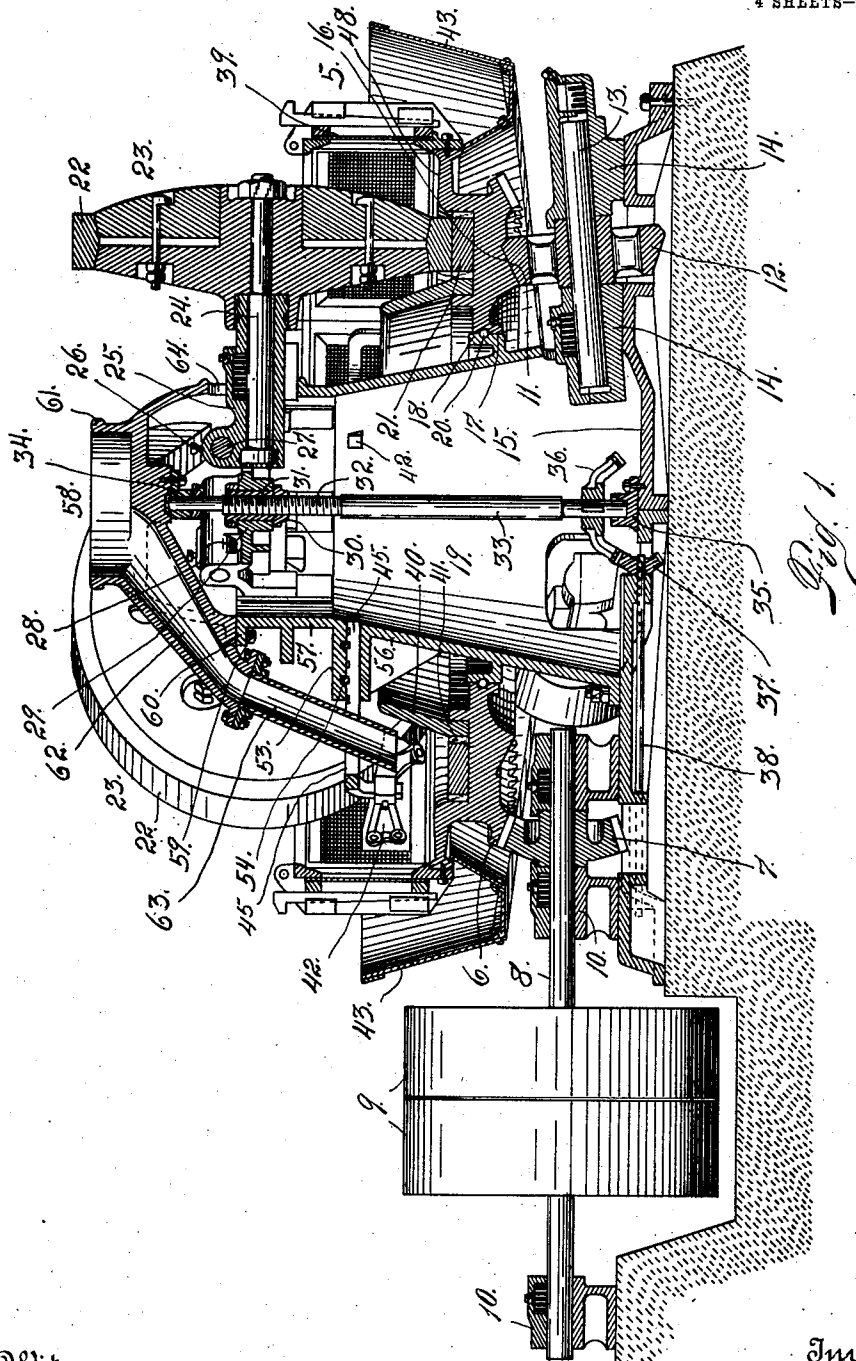


W. A. GALLAND.
PULVERIZING MILL.
APPLICATION FILED APR. 4, 1911.

1,021,981.

Patented Apr. 2, 1912.

4 SHEETS-SHEET 1.



Witnesses
C. H. Rossmore.
Otto E. Haddick.

