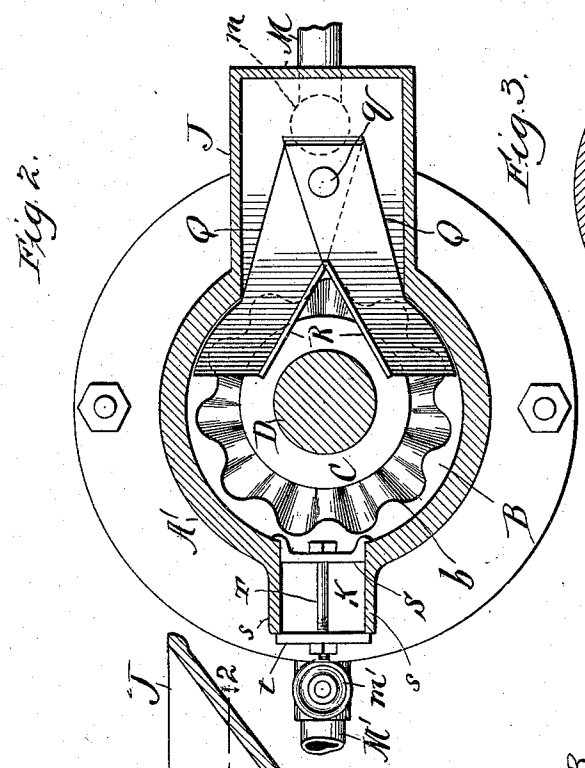
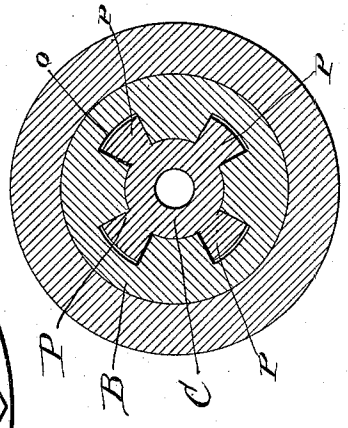
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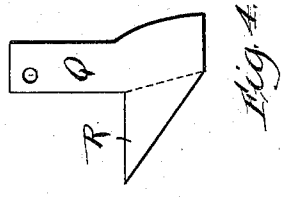
W. S. ISHAM.

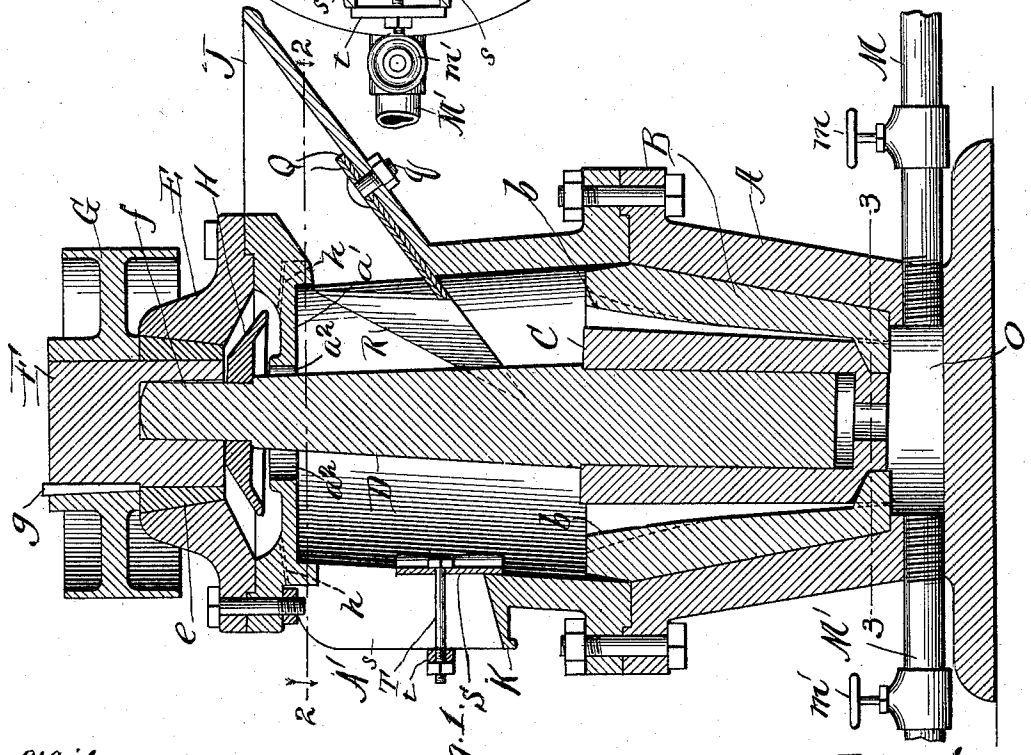
QUARTZ PULVERIZER.

