

(No Model.)

4 Sheets—Sheet 1.

R. D. GATES.
PULVERIZING MACHINE.

No. 269,404.

Patented Dec. 19, 1882.

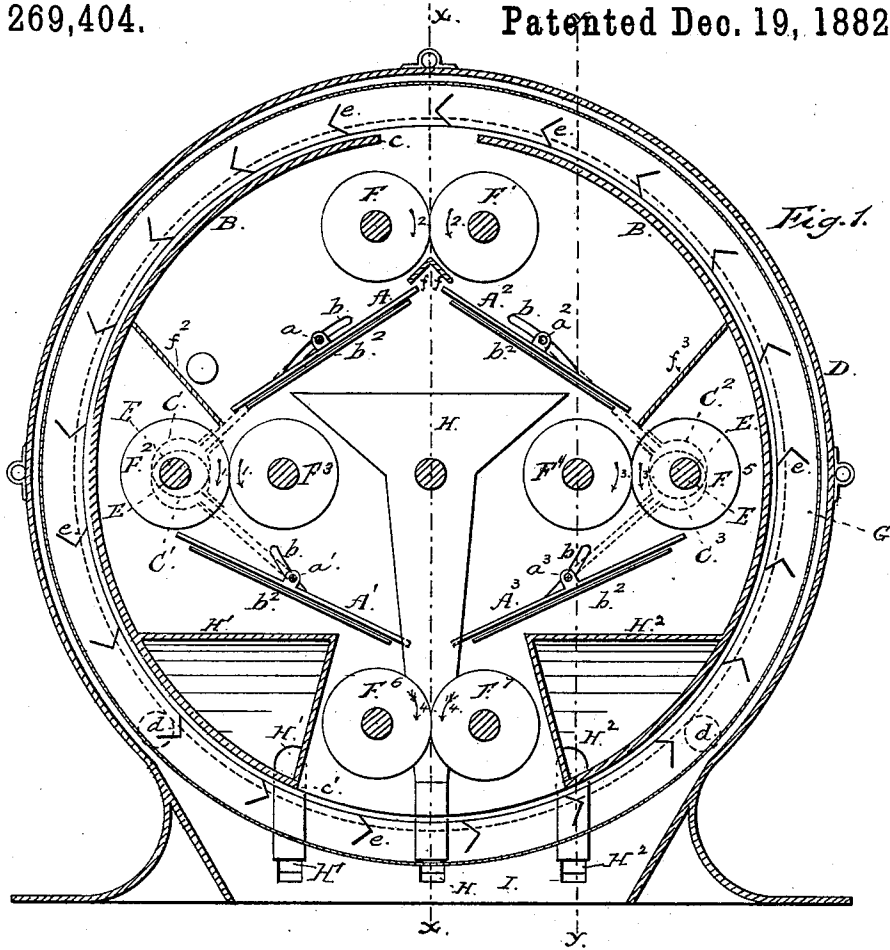


Fig. 1.