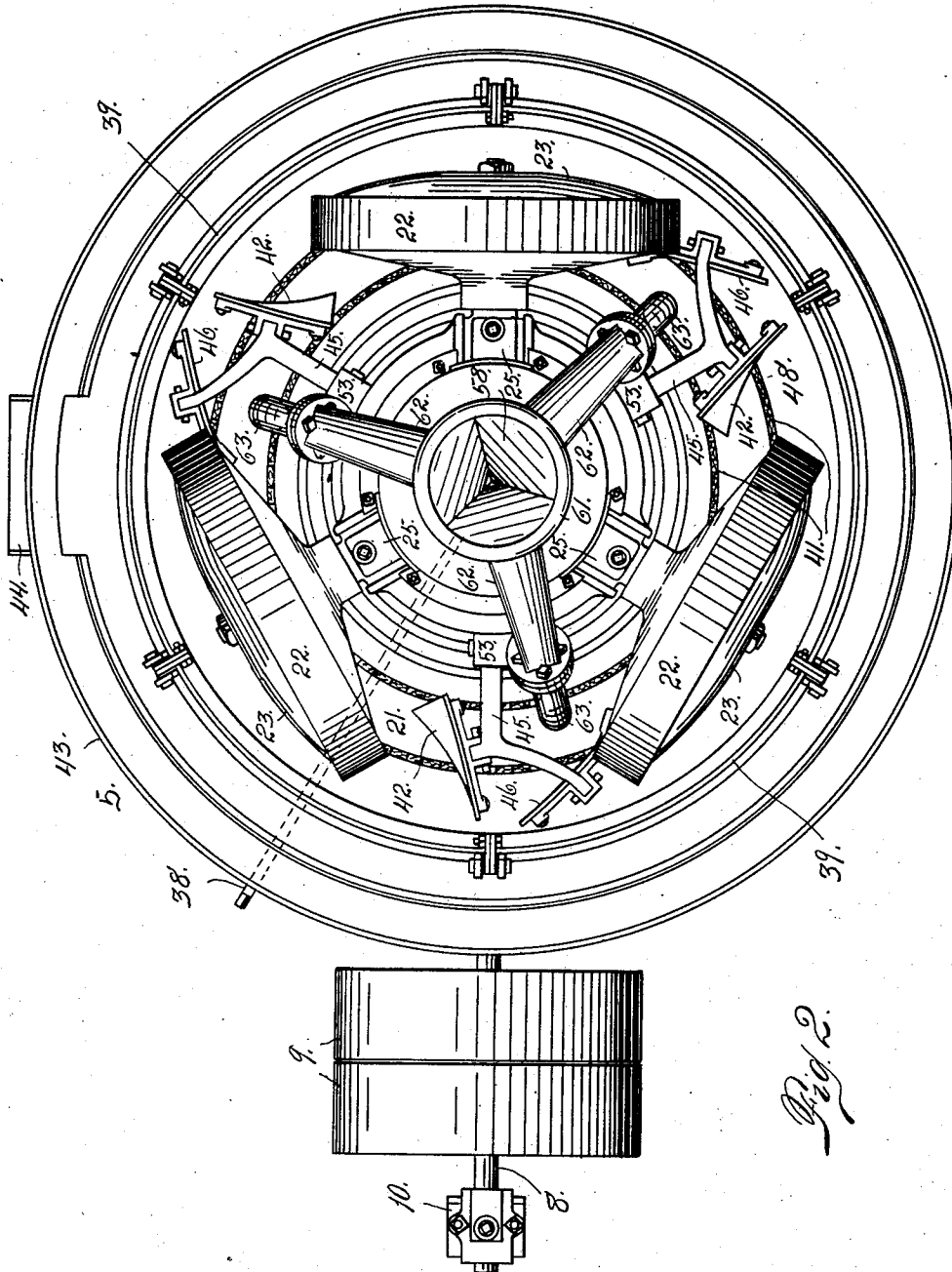
Inventor
Walter A. Galland.
By A. J. O'Brien
Attorney

W. A. GALLAND.
PULVERIZING MILL.
APPLICATION FILED APR. 4, 1911.

1,021,981.

Patented Apr. 2, 1912.

4 SHEETS—SHEET 2.



Witnesses
C. H. Rossoner.
Otto E. Haddick.

