2 Sheets—Sheet 1.

M. GOLDING.

Pulverizing Apparatus.

No. 221,548. Patented Nov. 11, 1879.

Fig. 1.

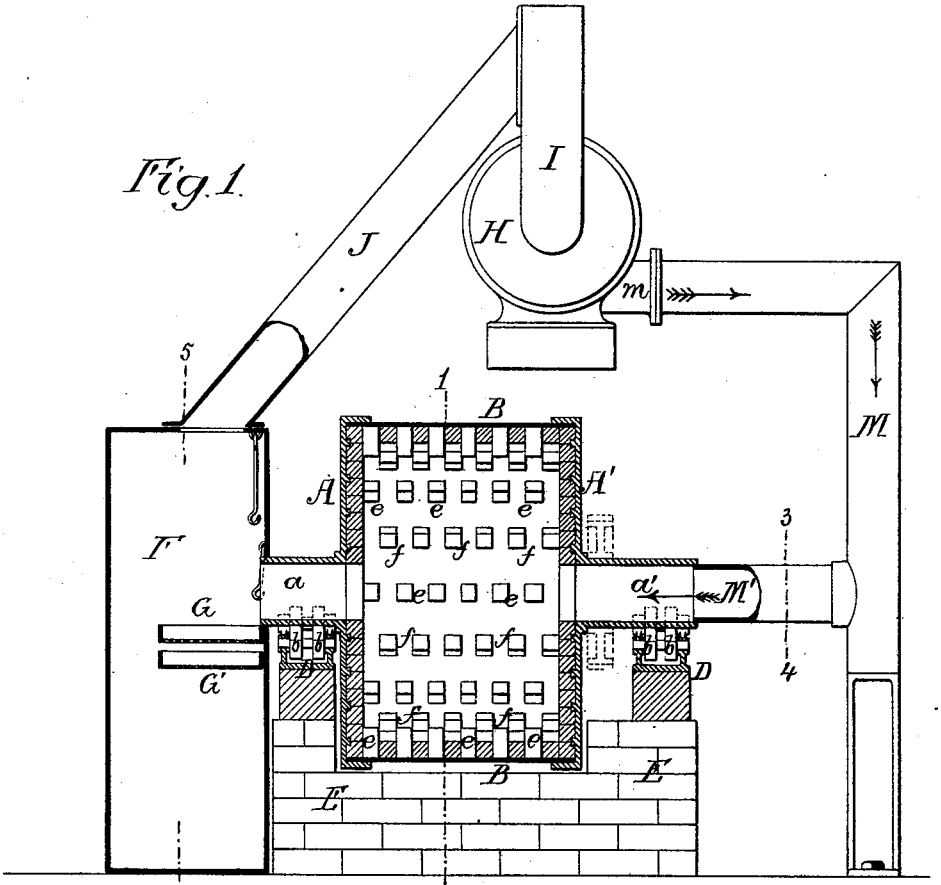
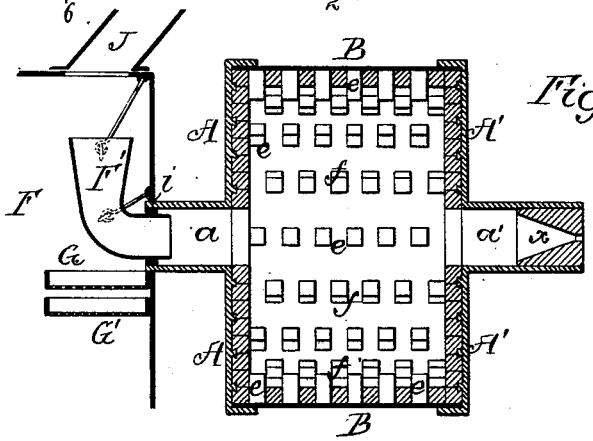


Fig. 4.