No. 590,227. Patented Sept. 21, 1897.









Witnesses:
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UNITED STATES PATENT OFFICE.

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QUARTZ-PULVERIZER.

SPECIFICATION forming part of Letters Patent No. 590,227, dated September 21, 1897.

Application filed September 28, 1895. Serial No. 563,997. (No model.)

To all whom it may concern:

Be it known that I, WILLARD S. ISHAM, a citizen of the United States, residing at the city of Mexico, in the Republic of Mexico, have invented certain new and useful Improvements in Quartz-Pulverizers; 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 letters of reference marked thereon, which form a part of this specification.

The object of the invention is to provide means for rapidly and thoroughly pulverizing quartz in mining operations without resorting to the stamp-mill.

The invention consists of a grinding-head having a gyratory movement in a mortar, through the bottom of which water or other fluid is forced upwardly to carry off the pulp.

In the accompanying drawings I illustrate the machine for accomplishing the purpose and in the manner stated, and show in Figure 1 a central vertical section of the machine and in Fig. 2 a plan section on the line 2 2 of Fig. 1; Fig. 3, a plan section on the line 3 3 of Fig. 1, and Fig. 4 a detail of one of the parts.

The body or shell of the machine may be made of cast iron or steel, and consists of two sections A A′, the latter being mounted upon the former, the two being securely bolted together and their greatest diameter being at the line of their contact. The lower section A is provided with a laterally-extending base *a*, upon which the machine is supported. This lower section is provided with a lining B of hardened steel, whose inner surface is slightly curved vertically, its upper portion being also vertically ribbed, as indicated at *b*.

A cylindrical head C, made of hardened steel, is placed within the central chamber of the lining or grinding wall B, its diameter being but a trifle less than that of the bottom of the chamber.

The head C is provided with an upwardly-extending stem D, which is set loosely within an eccentric socket in the lower end of a shaft F, preferably of phosphor-bronze, vertically journaled in a cap E, mounted upon the top of section A′ of the body of the machine. A drive-pulley G is mounted upon the shaft F above the body of the machine and is keyed thereto, as indicated at *g*. The aperture of the casing E within which the shaft F is journaled is preferably bushed, as shown at *e*.

The upper portion A′ of the body of the machine is provided with a laterally-projecting hopper J, discharging into its interior, and also with a discharging-spout K, leading through its wall at a lower elevation than the top of the hopper J.

The floor of the hopper J is prolonged into the central chamber of the machine, so as to deliver the material practically at the center of this chamber, and in order that it may be practicable to take out the grinding-head when the cap of the machine is removed I use for this extension a pair of removable plates Q Q, secured to the floor of the hopper at *q* and projecting within the machine, the one to the right, the other to the left of the stem D. The plates are of sheet metal and are first cut to the form shown in Fig. 4 and then folded along the dotted line so that the wing R stands vertically. The blank shown in this figure forms the extension to the left of the shaft. The companion piece is of course the reverse of this. The two vertical wings meet at their upper edges and prevent the material from being discharged directly against the stem D.

I provide means for varying the elevation of the discharge-opening by forming the upper section A′ of the machine with vertical wings *s s*, one upon each side of the discharge-opening and extending upwardly from the spout K and securing across the lower portion of the opening and against the inner wall of the machine a plate S by means of a screw-bolt T, engaging a cross-bar *t*, drawing against the edges of the wings *s s*. By loosening the screw-bolt T the plate S may be vertically adjusted.