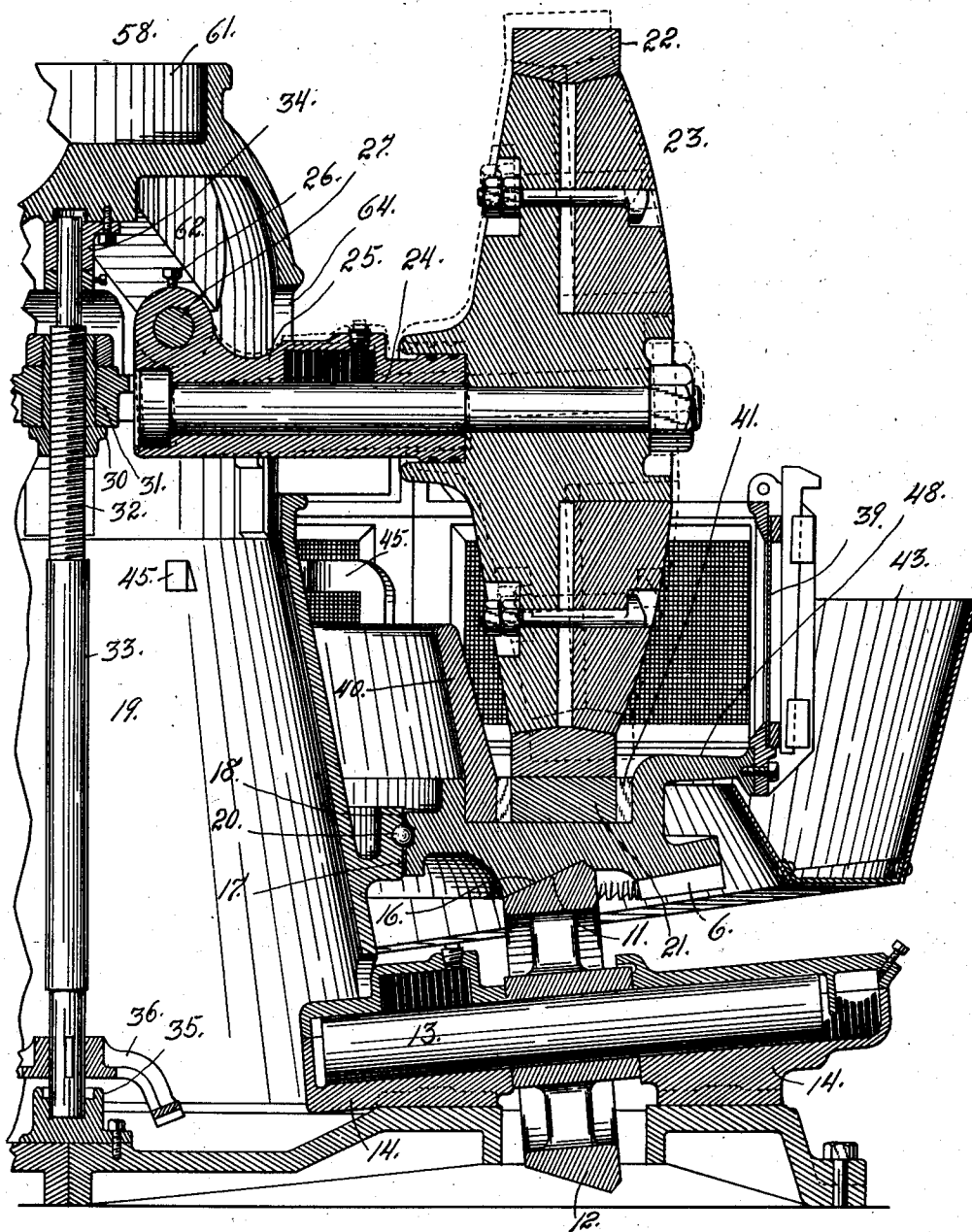
Inventor
Walter A. Galland.
BY A. J. D. Zien
Attorney

W. A. GALLAND.
PULVERIZING MILL.
APPLICATION FILED APR. 4, 1911.

1,021,981.

Patented Apr. 2, 1912.

4 SHEETS—SHEET 3.



Witnesses
C. H. Rosener.
Otto E. Haddick.

