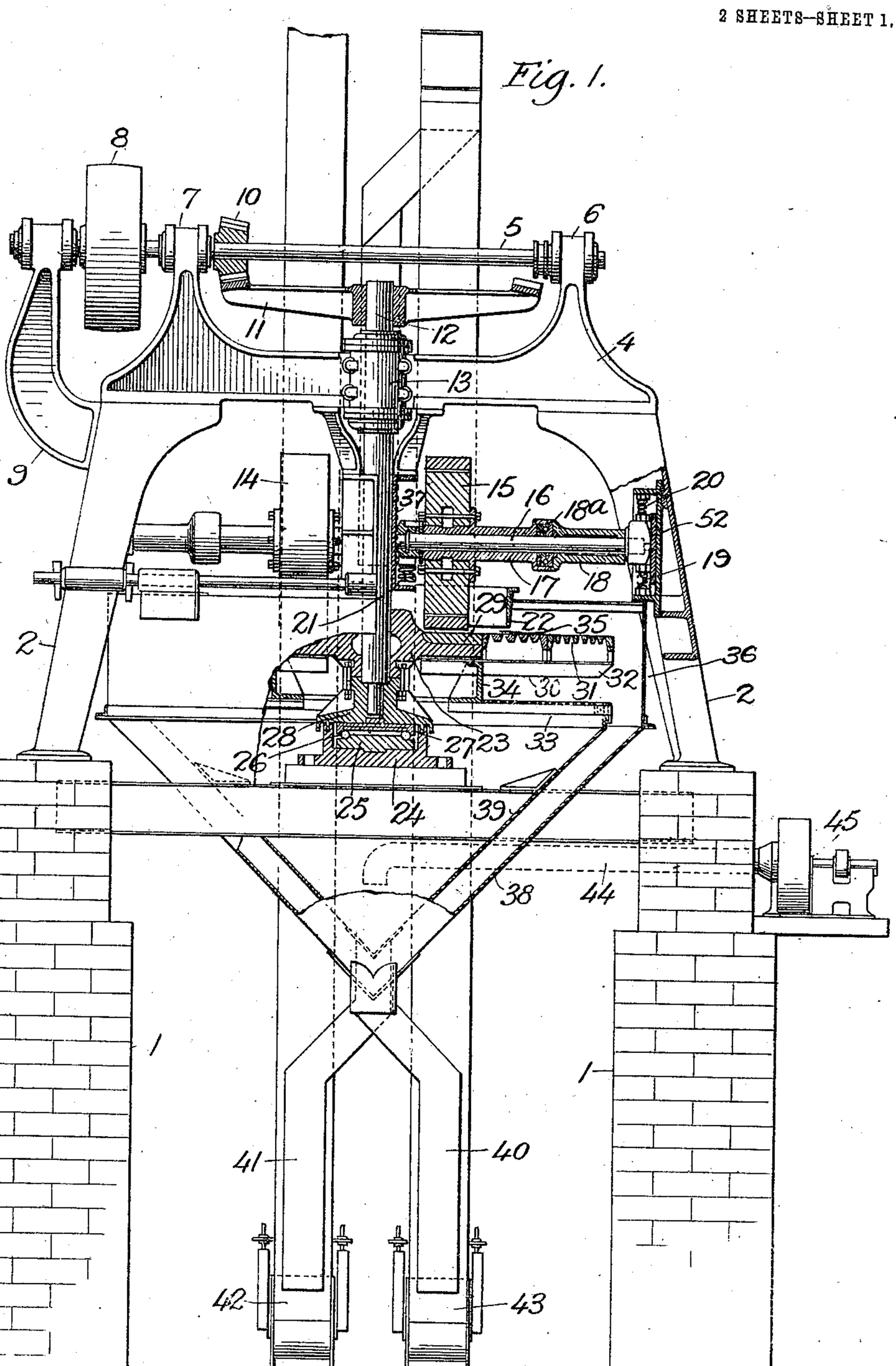
DRY PAN.

APPLICATION FILED JULY 13, 1909.