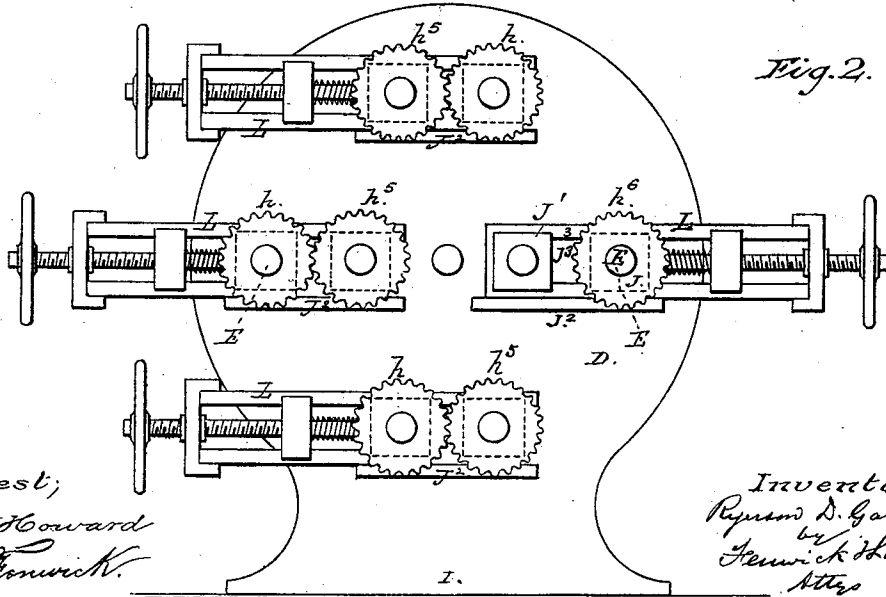


Fig. 2.

Attest;
C. W. Howard
R. C. Spruick.

Inventor,
Ryder D. Gates
by
Fenwick Lawrence
Atty

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Fig. 3.

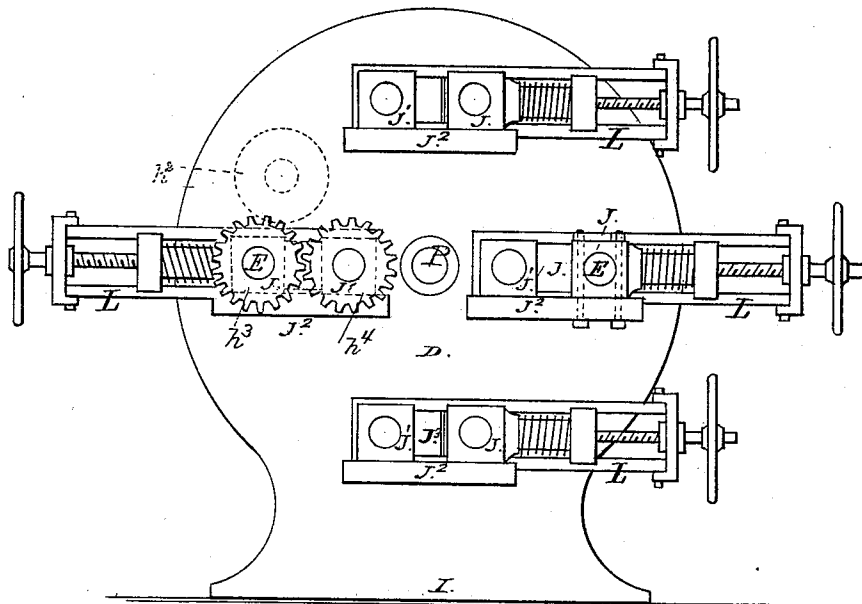


Fig. 4.

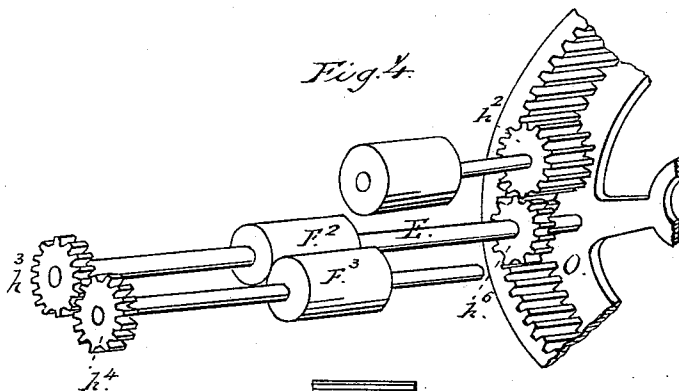
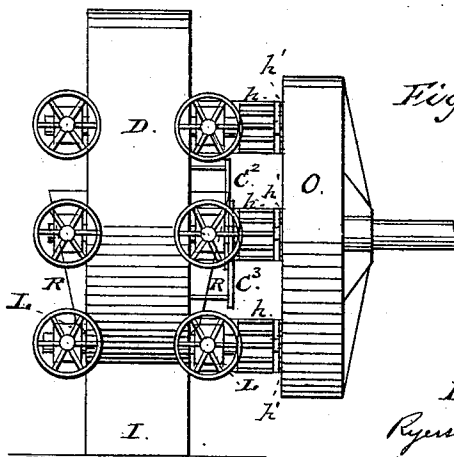


Fig. 5.