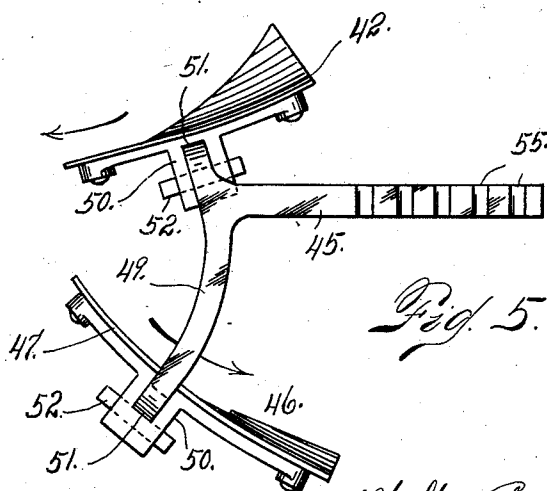
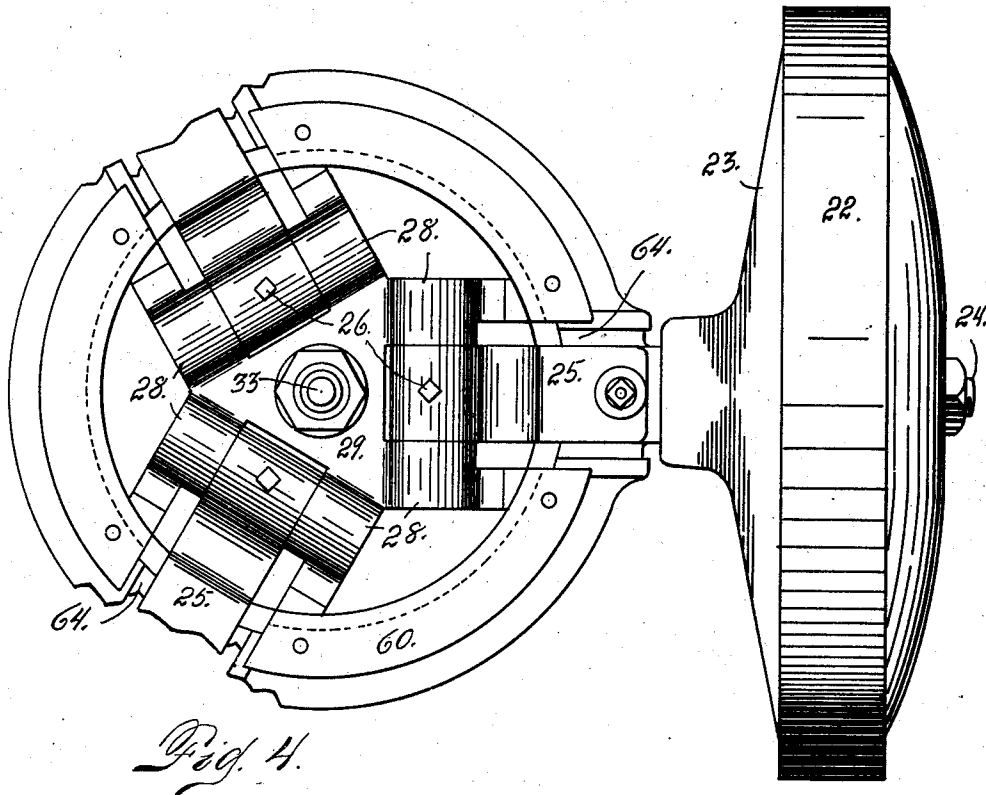
Fig. 3. Inventor
Walter A. Galland.
By A. J. O'Brien
Attorney

W. A. GALLAND.
PULVERIZING MILL.
APPLICATION FILED APR. 4, 1911.

1,021,981.

Patented Apr. 2, 1912.

4 SHEETS-SHEET 4.



Witnesses
C. H. Rossmeyer.
Otto E. Haddick.

Inventor
Walter A. Galland.
By A. J. O'Brien
Attorney

UNITED STATES PATENT OFFICE.

WALTER A. GALLAND, OF DENVER, COLORADO, ASSIGNOR TO JOHN H. ELSPASS, OF DENVER, COLORADO.

PULVERIZING-MILL.

1,021,981.

Specification of Letters Patent.

Patented Apr. 2, 1912.

Application filed April 4, 1911. Serial No. 618,978.

To all whom it may concern:

Be it known that I, WALTER A. GALLAND, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Pulverizing-Mills; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in pulverizing mills of the class in which pulverizing rolls are arranged to coöperate with a circular die in a rotary mortar, the rolls being actuated by the rotation of the mortar.