Patented Nov. 8, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



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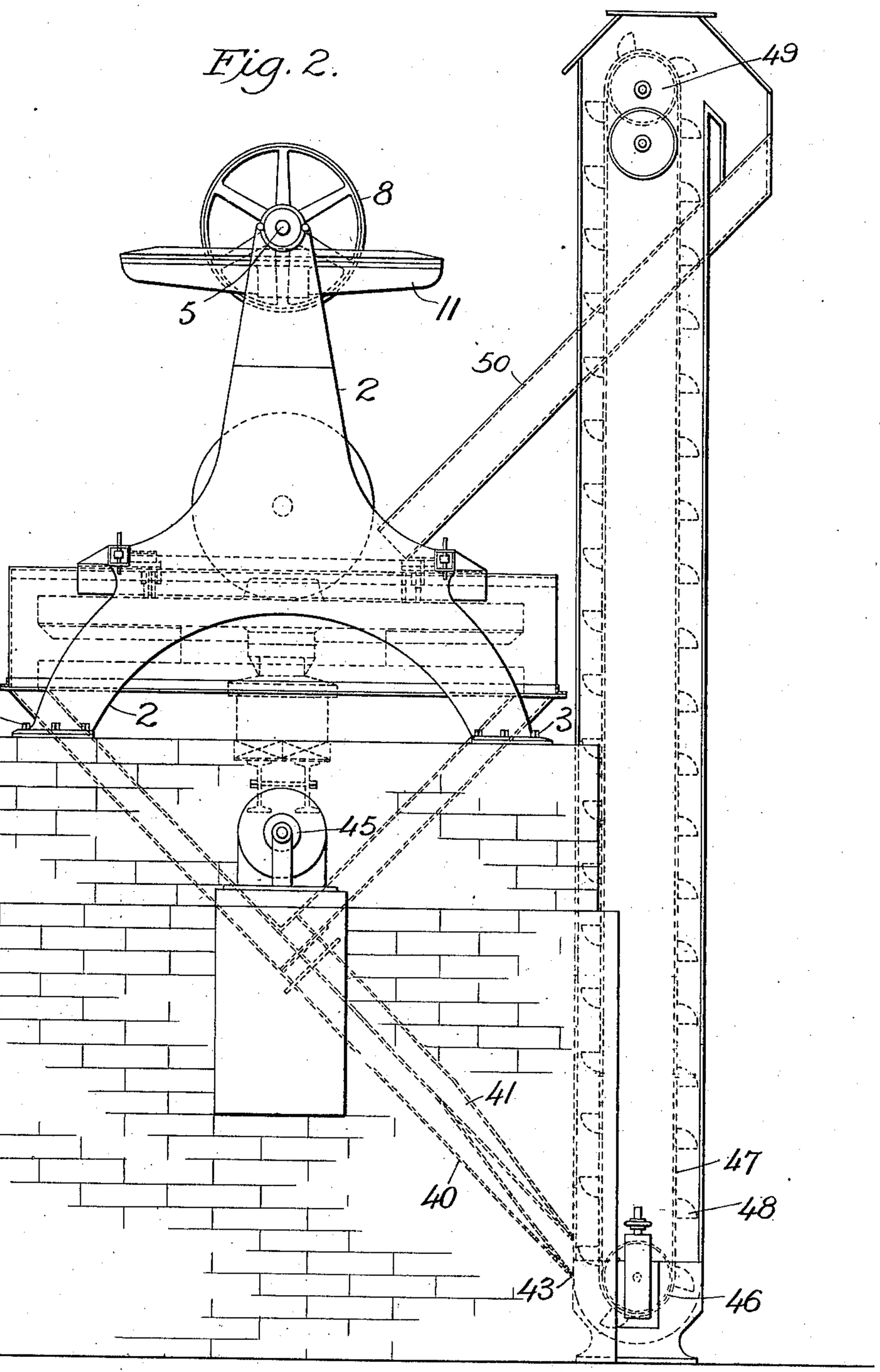
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

RAYMOND C. PENFIELD, OF NEW YORK, N. Y.

DRY-PAN.

974,816. Specification of Letters Patent. Patented Nov. 8, 1910.

Application filed July 13, 1909. Serial No. 507,420.

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.

My invention relates to a rotary 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 is fed under suitable heavy grinding or crushing rollers or mullers located at opposite sides of the axis of revolution of the pan.

The invention refers particularly to certain improvements upon or alternative forms of my invention set forth, described and claimed in my co-pending application for Letters Patent upon a dry pan, filed July 13, 1909, Serial No. 507,423.

It has been found that the best practice for reducing refractory material, such as shale, in the manufacture of clay products is by the employment of the grinding pan. The principal difficulty heretofore experienced with machines of this class is to obtain a large capacity for the space they occupy. A chief reason for not being able to obtain a large capacity has been that the speed of the pan causes the material, after it passes under the mullers, to pass over the screening plates by centrifugal force too rapidly to be properly screened. My invention provides a mechanism for overcoming this difficulty.

The invention contemplates an improved arrangement of the grinding surfaces whereby the clay or other material may be rapidly supplied thereto and more speedily and perfectly ground or reduced.

The chief objects are very much the same as they are in my other application to which reference has already been made, but I attain these objects through a different kind of arrangement of mechanical elements which will be found suitable for very many locations.

