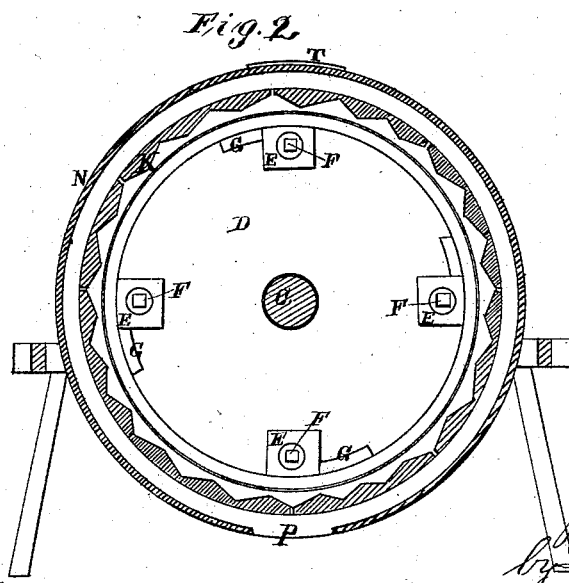
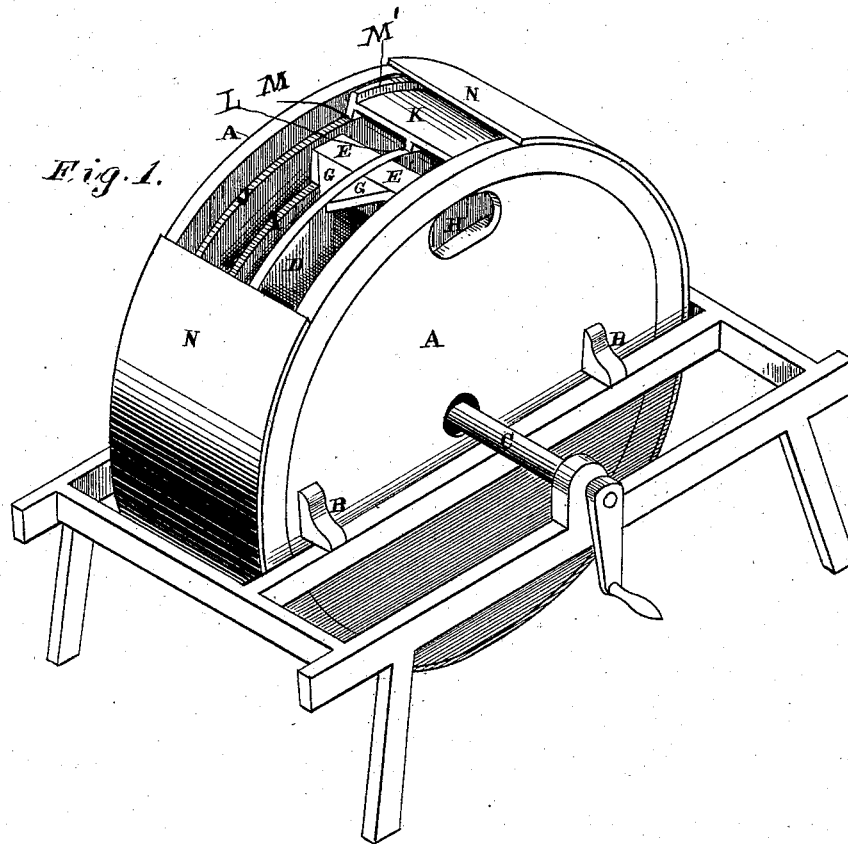


J. T. DAVIS.
Crushing and Pulverizing Mill.

No. 217,075.

Patented July 1, 1879.



Witnesses
Geo. H. Strong.
Frank A. Brooks

Inventor,
John T. Davis
by *Dewey & Co.*
Atys

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Fig. 3.

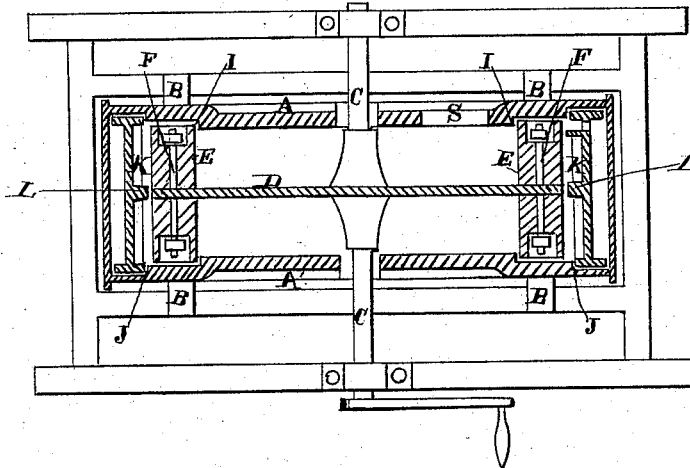


Fig. 4.