Attest;
C. W. Howard
D. C. Fenwick.

Inventor;
R. D. Gates
by
Fenwick Howard
Attys.

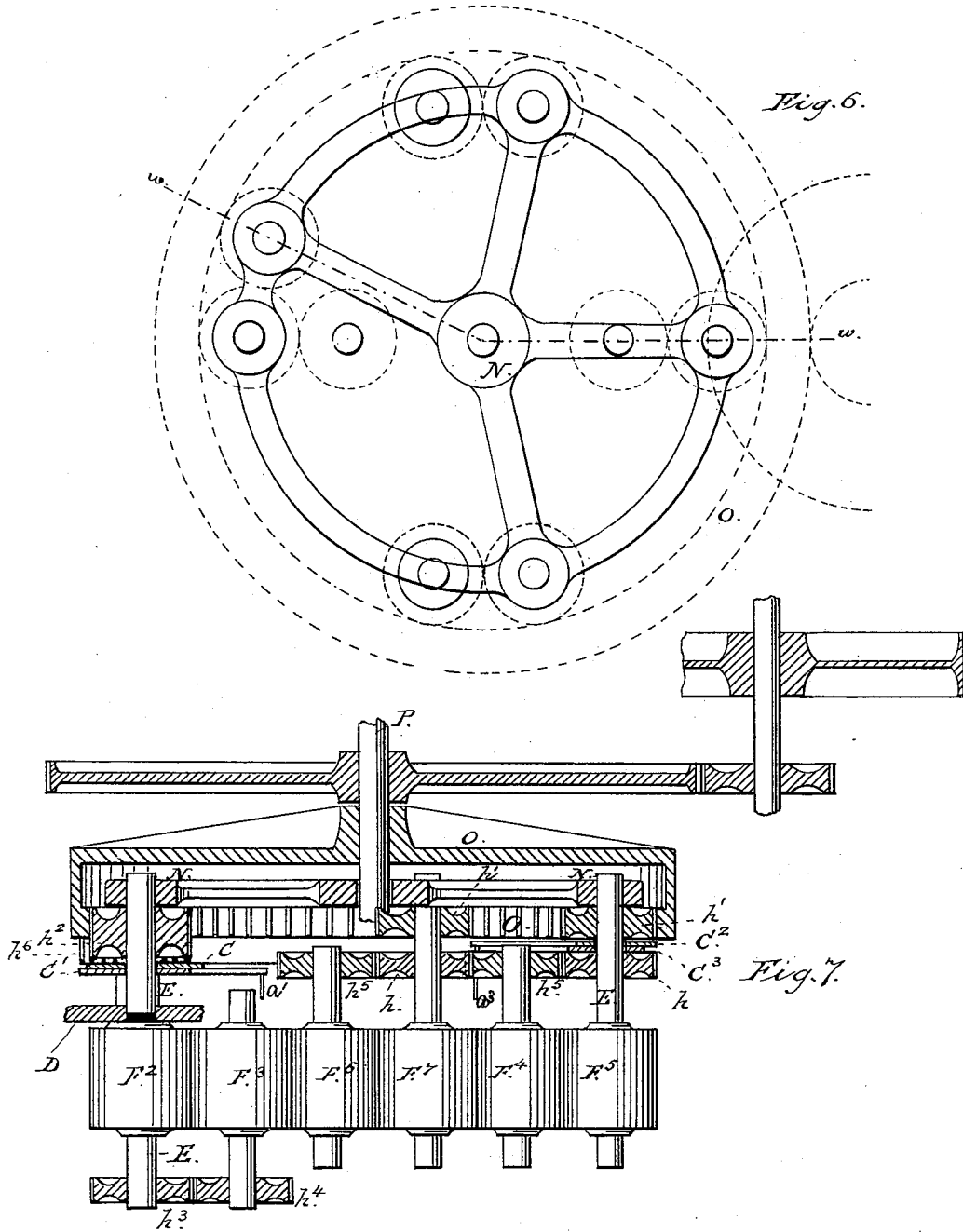
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4 Sheets—Sheet 3.