The invention may be said therefore to comprise 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 front elevation of my improved rotary dry pan. Fig. 2 is a sectional side elevation at right angles to the view in Fig. 1.

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

1 designates 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 and held thereto by means of bolts 3 or other fastening devices. Upon the frames 2 is supported a horizontal cross frame 4 which is rigidly affixed to said frames 2. This frame 4 provides journal bearings 6 and 7, in which is rotatably mounted a horizontal shaft 5 whereon is a driving pulley 8 which may obviously be a plain pulley, a tight and loose pulley, or any other suitable kind of pulley. A bracket 9 secured to one of the side frames 2 serves to provide another bearing for the shaft 5, which bearing is at the outermost end of the shaft. All of these bearings are preferably built with roller bearings in order to enable them to give a freer revolution to the shaft 5. Also, on shaft 5 contiguous to the bearing 7 is a bevel driving pinion 10 which meshes with a horizontal master gear wheel 11 that is securely fastened upon the upper end of a vertical driving shaft 12 which occupies a position centrally in the machine. Shaft 12 is supported at its upper end in a bearing 13 supplied near the central point of the horizontal cross frame 4. Vertical shaft 12 is shown in its full length in Fig. 1.

23 designates a grinding base or grinding pan proper which has an enlarged hub that is bored to fit the shaft 12 to which it is securely keyed in order that the shaft may drive said base or pan (see Fig. 1). The upper surface of this grinding base 23 is provided with grinding plates 29 of hard material that are securely bolted or otherwise fastened thereto, and of which there may be any suitable number preferably arranged in a circular series. Above the plates 29 of the grinding base 23 are the vertical rotary wheels or mullers 14 and 15. They are the main grinding devices and they revolve in consequence of the revolution of the pan or base 23 and plates 29 beneath them,

said pan carrying the material to be ground. The base 23 and plates 29 constitute the main part of the grinding element of the machine on which the mullers act. These mullers 14 and 15 are built in any desired manner and of any suitable hard material. The central portion of each is bored to receive one end of a wearing sleeve 17 which is flanged and securely bolted to the muller, as seen in Fig. 1. Each wearing sleeve 17 is provided with a flanged sleeve 18 extending in the same horizontal direction as the sleeve 17, there being between the sleeve 17 and the sleeve 18 a ball bearing 18[a] which serves as a thrust bearing for the muller. A shaft 16 runs through the sleeve 17 and the sleeve 18 and is supported at its ends in boxings 37 and 52, the boxing 37 preferably containing a spring 21, and the boxing 52, springs 19 and 20 which enable the mullers to be more or less elastic and adjustable to compensate for wearing on the grinding plates 29, and also to give ease of movement when unusually hard or coarse particles of the material which is ground get under the mullers. It is quite necessary in the operation of mullers of this kind that the shock incident to their action on very hard material should be provided for in some such way as I have here devised, and these springs serve the purpose very well. The construction and arrangement of the journal or shaft 16, the sleeve 17, secondary sleeve 18, as well as the bearings 37 and 52 and the contained springs, will be substantially the same for both the mullers 14 and 15.

The lower end of the main driving shaft 12 is supported in a suitable step bearing, the details of which may vary widely. 24 denotes such bearing which is carried upon some suitable part of the main frame. Within the bearing is a plate 25 having a raceway therein containing a series of balls 26 which are also contained in another raceway 29 which is carried by a casting 28 that is bolted to the main grinding base 23. As the shaft revolves and carries with it the grinding base, the casting 28 is likewise rotated and the ball bearing arrangement which I have just described facilitates the movement of the parts at this point and enables an effective step or support for the lower end of the shaft to be provided. The casting 28 is preferably provided with peripheral grooves and flanges which overlap and engage oil grooves and flanges in the upper edge of the box that forms the step casting 24.

A circular stationary rim 22 of greater or less diameter is supported by any convenient means centrally in the machine and surrounding the mullers and the grinding pan, that is to say, the grinding base 23 and its grinding plates 29, the point of support of this ring or rim 22 being preferably somewhat outside of the plates 29 and directly above the screen, there being a small intervening opening 35 between the lower edge 22 and the screen. The screen in the present example is made to consist of two sections 30 and 31 both situated in the same horizontal plane and carried by a skeleton frame consisting essentially of arms 32 rigidly supported by the main grinding base 23. The screen I am now describing is the primary screen and enables the first screening of the material to be performed. The screen plate 30 is made much heavier than the screen plate 31 so that it will not be so liable to break when the material passes through the opening 35 between the rim 22 and the screen 30. Obviously, the screen 31 may be made of a lighter construction, for the same pressure is not brought to bear thereon. Below the primary screen is a secondary screen 33 likewise in a horizontal position and carried by a frame 34 which forms a part of or is securely attached to the main grinding base or the screen supporting frame for the primary screen. The secondary screen 33 as well as the primary screen, consisting of parts 30 and 31, and the grinding base 23 with its plates 29, are thus all seen to be jointly supported and jointly revolved by one actuating mechanism in which the main driving shaft 12 is the prominent and leading member. The material which refuses to pass through the interstices of the primary screen 30 and 31 falls off the periphery of the same, while that which does pass through drops upon the secondary screen 33, and such material as passes the latter enters the proper receptacle beneath. The openings in the secondary screen 33 will usually be smaller than those in the primary screen so that a finer screening may be accomplished thereby.