The bottom of the lining B is centrally apertured to receive the reduced end of the head C, and from this central aperture radiate recesses *o* to allow the free entry of water from a chamber O in the base of the machine.

Water is led to the chamber O by a pipe M, controlled by a valve *m*. A relief-pipe M′, controlled by the valve *m′*, leads from the cham-

ber O and may be employed to control the supply of water to the machine. The socket *f*, within which the upper end of the stem D is journaled, being out of alinement with the central vertical line of the machine, the stem D and the head C are necessarily inclined, so that the water entering through the apertures *o* freely escapes from beneath the head and passes up through the grinding-chamber.

The machine may be made of any desired size. In using small machines it may be necessary to first somewhat reduce the rock by a crusher, so that the material fed to the machine through the hopper J will enter the space between the upper portion of the head C and the lining B. As the shaft F is rotated a gyratory motion is communicated to the head C, so as to cause it to roll along the surface of the lining B, crushing the pieces of rock as they are held by the ribs of the lining and grinding them to powder as they sift down into the more contracted portion of the grinding-chamber. The water delivered to the machine through the pipe M should enter it with considerable force, and will carry up with it the pulp formed by pulverizing the quartz and discharge it from the machine through the spout K.

Grease from the bearing of the shaft F may be prevented from entering the body of the machine by forming its section A′ with a transverse partition *a′*, apertured for the accommodation of the stem D and having its aperture surrounded by an upwardly-projecting flange a^2. A deflecting cap H, shaped like an inverted saucer and centrally apertured, mounted upon the stem D above the partition *a′*, carries the drippings from the shaft-bearing beyond the aperture in the partition, and they may be drained off by means of ducts, as *h*.

In some situations it is preferable to use air instead of water to carry away the pulverized material, and the machine herein described may be adapted for such service by merely providing a closure for the hopper. I do not, therefore, desire to be limited to the use of water as the clearing agent.

I am aware that rock-crushers have been made in which a head is caused to gyrate within a mortar, and I do not broadly claim such construction.

The shoulder formed at the lower end of the head C by reducing it to adapt it to the aperture in the bottom of the lining B is provided with bosses or teeth P to correspond with and engage the radiating recesses in the bottom of the lining, whereby the head is limited to a rolling contact with the walls of the mortar and is prevented from sliding thereupon, its bosses or teeth intermeshing with the recessed bottom of the mortar as one gear-wheel intermeshes with another.

What I claim as my invention is—

1. The combination with a mortar having its chamber of decreasing diameter from top to bottom, its inner walls being vertically convexed and having their upper portions vertically ribbed, of a passage entering through its bottom, a duct leading to such passage, a grinding-head fitting loosely within the bottom of the mortar-chamber, a stem projecting upwardly from the head, a vertical shaft journaled above the mortar and in central alinement therewith, the stem being eccentrically journaled in the end of the shaft, and ore-service and discharge ways communicating with the mortar above the grinding-chamber, substantially as described and for the purpose specified.

2. The combination with the case A, A′ of the lining B for the lower portion of the case and having its inner walls vertically convexed and vertically ribbed or fluted through their uppper portions, a grinding-head C for coöperating with the inner surface of the lining B, a stem D projecting upwardly from the head, a vertical shaft F, in line with the center of the case, the stem D being set in an eccentric-socket in the end of the shaft F, a water-tube entering the bottom of the casing, a feed-hopper discharging into the upper portion of the case and a discharge-aperture in the wall of the case above the lining B, substantially as described and for the purpose specified.

3. In a quartz-mill the combination with a flaring mortar having a central aperture in its bottom and radiating recesses extending from such aperture toward the side walls of the mortar, of a grinding-head of approximately the same diameter as the bottom of the mortar and having a projection from its end to enter the aperture therein and lugs or ribs radiating from such projection and adapted to the radiating recesses, means for imparting a gyratory motion to the grinding-head, and a fluid-service pipe leading to the aperture in the bottom of the mortar.

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

WILLARD S. ISHAM.

Witnesses:
C. C. BRENNEMAN,
THOMAS GILGAN.