WITNESSES

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Fig. 5

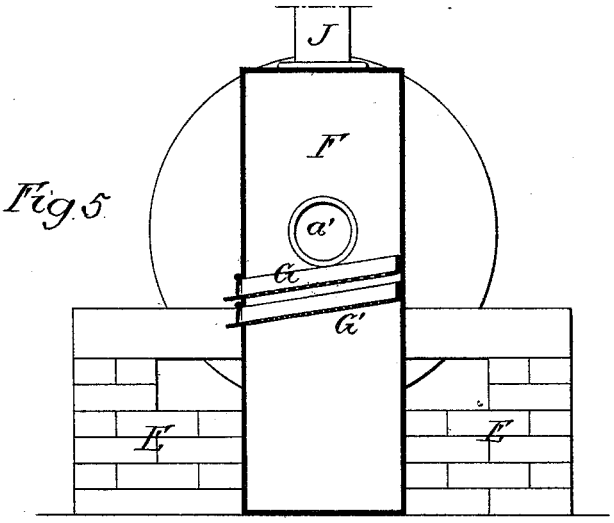


Fig. 3

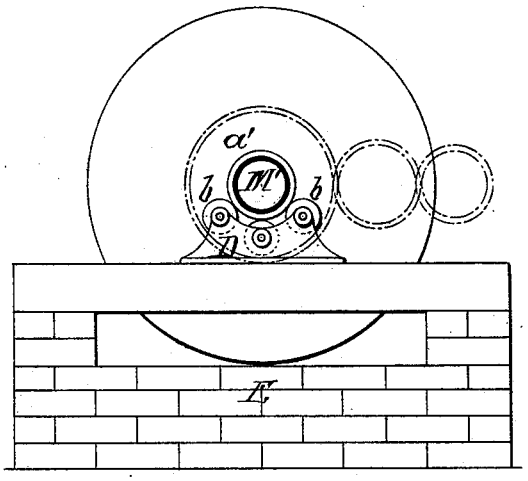
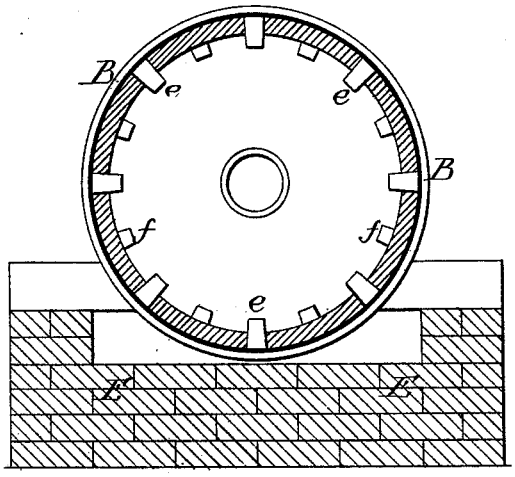


Fig. 2



WITNESSES

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D. M. Deemer.

INVENTOR

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UNITED STATES PATENT OFFICE.

MOSES GOLDING, OF TRENTON, NEW JERSEY.

IMPROVEMENT IN PULVERIZING APPARATUS.

Specification forming part of Letters Patent No. **221,548**, dated November 11, 1879; application filed July 12, 1879.

To all whom it may concern:

Be it known that I, MOSES GOLDING, of Trenton, New Jersey, have invented a new and useful Improvement in Pulverizing-Machines, of which the following is a specification.

My invention relates to that class of pulverizing apparatus in which the mineral to be pulverized is contained within a rotating cylinder and subjected therein to the triturating action of hard rounded stones, such pulverizing-machines being used in reducing quartz, feldspar, and other minerals to an impalpable powder for use as ingredients in the manufacture of pottery-ware.

One of the main objects of my invention is to increase the triturating efficiency of the rotating cylinder by causing some of the lining-blocks to project beyond the lining proper, thereby insuring a more thorough agitation of the triturating-stones and of the minerals acted on by the said stones.

Another object of my invention is to remove the pulverized material from the cylinder without disseminating throughout the room in which the apparatus is situated any of the said pulverized material, which is in the form of a deleterious impalpable powder, and this object I attain by combining with the rotating pulverizer and its hollow journals a fan or other exhausting device, certain pipes, and a box or other receptacle, by which air is caused to pass through the pulverizing-cylinder and through the pipes or fan, the effect of this current of air being to withdraw the pulverizing material from the cylinder and deposit it in the box.

Other features and objects of my invention are connected with the details of the apparatus, and will be fully explained hereinafter.

In the accompanying drawings, Figure 1 is a side view, partly in section, of the apparatus; Fig. 2, a transverse section on the line 1 2, Fig. 1; Fig. 3, an end view, partly in section on the line 3 4, Fig. 1; Fig. 4, a longitudinal section; and Fig. 5, a transverse section on the line 5 6, Fig. 1.

The outer casing of the pulverizing-cylinder consists of the end plates or disks, A A′, preferably of cast-iron, and the intervening annular plate B, which may be of sheet or plate iron, the whole being properly secured together.

From the center of the end plate A projects a hollow journal, *a*, and from the center of the end plate A′ projects a similar journal, *a′*, these journals having their bearings on anti-friction rollers *b*, arranged to revolve in pedestals D D, secured to a suitable foundation, E.

The interior of the cylinder is lined with hard wood in the shape of blocks, the inner faces of the two end plates of the cylinder having dovetailed ribs, to which the blocks are fitted, and by which they are retained in place, and the lining-blocks within the annular plate B being so fitted together as to be self-retaining without the aid of dovetailed ribs. The blocks are of hard wood—hickory, for instance—and are so cut or arranged within the cylinder that the end grain will in all cases be presented to resist the triturating action of the contents of the cylinder.

Some of the blocks within the cylinder project beyond the lining proper of the annular plate, as shown in Figs. 1 and 2, in which eight series or rows of projecting blocks, *e*, are arranged at equal distances apart, a similar set of blocks, *f*, being arranged at a short distance from the first set. There are as many more sets of projecting blocks as the length of the pulverizing-cylinder may suggest, the blocks of one set being arranged opposite to the spaces between the blocks of the adjoining sets. In other words, the projecting blocks are so staggered that those of one set shall not be in line with those of the adjoining sets.