38 denotes a conical hopper which I term the tailings hopper, and 39 another conical hopper concentric with the first and located inside of the same, which hopper I term the screened clay hopper. These two hoppers are located below the screens as clearly indicated in the drawings. The outer hopper 38 is provided with a vertical cylindrical husk 36 which extends upwardly alongside of the screen mechanisms in such a manner as to leave a certain amount of space between said husk and the peripheries of the screens into which the coarse material that refuses to pass the screens can fly through the action of the centrifugal force which is exerted by the screens. All the coarse material which refuses to pass screens 30 and 31 falls from the edge thereof inside the husk 36, and all the material which refuses to pass the finer screen 33 falls from the edge thereof also into the husk 36, and all this material drops down into the outer tailings hopper 38. On the other hand, all

the fine material which has been sufficiently reduced to fit it to be used in the manufacture of brick and clay products which falls through the screen 33 enters the conical hopper 39 as a completed and finished product ready to be removed for use.

The hopper 38 is provided with a discharge chute 40 which delivers its contents into the tailings boot 43 where it is taken by the buckets 48 on the belt 47 that passes around the lower pulley 46 and the upper pulley 49, and thereby elevated and dumped into a re-delivery chute 50, whereby this coarse material is passed back again into the pan to be re-ground. The other or screened clay hopper 39 is provided with an outlet chute 41 which delivers its contents into the screened clay boot 42, from which it is taken by any suitable elevator or conveyer, similar to that which operates to carry away the coarse material, and is thereby transported to any point where it is to be used to be worked into material in course of manufacture.

In order to prevent the dust from flying about the machinery room while the clay or shale is being reduced, I find it convenient to employ a dust fan which is shown at 45. This is provided with a spout 44 which leads through the walls of the hoppers 38 and 39 and has its mouth inside of the inner hopper 39. When the fan is actuated a downward current of air is transmitted into the hopper 39, and this operates to draw all the dust away from the pan and prevent it from flying through the room and through the working parts of the machine as well as through the machinery that is being used in the manufacture of clay products.

Many changes in the exact construction and arrangement of the various parts may be made without departing from the legitimate scope of the present invention as it is outlined and stated in the claims.

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 with a grinding base, of a primary screen, a secondary screen, said primary screen being situated in substantially the same plane as the grinding base, and both the primary and the secondary screens having a free outer edge, a surrounding husk, two hoppers below the screens, one for the tailings and the other for the screened clay, the outermost receiving the tailings, and the innermost the screened clay.

2. In a dry pan, the combination with a grinding base, of a primary screen, a secondary screen, hoppers below the screens, one for the tailings and the other for the screened clay, and a stationary rim having its lower edge close to the primary screen and providing a small opening between it and the screen through which the ground material passes to the screen.

3. In a dry pan, the combination of a grinding base having grinding plates thereon, mullers arranged in association with said parts, a cylindrical encircling rim, a primary screen rotating with the grinding base and close to the said rim, a secondary screen below the primary screen, said screens having each a free outer edge, a surrounding husk, and separate hoppers for receiving the material from the screens.

4. In a dry pan, the combination with a grinding element, of a primary screening element and a secondary screening element, the screens and the grinding element revolving in unison, a surrounding husk, hoppers below the screens, one for the tailings and the other for the screened clay, mullers arranged in connection with the grinding element, and a stationary rim supported above the primary screen with its lower edge in close proximity thereto, so that a space is provided between said rim and the screen through which the ground material passes.

5. In a dry pan, the combination with a grinding base and mullers, of a primary screen having two sections one of which is stronger than the other, a stationary rim supported above the stronger section with an intervening space between it and the screen through which the ground material passes, a secondary screen below the primary screen, a surrounding husk, and hoppers below the screen, one for the tailings and the other for the screened clay.

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

RAYMOND C. PENFIELD.

Witnesses:

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C. B. SCHROEDER.