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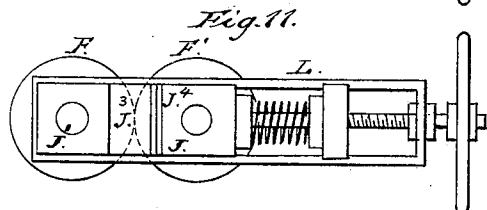
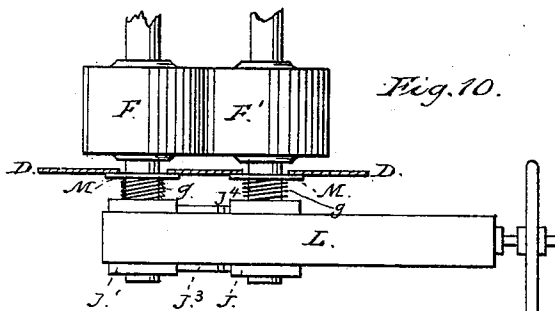
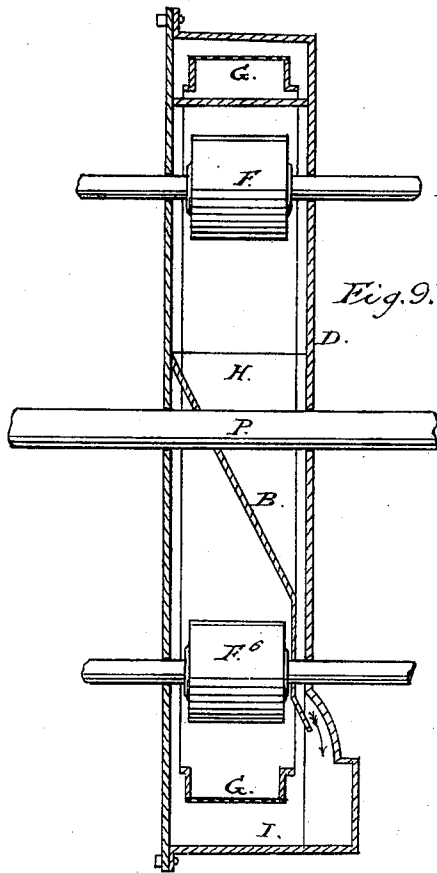
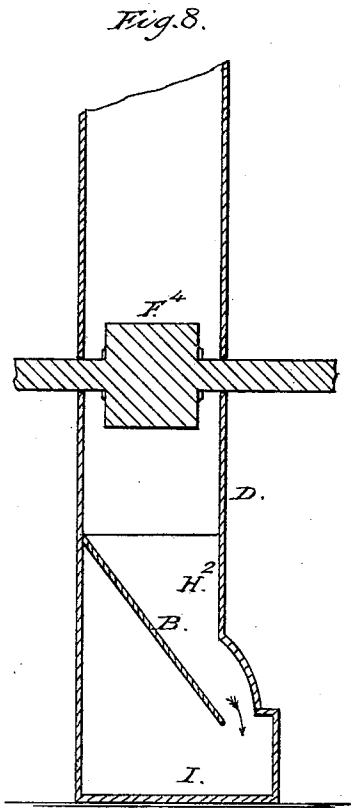
Attest;
G. W. Howard
R. D. Gates

Inventor;
R. D. Gates
by
Jenrich Lawrence
Atty

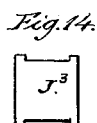
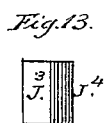
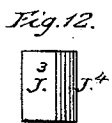
R. D. GATES.
PULVERIZING MACHINE.

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Attest,
H. W. Howard
B. Fenwick



Inventor,
 Rufus D. Gates.
by
Henrick Lawrence
 Atty

UNITED STATES PATENT OFFICE.

RYERSON D. GATES, OF CHICAGO, ILLINOIS.

PULVERIZING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 269,404, dated December 19, 1882.

Application filed August 7, 1882. (No model.)