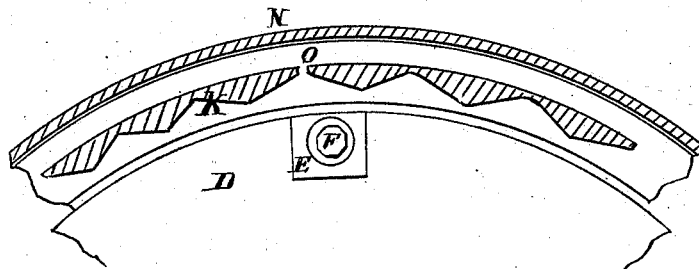


Fig. 5.

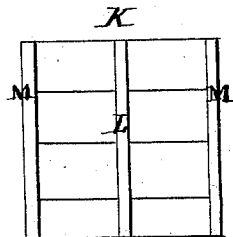
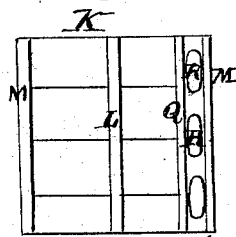


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN T. DAVIS, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN CRUSHING AND PULVERIZING MILLS.

Specification forming part of Letters Patent No. **217,075**, dated July 1, 1879; application filed July 29, 1878.

To all whom it may concern:

Be it known that I, JOHN T. DAVIS, of the city and county of San Francisco, and State of California, have invented an Improved Crushing and Grinding Mill; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates to an improved method of pulverizing quartz-rock, grain, or other hard substances; and it consists in bringing the substances to be pulverized into contact with cast-iron plates within an inclosed cylinder by means of a disk rotating within said cylinder, said disk being provided with projecting shoes, the interior of the case being provided with removable and interchangeable dies of peculiar construction, against which the material to be pulverized is violently thrown by the shoes until crushed to the required degree of fineness, when it passes through suitably-sized openings between the dies, or out of discharge-holes in the sides of the dies, and from thence to the discharge-passage. Means are provided for removing the shoes and dies at will, so that they may be changed or reversed when necessary.

Referring to the accompanying drawings, Figure 1 is a perspective view of my invention. Fig. 2 is a vertical section. Fig. 3 is a horizontal section. Figs. 4, 5, 6 are enlarged parts of my machine.

A A are the sides of the case, which are provided with lugs B, by which they are mounted upon the frame. The centers of these sides are open, so as to allow the shaft C to pass through, said shaft having bearings on the outer sides of the frame, as shown. Upon this shaft is mounted centrally in the case the disk D. On this disk, at suitable distances apart, are the extensions or shoes E, secured to the disk by means of bolts F, and additionally strengthened by the back braces G. Man-holes H are provided in the case in each side, by means of which the bolts and shoes may be removed or changed when desired. An offset, I, is formed in the sides of the case, past which the ends of the shoes project, so that the shoes pass close to said offset in their revolutions, in order that they may more ef-

fectually force the ore against the dies, as hereinafter described.

Another offset or flange, J, on the sides of the case forms a support for the inner edges of the dies K. These dies are formed in short sections for convenience in replacement and for purposes of discharge, and completely encircle the disk D, extending to the sides of the case, as shown. The inner sides of these dies are formed with corrugations, the faces of which are at opposite angles to each other alternately, and there is one central flange, L, and two side flanges, M M', formed on the dies, as shown. The side flanges, M M', are for the purpose of keeping the dies in position, since the flanges M rest on the offset or shoulder J, and the flanges M' bear against the rim or outer cover, N, joining the sides of the case together, and inclosing the operating mechanism. By means of these flanges the dies are kept in position, and do not need to be bolted on.

The central flange, L, on the inner side of the die corresponds in position to that occupied by the disk, its edge just clearing the periphery of said disk, and dividing the interior of the case into two compartments, so that nothing may pass from the first into the second compartment without passing between the space between said flange L and the edge of the disk carrying the shoes, for the purpose hereinafter described.

