H. S. RANKIN.

QUARTZ MILL.

APPLICATION FILED SEPT. 17, 1910.

1,044,571. **Patented Nov. 19, 1912.**

FIG. 1.

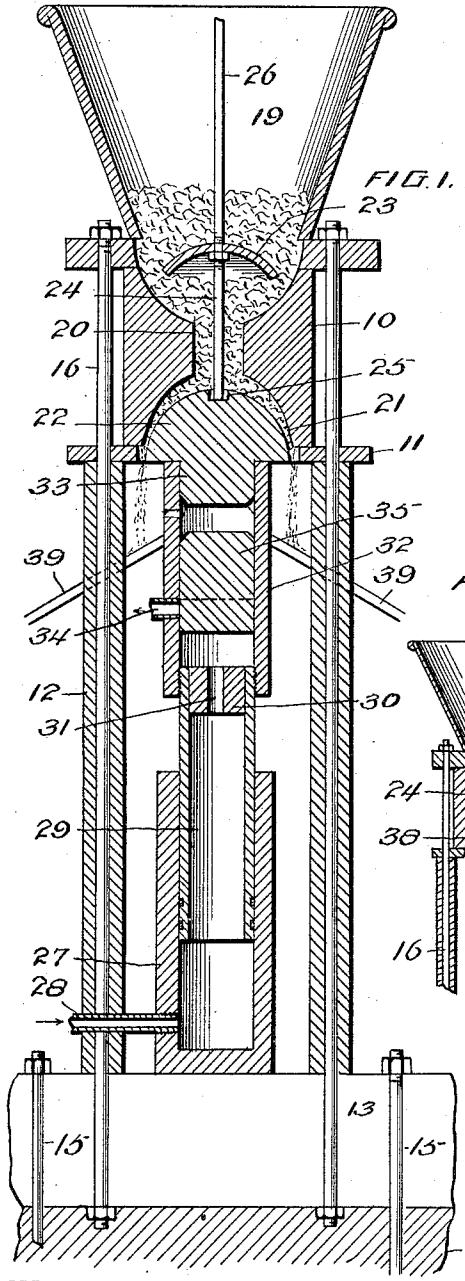


FIG. 2.

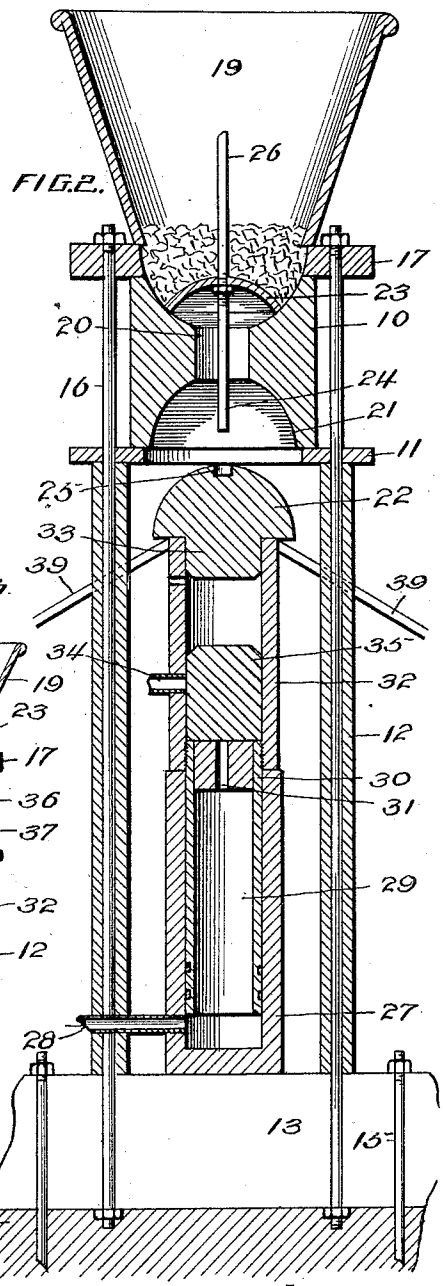
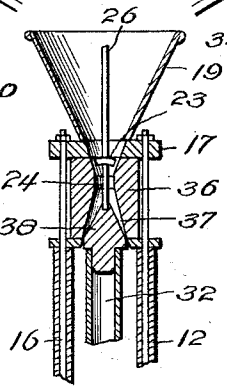


FIG. 3.



WITNESSES:

W. F. Coyle.

Alfred T. Gage

INVENTOR

Hiram S. Rankin,

BY E. B. Stocking

Attorney

UNITED STATES PATENT OFFICE.

HIRAM S. RANKIN, OF CRIPPLE CREEK, COLORADO, ASSIGNOR TO RANKIN QUARTZ MILL COMPANY, OF INDIANOLA, NEBRASKA, A CORPORATION OF SOUTH DAKOTA.