To all whom it may concern:

Be it known that I, RYERSON D. GATES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Pulverizing-Machines, of which the following is a specification.

My invention relates specially to an improvement on the pulverizing-machine secured to me by Letters Patent No. 260,092, dated June 27, 1882, and the nature of the same will be clearly understood from the following description and claims and accompanying drawings, in which latter—

Figure 1 is a vertical section longitudinally of the case and revolving screen of the machine. Fig. 2 is a side elevation with the large internally-toothed gear-wheel and spider removed. Fig. 3 is a view of the opposite side of the machine. Fig. 4 is a broken perspective view of a portion of the gearing and one pair of the crushing-rolls. Fig. 5 is an edge view of the machine complete. Fig. 6 is a diagram showing the spider, and illustrating in dotted lines the relation of other parts thereto. Fig. 7 is a horizontal section in the line $w w$ of Fig. 6. Fig. 8 is a detail section in the line $y y$ of Fig. 1. Fig. 9 is a partial section in the line $x x$ of Fig. 1. Fig. 10 is a detail top view, showing a pair of rollers and the adjusting-bearings at one end of the same, and packing-plates for the shaft-holes of the case. Fig. 11 is a side view of the same. Figs. 12, 13, and 14 are details of a block and pieces used between the bearings.

The same letters of reference in the several figures designate the same or corresponding parts.

The first improvement which I shall describe is intended to facilitate the discharge of the finely-pulverized substances from the screening-surfaces, and thus increase the working capacity of said surfaces in a given sized machine; and to effect this object I apply four movable, instead of stationary, inclined conducting sieves or chutes, $A A' A^2 A^3$, within an internal stationary shell, B, of the outer case, D, and connect the same to pitmen of eccentrics $C C' C^2 C^3$, which are on the shafts $E E$ of pulverizing-rollers $F^2 F^5$. The eccen-

tries are outside of the case D, and are connected with the screen sieves or chutes by means of rods $a a' a^2 a^3$, which pass through segmental slots b in the case, and they receive a rapid vibratory motion during the revolution of the rollers $F^2 F^5$, being guided in said movement by inclined ledges b^2 on the ends of the case D, as shown.

The sieves or chutes may be formed of either open wire-work or perforated sheet metal; or in some cases they may be of imperforate boards or plates, and if the latter they might be stationary.

In connection with the described means for giving a vibratory motion to the conducting sieves or chutes $A A' A^2 A^3$ it is important to employ the internal shell, B, which is constructed as follows: Immediately above the pair of rollers $F F'$ an opening, c , is formed in the shell B, said opening extending from head to head of the case D, and a similar opening, c' , of greater length than c , is also provided in this shell below the rollers $F^6 F^7$. The shell B is of smaller diameter than the shell of the outer case, D, and it is concentric with the latter-mentioned case, in order that the revolving cylindrical elevating-screen G, embraced in my aforesaid patented machine, may be placed around it and allowed to revolve freely upon the supporting friction-rollers $d d$. In constructing the case with the shells B D the ends or heads of the case D are made to form the ends or heads for the internal shell, B.

The revolving screen G is, as heretofore, provided with elevating devices e , which I prefer to make in the form of V-shaped buckets. This screen serves for elevating the substances to be ground, and depositing them through the passage c upon the rollers $F F'$. It also serves for screening and discharging the finely-pulverized substances, as well as for re-elevating such substances as are not in the first passage through the rollers pulverized to the degree of fineness desired.

In order to effect the passage of the substances in opposite directions upon the sieves as they come from the pair of rollers $F F'$, a V-shaped parting-ridge, f , is placed centrally between and below said pair of rollers; and

