(No Model.) 2 Sheets—Sheet 1.

R. D. GATES.

PULVERIZING MACHINE.

No. 288,050. Patented Nov. 6, 1883.

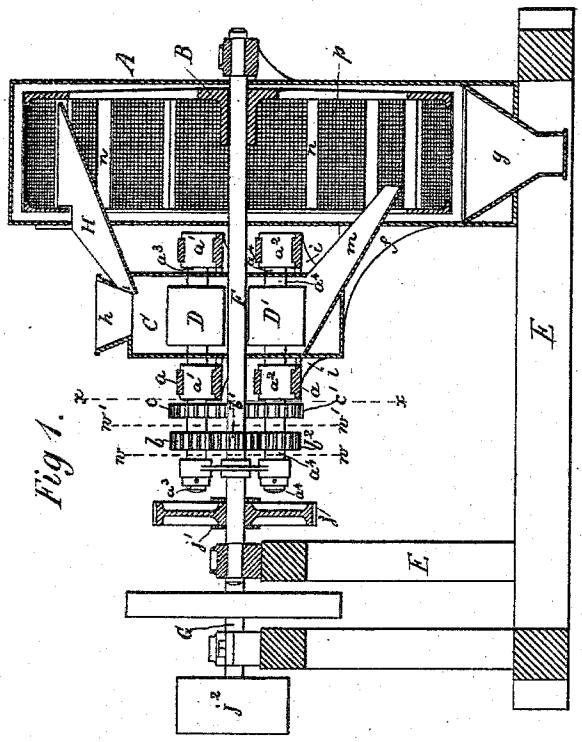


Fig 1.

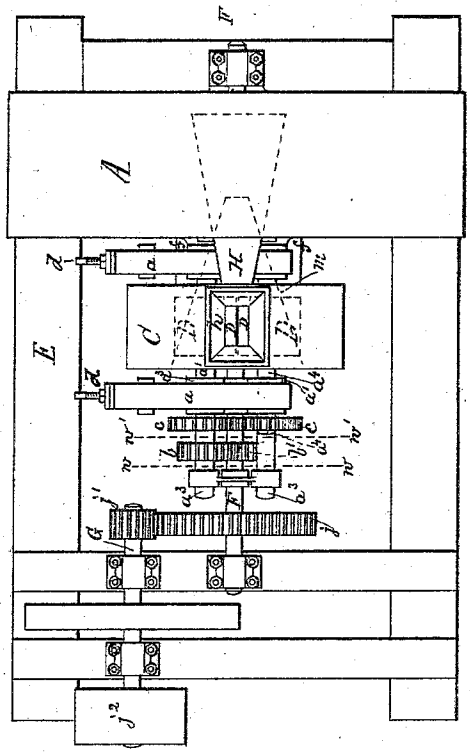


Fig 2.

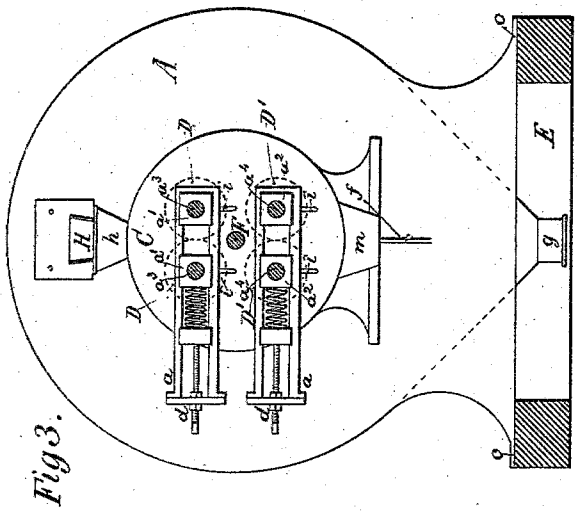


Fig 3.

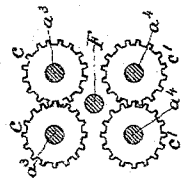


Fig 5.

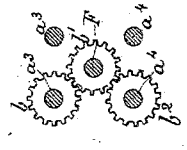


Fig 4.