The discharge is accomplished by setting the sections of dies a short distance apart, so that as soon as the ore is pulverized fine enough to pass through the space O between the dies it comes out on outer surface of said dies, and slides down the space left for the purpose between the outer surface of the dies and the inner surface of the outer rim or cover, N. The pulverized ore is then discharged through the discharge-opening P at the bottom of the case. It will be manifest that these openings O between the dies will be varied in shape or in the position or angle at which they are placed, and that various means for enlarging or diminishing the openings may be adopted without materially affecting the principle involved in my invention.

Another method of discharge which may be

adopted is to add an additional flange, Q, to the die, as shown in Fig. 6, and form holes R in said die between this flange Q and flange M' on the side of the die. Then as soon as the ore is crushed fine enough it passes up or out through these holes R in the die between the flanges Q and M', and so into the space between the rim and dies and out of the discharge-hole, as described.

The operation of my device is as follows: The ore is fed into the opening S in the side of the case after the disk is set in motion by means of the shaft. As the shoes on the disk strike the ore it is thrown against the angular faces or corrugations of the dies, broken, deflected to the shoes again, and again thrown back to the dies, this operation being repeated until the ore is sufficiently fine.

As the case is practically in two compartments, formed by the disk and the flange L, as described, the ore is crushed comparatively fine in the side into which it is first fed. As soon as it becomes fine enough to pass through the space between the flange L and rim of the disk carrying the shoes it passes through into the next compartment, where the same process of attrition is repeated until the ore is fine enough to pass out of the discharge-openings into the space between the outer faces of the dies and inner face of the cover or rim of the case, as herein described. Of course any ore that is crushed fine enough in the first compartment will pass out between the sections of dies without going into the second compartment; but where dies with the openings R are used most of the ore will discharge through them.

It will be seen that the shoes revolve in such a manner as to produce a strong current of air, as they fill the space between the offset I and the offset J, thus more effectually forcing the ore against the dies. The openings in the sides of the case where the shaft passes through and the feed-opening allow plenty of air to enter, so that the machine is kept perfectly cool. The pressure of atmosphere inside, caused by the rapid revolution of the shoes, is sufficient to force the pulverized ore out through the proper openings as soon as it is sufficiently fine.

The peculiar shape of the dies admits of their being interchangeable at will. As soon as the faces against which the ore is thrown by the shoes become worn, by removing a cover, T, on top of the case the sections may be taken out and reversed, so that the other angular face may be brought into service.

The same is true of the shoes, which may be removed through the man-hole herein described, and their faces reversed, so as to bring the wear on a fresh surface.

There are no grinding-surfaces in this de-

vice. Pulverization is accomplished entirely by attrition or impact. The disk carrying the shoes is revolved very rapidly, and the pieces of ore are repeatedly and violently thrown against the dies until sufficiently pulverized to pass out of the proper discharge-holes.

If necessary I can line the inside of the sides of the casing with pieces of corrugated metal, in order to increase the attrition-surface; or I could substitute bars of iron closely brought together for the style of die herein described. In that case the ore could pass out of the interstices between the bars of iron, and pass out of the space between them and the rim of the case, falling by gravitation to the discharge-hole, as described. Where the material to be pulverized is not required to be very fine, smooth-surfaced or plain dies may be used.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The dies K, having their interior faces formed with corrugations, as shown, said dies being provided with the side flanges, M M', which are adapted to rest upon the offset J and against the interior of the outer rims, N, substantially as and for the purpose herein described.

2. The dies K, mounted around the periphery of the case, as shown, and provided with the interior flange, L, which corresponds with and approaches the edge of the disk, so as to divide the interior space into two equal compartments, substantially as and for the purpose herein described.

3. The case A A, divided into two crushing-compartments by the interior rotating disk, D, in combination with the corrugated dies K, having discharge-openings D and flanges M L, substantially as and for the purpose herein described.

4. The combination, with the disk D and case A A N, of the dies K, having the rims M M' L, substantially as and for the purpose herein shown and described.

5. The beater E, composed of two polygonal blocks of metal, attached to the disk D by through-bolts F, substantially as set forth, and for the purpose described.

6. The combination of the plates or dies which compose the inner peripheral reducing-surface, the disk carrying beaters, and the ring or flange which serves, in connection with the disk, to divide the interior cylindrical space into two compartments, substantially as and for the purpose set forth.

In Witness whereof I hereunto set my hand.
JNO. T. DAVIS.

Witnesses:

FRANK A. BROOKS,
M. A. HEAL.