in order to effect the passage of the substances from the sieves or chutes A A' to and between the rollers F² F³ F⁴ F⁵, inclined guard-plates f² f³ are applied to the inner surface of the shell B, as shown; and inasmuch as it has been found, in operating practically with my hereinbefore-mentioned patented machine, that the rolls crushed faster than the substances were discharged, and in consequence thereof the elevating-buckets carried up considerable material which was fine enough to go through the revolving screen, and which would have passed off if a chance had been afforded, I have provided the internal shell of the machine herein represented with a chute, H, which is directly under the sieves or chutes A A², and with chutes H' H², which are directly under the sieves A' A³, all of which chutes H H' H² lead out of the shell B into the receiving and discharging chamber I of the outer case, D, as illustrated in Figs. 1, 8, and 9 of the drawings. With this arrangement of chutes H H' H² such fine substances as are suitable for being discharged after being acted upon by the rollers F F' and sieves or chutes A A² pass immediately off through the chute H into the chamber I of the outer case, D, while such substances as are pulverized fine enough after being acted upon by rollers F² F³ F⁴ F⁵ and sieves A' A³, are immediately discharged through the chutes H' H² into the said chamber I of the outer case, D. The remaining substances on the screens A' A³ pass between the rollers F⁶ F⁷ and descend into the revolving screen G, the finely-pulverized substances escaping through its meshes into the chamber I, while the coarser substances are re-elevated by the screen. Should any fine substances be carried up to the rollers F F' by the revolving screen, they will pass between these rollers and through the sieves A A² into the chute H and chamber I, instead of falling again into the screen G.

By my arrangement for conducting off the finely-pulverized substances in separate chutes, as well as through the revolving screen, the liability of the machine clogging or choking is avoided, as a great deal of stuff can be screened and passed off directly through the chutes H H' H², thus relieving the revolving screen and increasing the working capacity of a given sized machine.

The bearings J J' of the shafts of the rollers are applied upon bracket-plates J² of the outer case, D, that J being bolted fast to said bracket, while the other, J', slides on the bracket, and between the two bearings a packing device consisting of a main block, J³, and plates J⁴ is placed for the purpose of maintaining a solid connection between the bearings whatever may be the adjustment of the movable bearing. The main part J³ is a solid piece, and with flanges or guides, so as to slide back and forward, while pieces J⁴ are of thin sheet-iron, which are removable, being inserted or removed accordingly as the adjustment of the rolls toward or from one another may require.

A sliding yoke, L, with spring-pressure and screw-adjusting device, is employed in connection with the bearing-boxes, in substantially the same manner as in my hereinbefore-mentioned patented machine; and between the bearing-boxes and the ends of the outer case, D, packing-plates M are placed around the shafts of the rollers, and are held up tight against said case by means of spiral springs g. By this means the openings in the case for the shafts of the rollers are closed around the shafts, and thus dust is prevented from coming out of the machine. These packing-pieces may be of metal faced with cloth; or they may be made of wood, leather, or other suitable material.

In order to give greater stability to the gearing of the machine, the shafts of the rollers F' F² F⁵ F⁷ are extended beyond the pinion-wheels thereon, and three of these shafts are provided with two pinions, h h', and the other with a single long pinion, h². The shaft driven by the pinion h² has a pinion, h³, on its off end, which gears with a pinion, h⁴, of the roller F³, while the long pinion gears with a pinion, h⁵, on the inner end of the shaft E of the roller F².

The extended ends of the shafts of the rollers F' F² F⁵ F⁷ are supported in a spider, N, which is arranged within the internal-toothed gear-wheel O, said spider being loosely fitted upon the power-shaft P, as shown, so as not to revolve with said gear or shaft. It is important to have the expansion-gears h h⁵ of the rollers F F' F² F³ F⁴ F⁵ F⁶ F⁷ constructed with long teeth, in order to allow the rolls to move back and forward, and their teeth being made thus long, they are unfitted for gearing into the internally-toothed wheel and bearing the strain necessary in driving the rolls.

The pinions h' and h², by gearing into the internally-toothed wheel, obviate the necessity of having the pinions h and h⁵ and h³ h⁴ h⁶ gear into the internally-toothed wheel, and thus breakage is avoided. By having the long pinion h² gear into the pinion h⁵ on the shaft of roller F², and providing the two pinions h³ h⁴ on the opposite ends of the shafts of rollers F² F³, these rolls are made to revolve properly—that is, in the direction indicated by the arrows 1, while the other pairs of rolls revolve in the directions indicated by the arrows 2, 3, and 4. This arrangement obviates the necessity of using a large spur-wheel on the shaft on the side of the machine opposite to that where the internally-toothed gear-wheel is placed.