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(No Model.) 2 Sheets—Sheet 2.

R. D. GATES.

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Fig 6.

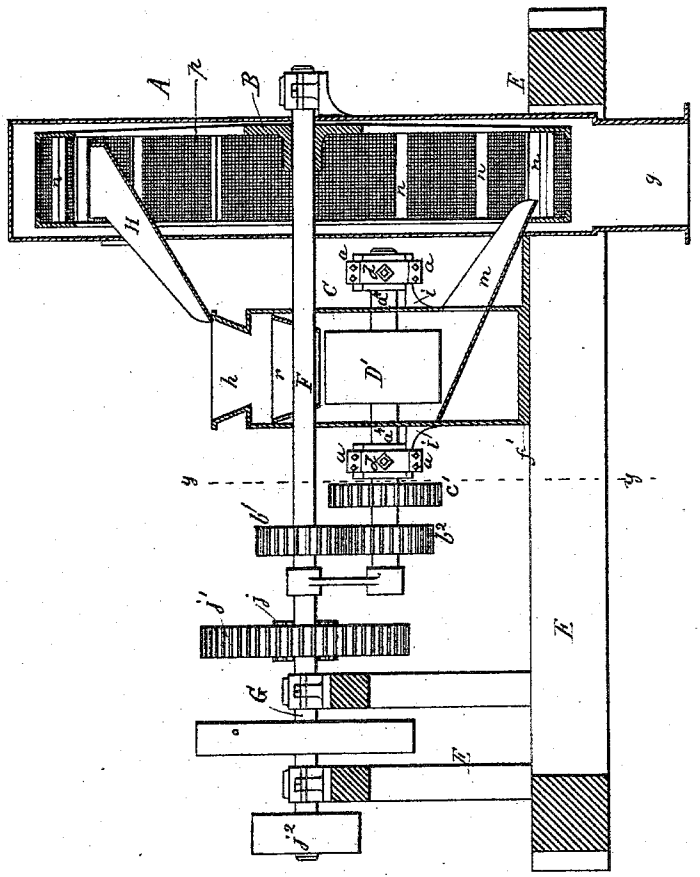
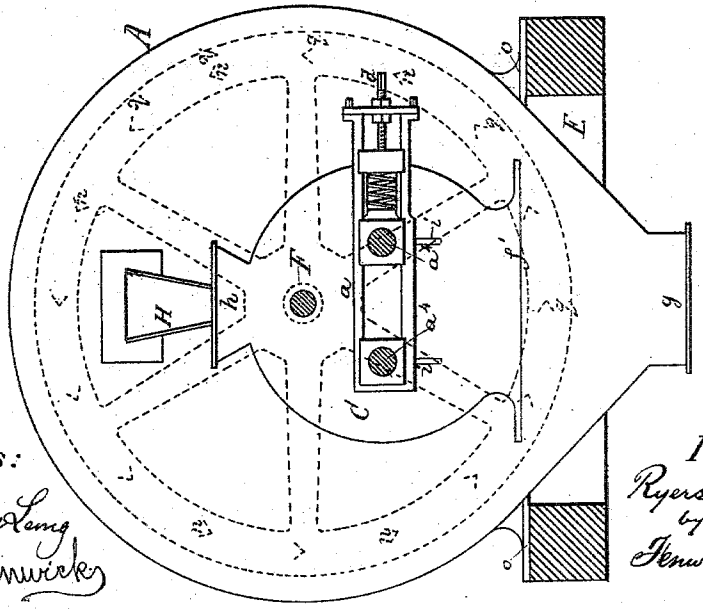


Fig 7.



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UNITED STATES PATENT OFFICE.

RYERSON D. GATES, OF CHICAGO, ILLINOIS.

PULVERIZING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 288,050, dated November 6, 1883.