In my improved construction each of the rolls is mounted on a shaft journaled in a bearing which is hinged above the axis of the shaft, thus permitting the roll the necessary oscillatory movement and at the same time maintaining its pulverizing face in proper coöperative relation with the die. The said bearing in which the roller shaft is journaled, is formed integral with a centrally located hub which is threaded upon a vertically disposed shaft, the latter being adjustable for the purpose of raising and lowering the shaft bearings for the proper adjustment of the rolls to compensate for wear. When the rolls are new, the said bearings are at their upward limit of movement. However, as the rolls and die, or either, become worn, these bearings may be lowered by the rotation of the vertical shaft in the proper direction.

Other features of novelty in my improved construction will become apparent as this specification proceeds.

Having briefly outlined my improved construction, I will proceed to describe the same in detail, reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing: Figure 1 is a central vertical section taken through a pulverizing mill equipped with my improvements. Fig. 2 is a top plan view of the same. Fig. 3 is a fragmentary section similar to Fig. 1,

showing the right-hand side of the machine, on a larger scale. Fig. 4 is a detail view with the feed hopper removed, illustrating the oscillatory bearings in which the roll shafts are journaled. Fig. 5 is a detail view illustrating the plows for discharging the pulverized material against the surrounding screen of the mortar, and for returning the material not sufficiently pulverized to the die for retreatment, respectively.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a mortar upon the bottom of which is formed a gear 6 which meshes with an operating pinion 7 fast on a shaft 8 carrying fast and loose pulleys 9, the said shaft being journaled in bearings 10. The pulleys may be connected with any motor capable of supplying power for operating the machine. The mortar is supported from beneath by wheels 12 fast on shafts 13 journaled in bearings 14 mounted on the base plate 15 of the machine. The peripheries of the supporting wheels 12 are beveled as shown at 11, to coöperate with oppositely beveled faces 16 formed on the bottom of the mortar, these beveled faces serving to prevent friction and cause a perfect rolling action between the supporting wheels and the bottom of the mortar. Between the inner face 17 of the bottom of the mortar and the adjacent face 18 of a centrally located hollow frame member 19, are placed ball bearings 20 to relieve the friction between the mortar and its engaging centrally located member.

The upper surface of the bottom of the mortar is equipped with a circular die 21 which is engaged by the tire 22 of the pulverizing rolls 23, the latter being fast on shafts 24 journaled in bearings 25, the inner extremities of these bearings being made fast by setbolts 26, to short shafts 27 journaled in bearings 28 fast on a hub 29, the latter resting upon a shoulder 30 formed on a nut 31, the latter being threaded on the upper threaded part 32 of a centrally located shaft 33, the latter being journaled at the top in a bearing 34 and at the bottom in a step box 35. To the lower extremity of this shaft is secured a gear 36 which meshes with a pinion 37 fast on a shaft 38 whose outer extremity is exposed for manipulating

purposes, whereby the shaft may be turned for the purpose of vertically adjusting the hub-carrying bearings 28.

The mortar is equipped with an upwardly projecting surrounding screen 39 of suitable mesh, and an upwardly projecting wall 40 at its inner circumference, whereby the material under treatment is retained in the mortar. The die is secured in the bottom of the mortar by a filling 41 located on opposite sides thereof, this filling being interposed between the vertical walls of the die and adjacent walls formed on the mortar. By virtue of this arrangement the die is readily removable.

Mounted within the mortar and supported in suitable operative relation to the die, is a number of plows 42 which are arranged to throw the pulverized material from the circular pulverizing area of the bottom of the mortar, outwardly against the screen 22, whereby the material which is pulverized to the required degree of fineness, will pass through the screen into a surrounding trough 43 whose bottom slopes toward a discharge mouth 44 in the usual manner. This plow 42 is mounted on a supporting arm 45 which also carries a second plow 46 arranged the reverse of the plow 42, a portion 47 of the plow 46 projecting outwardly above the outer portion 48 of the bottom of the mortar beyond the die, whereby it is arranged to return the material which is too coarse to pass through the screen, to the pulverizing face of the die. This plow 46 is mounted upon a part 49 projecting angularly from the plow-supporting arm 45. Each of these plows is provided with lugs 50 which straddle parts 51 of the supporting arm, and are secured thereto by keys 52 passing through registering openings formed in the connected parts.