It will be understood that the tendency of the extended shafts to spring when the rollers are subjected to great strain is avoided by the use of the spider N, which spider renders all the bearings perfectly rigid or firm.

The machine, when constructed for use, is to be provided in any proper manner with a supply chute or chutes, R, which lead through the outer case, D, into the revolving screen G; and when the machine is in operation the substances are elevated by the buckets of said

screen to the opening *c* and deposited between the rollers *F F'*, and any overflow from the rollers *F F'* will be arrested by the inclined guard-plates *f² f³* and properly directed there-
 5 by to the rollers *F² F³ F⁴ F⁵*, said guard-plates also directing the screenings or partially-ground substances to the said rollers. It is
 10 my purpose to employ any desirable number of pairs of rolls—that is, one, two, three, four, or more pairs—and to operate them by gear-
 ing and within an inclosing case on the principle herein described.

What I claim as my invention, and desire to secure by Letters Patent, is—

15 1. The combination of an outer case, *D*, an inner shell, *B*, a revolving screen, *G*, and a pair of rollers, *F F'*, substantially as and for the purpose described.

20 2. The combination, with an outer inclosing case, *D*, and a pair of grinding-rollers, *F F'*, within said case, of one or more conducting sieves or chutes, as *A*, and eccentrics connected to the sieves and applied upon the roller-shafts outside the case *D*, substantially
 25 as and for the purpose described.

3. The combination of an outer case, *D*, an internal shell, *B*, a pair of grinding-rollers, *F F'*, and a chute, *H*, substantially as and for the purpose described.

30 4. The combination of an outer case, *D*, an internal shell, *B*, provided with chutes *H H'*, and two pairs of grinding-rollers, *F F'* and *F² F³*, and a conducting sieve or chute, *A*, substantially as and for the purpose described.

35 5. The combination of an outer case, *D*, an internal shell, *B*, provided with chutes *H H'*, and three pairs of grinding-rollers, *F F'*, *F² F³*, *F⁶ F⁷*, and conducting sieves or chutes *A A'*, substantially as and for the purpose described.

40 6. The combination of an outer case, *D*, an internal shell, *B*, provided with chutes *H H' H²*, four pairs of rolls, *F F'*, *F² F³*, *F⁴ F⁵*, *F⁶ F⁷*,

and conducting sieves or chutes *A A' A² A³*, substantially as and for the purpose described.

7. In a roller grinding-machine, the combi- 45
 nation of an external shell or case, an internal shell, *B*, guard-plates *f² f³*, and chutes *H H' H²*, substantially as and for the purpose described.

8. The combination of the outer case, *D*, inter- 50
 nal shell, *B*, grinding-rolls, and conducting sieves or chutes, substantially as and for the purpose described.

9. The combination, with an external case through which the shafts of the rollers extend, 55
 and with said shafts and their bearings, of packing-plates and springs applied upon the shafts between the said case and the bearings, substantially as described.

10. The combination of the flanged sliding 60
 adjustable blocks *J³* and plates *J⁴* with the bearings *J J'* of the rolls and sliding yoke *L*, substantially as and for the purpose described.

11. The combination of the internally-toothed gear-wheel *O*, spider *N*, pinions *h h' h⁵*, and a 65
 pair of grinding-rollers, substantially as and for the purpose described.

12. The combination of the internally-toothed gear-wheel *O*, spider *N*, pinion *h²*, pinion *h⁶*, pinions *h³ h⁴*, and pair of rollers *F² F³*, substan- 70
 tially as and for the purpose described.

13. The combination of four pairs of rolls inclosed within a case, *D*, the gearing, and spider *N*, substantially as and for the purpose 75
 described.

14. The combination of one or more pairs of pulverizing-rollers, the long-toothed gearing of the same, the driving-gearing, the spider, and an outside inclosing case, substantially as and for the purpose described.

RYERSON D. GATES.

Witnesses:

ERWIN O. HASTEN,

WILLIAM J. O'CONNELL.