It may be remarked here that I place within the cylinder hard flint stones with rounded surfaces, such as have heretofore been used in pulverizing-machines of the class to which my invention relates. These stones, together with the mass of quartz, feldspar, or other minerals to be triturated, are apt to remain more or less stationary while the cylinder revolves if the interior of the cylinder presents an uninterrupted and comparatively smooth surface. Hence there is not such an agitation of the stones and mineral as will cause the former to have the best triturating effect on the latter; hence the projecting blocks *e* and *f* are arranged at intervals, and in such respect to each other that as the cylinder revolves the stones must

be tossed about and pursue various courses, circumferential, lateral, and diagonal, as may be determined partly by the projecting blocks, partly by the shapes of the stones, and partly by the mineral acted on, the latter being also subjected to agitation and constant changes of position, so that it must be subjected to the most rapid and effective triturating action.

Near one end of the pulverizing cylinder is erected a box, F, through one side of which projects the journal *a* of the pulverizing-cylinder; and within the box, and below the end of the journal *a*, are two screens, G G′, one above the other, the upper screen having coarser meshes than the lower screen.

H is a rotary fan, between the exhaust pipe I of which and the box F a communication is effected by an inclined pipe, J, a pipe, M M′, extending from the outlet-branch *m* of the fan to the journal *a′* of the pulverizing-cylinder. A small portion only of the end of the pipe M′ enters the journal *a′*, and, while it fits snugly therein, it should not be so tight that the revolving journal will have a tendency to turn the pipe. The pipe is such that it can be sprung back away from the journal and turned on one side, thereby exposing the interior of the journal, the latter then becoming the feed-opening through which the mineral to be pulverized is introduced into the cylinder.

We will suppose that the cylinder is ready to receive its charge and commence the pulverizing operation. The pipe M′ is detached from and moved to one side of the journal *a′*, the fan H being out of gear. The empty cylinder is then started, and the supply of triturating-stones and quartz or other material to be pulverized is introduced into the cylinder through the journal *a′*. Both journals *a a′* are then provided with stoppers *x*, each having a small central aperture, flared on the inside, the object of these plugs or stoppers being to prevent the escape of the triturating-stones from the cylinder through the journals.

When the operation has continued for the proper length of time, and it is desired to test the fineness of the ground material, a suitable rod or scoop is inserted through the aperture of one of the plugs *x*, and on being withdrawn brings with it a specimen of the ground material. If this is found to have reached the proper degree of fineness, the plugs *x* are removed from the journals *a a′*, the pipe M′ inserted, and the fan H set in operation, so as to induce a current of air in the direction of the arrows shown in Fig. 1. The powder in the cylinder will be brought under the influence of this current of air, and will be carried by the latter through the journal *a*. After leaving the mouth of the journal *a* the greater portion of the powder will fall into the lower portion of the box F, part of the powder, however, being carried up the inclined pipe J, passing through the fan, through the pipes M M′, and back into the cylinder.

Any of the triturating-stones or any coarse particles of powder which may escape from the journal *a* fall into the uppermost of the two screens G G′, and are sifted first by the upper screen and then by the lower screen, the powder which passes through both screens joining that in the bottom of the box B, and any particles which are too large to pass through the screens being delivered at one side of the box, to be again returned to the cylinder.

When all of the powdered substance has been removed from the cylinder the movement of the fan is again stopped, the pipe M′ turned to one side, a new charge of material introduced into the cylinder through the journal *a′*, the plugs *x* reapplied, and the operation repeated as before.

It will be observed that the cylinder revolves continuously, no stoppage being necessary either for the introduction of the charge into the cylinder or for the removal of the pulverized substances therefrom.

In case the cylinder becomes heated during the pulverizing operation, owing to the limited amount of air which enters through the openings in the plugs *x*, the plug may be removed from the journal *a*, and an elbow-pipe, F′, adapted thereto, as shown in Fig. 4, this pipe permitting a full supply of air to enter the cylinder, without permitting the escape of the triturating-stones therefrom.

A ring, *i*, surrounds the end of the elbow-pipe and fits closely to the interior of the journal *a*, so as to prevent the escape of powdered substances around the pipe.

Owing to the fact that the cylinder discharges into a tight box, F, there can be no escape of any of the fine impalpable powder from the cylinder into the room or apartment in which the apparatus is situated.

I claim as my invention—

1. The combination of a lined pulverizing-cylinder, in which some of the blocks of the lining project beyond the lining proper, with triturating-stones, as set forth.

2. Pulverizing apparatus in which the following elements are combined, namely: a rotating pulverizing-cylinder having hollow journals, a box or other receptacle communicating with the said cylinder through one of its journals, a pipe or pipes for affording communication between said box and the other journal, and a device for causing a current of air to pass through said pipe or pipes and through the cylinder, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MOSES GOLDING.

Witnesses:
CHAS. F. TIETZE,
HARRY SMITH.