Application filed April 4, 1883. (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 to an improved construction and arrangement of the pulverizing-machine for which Letters Patent No. 260,092 were granted to me June 27, 1882; and the nature of the same will be fully understood from the following description and claims, and annexed drawings, in which latter—

Figure 1 is a vertical longitudinal section of my improved machine provided with two pairs of pulverizing-rollers. Fig. 2 is a plan view of the same. Fig. 3 is a vertical section in the line *x x*, looking toward the roller-case. Fig. 4 is a diagram section in the line *w w*, showing three wheels for gearing two pairs of rollers together; and Fig. 5, a diagram section in the line *w' w'*, showing four wheels by which the rollers are geared together in pairs. Fig. 6 is a vertical longitudinal section, showing a machine similar to that represented in Figs. 1, 2, and 3, excepting that two rollers instead of four, and suitable gearing for operating the same, are provided; and Fig. 7 is a vertical section of Fig. 6 in the line *y y*, looking toward the roller-case.

In the accompanying drawings, A represents a stationary case of cylindrical form, adapted for containing a revolving screen, B, and C is another stationary case of cylindrical form, adapted for containing two pairs of pulverizing-rollers, D D', as shown in Fig. 1.

E is a frame adapted for supporting a central gear-shaft, F, carrying a wheel, *j*, and G a driving-shaft, which carries a toothed wheel, *j'*, and a pulley, j^2, said frame E, shaft F, and the bearing-brackets *i* of the case C sustaining the yokes *a*, bearings *a' a²*, shafts a^3 a^4, adjusting devices *d*, and pinions *b b' b² c c c' c'* of the rollers. The central shaft, F, passes from supports at each end of the frame E through a spider, and the roller-case C, and the screen-case A, it being properly boxed, so as to be revolved by a gear-wheel, *j*, on one of its ends. The shafts a^3 and a^4 of the pulverizing-rollers are supported in boxes *a' a²*, which are fitted in the adjusting-yokes *a* on each side of the case C, which yokes are mounted upon brackets *i* of said case. Two of the said shafts a^3 and a^4 are extended on the geared side of the case and fitted in the spider, through which the central shaft, F, passes loosely.

The respective pairs of rollers D and D' carry toothed gear-wheels, the pair D being driven by the gears *c c*, which are on the shafts a^3 a^3, while the pair D' is driven by the gears *c' c'* on shafts a^4 a^4. The shaft F has the gear-wheel *b'* applied on it, and above this gear on shaft a^3 the gear *b* is applied, while below said shaft F the gear b^2 is applied on shaft a^4.

The means *d*, shown for adjusting the rollers toward and from one another, may be substantially the same as in my patent hereinbefore mentioned, or of any other known suitable construction. So, also, is the gearing for matching the rollers in pairs, and the means for supporting the bearing-boxes and yokes upon the case C. The shaft G is mounted upon the frame E, and on it are applied the pulley j^2, a balance-wheel, and a pinion, *j'*, which latter gears with the larger toothed wheel *j* on shaft F, and imparts motion to the said shaft and the screen B, and also to the pinion *b'*, wheels *b* and b^2, shafts a^3 and a^4, by wheels *c c c' c'*, which cause the pulverizing-rollers D D' to revolve in pairs, one roller of one pair revolving against the revolving motion of the other of the same pair—in other words, the rollers of a pair revolving toward each other.

The cylindrical case A is supported by the frame E, being bolted to it by means of its flanged portions *o*, while the case C is supported by the case A by means of a side bracket, *f*, as shown in Fig. 1; or it may be constructed separately and united to frame E by a stand, *f'*, as shown in Fig. 6.

The case A is provided with a funnel-like discharge-passage, *g*, while the case C is provided with a hopper-like inlet-passage, *h*, and a chute-like outlet-passage, *m*, the passage *h* leading to the pulverizing-rollers D D', while the passage *m* leads through the case A into the revolving screen B, which is fastened to the central shaft, F, and arranged to revolve within the case A, as shown.

The screen B is provided with V-shaped buckets *n*, which are shown in side elevation in Figs. 1 and 6, and in end elevation by dotted

lines in Fig. 7. These buckets are, as in my former patent, hereinbefore referred to, set in relief from the wire-gauze *p* of the screen B, so that escape-spaces *q* are left between their outer edges and the wire-gauze, as shown in Fig. 7. The buckets serve as elevators for imperfectly pulverized substances, which are to be returned to the rollers D D′, and the spaces *q* allow fully pulverized substances, which are not lifted by the buckets *n*, to escape through the wire-gauze during the revolution of the screen.