The plow-supporting arm 45 is secured in a bearing 53 by means of keys 54 which engage recesses 55 formed in the upper face of the arm. There is a series of these recesses, whereby the arm is adjustable radially for the purpose of regulating the position of the plows 42 and 46 carried thereby. The frame member 19 is composed of a lower frustum-shaped part 56 and an upper cylindrical part 57, upon which is mounted a hopper 58, the hopper being secured to the top of the said frame member by bolts 59 passed through a flange 60 formed on the top of the frame member, and threaded into the casting of which the hopper is composed. This casting is provided with openings 64 through which the oscillatory bearings 25 pass, the said openings being sufficiently large to permit the necessary degree of oscillation. This hopper is composed of a centrally located cylindrical top 61 from which lead a number of downwardly and outwardly projecting spouts 62

to whose outer extremities are secured pipes 63 which extend downwardly into the mortar, terminating a short distance above the die, whereby the material fed into the mortar is carried to the die for treatment. These feed members are interposed between the pulverizing rolls and the material is fed to the die from each feed member a short distance in the rear of each roll, whereby the material immediately after it is deposited upon the die is carried underneath the pulverizing roll, the discharge taking place between the plow 42 and the roll, whereby the plow cannot act upon the material to throw it outwardly against the screen until after it is passed underneath the roll. It will be observed from an inspection of the drawing (see Fig. 2), that the machine is equipped with three pulverizing rolls, three sets of plows 42 and 46, and three conduits for discharging material into the mortar for treatment.

From the foregoing description the use and operation of my improved pulverizing mill will be readily understood. Power being applied to the machine in the manner heretofore explained, the mortar is rotated and the pulverizing rolls actuated by coming in contact with the material discharged into the mortar through the instrumentality of the feed hopper and the conduits leading downwardly therefrom. As the material is delivered to the die it is carried underneath the rolls, which are of sufficient weight for pulverizing purposes. The material acted upon by the dies is thrown outwardly against the screen by the plows 42, and such of it as has been pulverized to the required mesh will pass through the screen into the surrounding trough, while the balance will be returned to the die for retreatment, by the plows 46.

As the tires of the rolls or the die or both become worn, the bearings in which the shafts of the pulverizing rolls are journaled, may be lowered by rotating the shaft 33, a suitable wrench or other device being applied to the outer extremity of the shaft 38 for the purpose.

Having thus described my invention, what I claim is:

1. The combination with a rotary mortar, of pulverizing rolls, bearings in which the rolls are journaled, a hub to which the said bearings are pivotally connected at one extremity, a vertically disposed shaft upon which the hub is vertically movable, and a centrally located hollow frame member surrounding the shaft and having openings through which the bearings of the rolls are passed, the openings being of sufficient size to permit of an oscillatory movement of the bearings, substantially as described.

2. The combination with a rotary mortar, of pulverizing rolls, bearings on which the

said rolls are journaled, a centrally located rotatable shaft, a hub vertically adjustable upon the said shaft, the bearings being pivotally connected with the said hub, a centrally located hollow frame member surrounding the shaft, the frame member having openings through which the said bearings pass, the openings being of sufficient size to permit an oscillatory movement of the bearings, substantially as described.

3. The combination with a rotary mortar, of pulverizing rolls, bearings in which the said rolls are journaled, a centrally located vertically disposed shaft, a hub mounted on the said shaft and vertically adjustable, the bearings in which the rolls are journaled being pivotally connected with the hub, a centrally located hollow frame member, and a hopper mounted on the frame member, the frame member having openings through which the said bearings pass, the openings

being of such size as to allow the bearings the necessary oscillation, substantially as described.

4. The combination with a rotary mortar, of pulverizing rolls, bearings in which the said rolls are journaled, a hub upon which the said bearings are pivotally mounted at their extremities remote from the rolls, the opposite extremities of the bearings being free to oscillate, a centrally located rotatable shaft upon which the said hub is vertically movable, whereby the angle of the rolls with respect to the vertical may be adjusted, substantially as described.

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

WALTER A. GALLAND.

Witnesses:

OTTO E. HODDICK,
F. E. BOWEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."