H represents an inclined return-chute arranged at the top of the screen-case, and connecting the screen-case A with the roller-case C, as shown.

In Figs. 6 and 7 the machine is modified in its form and gearing so as to operate with one pair of rollers, D′ D′, the gears *j j′* being similar to those used in the form shown in Figs. 1 and 2, while the gear *b*, gears *c c*, and shafts a^3 a^3 are dispensed with, and the gear b^2, applied on roller-shaft a^4, meshes with the gear *b′* on the shaft F, as shown in said Figs. 6 and 7.

In Fig. 6 the case C is shown as provided with a secondary hopper, *r*, above the pair of rollers D′ D′, and the chute, as H, entering the hopper *h* at top.

From the foregoing specification, referring to Figs. 1, 2, 3, 4, and 5, it will be seen that the shaft G, on being revolved by pulley j^2, sets in revolving motion shaft F through toothed wheels *j j′*, and said shaft F sets in motion the two pairs of pulverizing-rollers D D′ through the gear-wheels *b b′* b^2 and *c c c′ c′*. The machine being thus set in motion, the substances to be pulverized are placed in the hopper *h* of the case C, and these substances, passing between the pairs of rollers D D′, are pulverized, and, being pulverized, pass from said rollers down the chute *m* into the revolving screen B, where the finely-pulverized or finished part passes off through the meshes of the wire-gauze *p* into the screen-case A during the revolution of the screen, and this product descends to the bottom of said case A, and is discharged through the funnel-like passage *g* at the bottom of the same. While the fine product is being screened, the partially-pulverized substances are collected by the buckets *n*, carried up to the top of the case A, discharged upon the chute H, and conducted back into the case C, to be further pulverized by the rollers D D′, and from thence they are again passed into the screen, to be screened into and discharged from the case A through the funnel-like passage *g*.

If only one pair of rollers is desired, the form of machine shown in Figs. 6 and 7 will be adopted, and the action upon the substance will be the same as when two pairs of rollers are employed, the only special difference being that less of the substances will be required to be returned for further pulverization when two pairs of rollers are provided, as a greater quantity of substance in a given time can be acted upon by two pairs of rollers than is possible with a single pair.

In a machine of the character herein described it is important to have the rollers and the screen in tightly-closed cases, such as C and A; and I prefer to adopt such construction; but I do not confine myself thereto. The central shaft, F, might be extended in length and be provided with a belt-pulley, and thus be operated directly instead of by a shaft G.

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

1. The combination, with an outer case, C, provided with inlet and outlet passages, and supports for roller-shafts and pulverizing-rollers arranged within said case, of the screen-case provided with a return-chute and a discharge-passage, a revolving screen, B, having elevating devices, and the central shaft, F, passed through the cases A and C, and having gears applied to it for giving motion to the pulverizing-rollers and the screen, substantially as described.

2. The combination of the roller-case C, pulverizing-rollers within said case, central shaft, F, passed through the case C, elevating-screen B, fastened to shaft F, chutes *m* and H, and gearing for connecting and revolving the screen and rollers, substantially as described.

3. The cylindrical screen-case A, inclosing and surrounding the screen, and provided with a discharge-passage, *g*, and a return-chute, H, in combination with a revolving screen, B, provided with elevating-buckets, the chute *m*, and the central revolving shaft, F, substantially as and for the purpose described.

4. The roller-case C and rollers within the case, in combination with a screen-case, A, inclosing and surrounding the screen, the revolving elevating-screen within the case, and the central revolving driving-shaft, F, said roller and screen cases being united to each other and provided with passages by which they communicate with each other, and the shaft provided with suitable gears, whereby the rollers and screen are operated simultaneously, substantially as described.

RYERSON D. GATES.

Witnesses:
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E. O. HASTEN.