QUARTZ-MILL.

1,044,571. Specification of Letters Patent. **Patented Nov. 19, 1912.**

Application filed September 17, 1910. Serial No. 582,540.

To all whom it may concern:

Be it known that I, HIRAM S. RANKIN, a citizen of the United States, residing at Cripple Creek, county of Teller, State of Colorado, have invented certain new and useful Improvements in Quartz-Mills, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a quartz mill and particularly to a construction embodying a mortar block and coöperating anvil.

The invention has for an object to provide a novel and improved construction of crushing mill in which a motar block is provided with a feed hopper having a controlling valve automatically actuated by a coöperating anvil adapted to be reciprocated toward and from said block.

A further object of the invention is to provide an improved construction by which the anvil may be raised by fluid pressure into operative position and then subjected to a continuous hammer action controlled by said pressure.

Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawing—Figure 1 is a vertical section showing the parts in position for operation; Fig. 2 is a similar view showing the parts at rest; and Fig. 3 is a detail section showing a modified form of the mortar and anvil.

Like numerals of reference refer to like parts in the several figures of the drawing.

The numeral 10 designates the mortar or crushing block which may be of any desired construction or configuration and is adapted to be supported upon a plate 11 resting upon standards 12 which extend downward to the base 13. This base may, if desired, be secured to a foundation 14 by means of the bolts 15 anchored therein. Through the standards 12, anchor rods 16 extend and are secured at their lower ends in the base 13 and their upper ends connected with the retaining plate 17. Resting upon this plate and communicating with the feed chamber 18 of the mortar block 10 is a hopper 19. This mortar block is provided with a passage 20 by which material is fed to the crushing chamber 21 thereof. Coöperating with the face of this chamber is a die or anvil 22 which may be reciprocated in any desired manner to produce the crushing of the material between its periphery and the inner face of the chamber 21 of the block 10. Within the hopper, a controlling valve 23 is disposed and adapted to engage the inner walls of the feed chamber 18 when the anvil is in lowered position, as shown in Fig. 2. For the purpose of raising this valve and maintaining it in raised position during the crushing action, a stem 24 depends therefrom and is adapted to seat in a socket 25 carried by the anvil 22. If it be desired to raise this valve by hand, the stem 26 extending upward therefrom may be used for that purpose.

A desirable construction for raising the anvil 22 and controlling its reciprocation, comprises the cylinder 27 having a feed pipe 28 communicating with the lower portion thereof. Within this cylinder, a tubular piston 29 is disposed having at its upper end a piston head 30 formed with a feed aperture 31 which communicates with the hammer cylinder 32 upon which the anvil 22 is mounted in any desired manner, for instance by means of the depending base 33. The hammer cylinder is provided with an exhaust connection 34 and a slidably mounted hammer block 35 disposed therein. Any desired form of delivery shelf may be disposed beneath the anvil, as indicated at 39.

In the modified form of the invention, shown in Fig. 3, the mortar block 36 is provided with a conical crushing chamber 37 which coöperates with an anvil 38 of similar form. The shape or configuration of the crushing members and the chambers therein may be varied as found convenient or desirable.

In the operation of the invention, with the parts shown in the position in Fig. 2, when the fluid or other pressure is introduced into the lower cylinder, the tubular piston is raised carrying the hammer piston upward and the anvil into contact with the mortar. During this movement, the feed valve is raised by the anvil allowing the material to fill the chambers of the mortar block. The fluid pressure also acts upon the hammer block within this cylinder, raising it to produce a blow upon the base of the anvil and when in its raised position, as shown by dotted lines in Fig. 1, the exhaust port of the hammer cylinder is un-

covered or opened, allowing the pressure to escape which permits the hammer block to again drop into position to close this port and produce a succession of rapid blows through the medium of a continuous pressure applied to the parts. When the pressure is removed or cut off, the escape thereof permits the parts to be restored to the position shown in Fig. 2.

It will be seen that the invention presents a simple, efficient and economical construction of crushing mill adapted for operation on quartz or any other material, in which the power may be directly applied and a continuous hammer or stamping action obtained between the crushing members with a proper control of the feed thereto.

Having described my invention and set forth its merits what I claim and desire to secure by Letters Patent is—

1. In a crushing mill, means for supporting a mass of material, a stationary member having a crushing chamber on its under face, a correspondingly shaped crushing die adapted to enter said chamber, means for producing a reciprocating stroke upon the lower face of said die, and means actuated by the crushing die for controlling the passage of material to the crushing chamber.

2. In a crushing mill, a stationary crushing member, a hopper carried thereby, a movable crushing member, a cut-off valve for said hopper having a depending stem to be engaged by said movable member to open said valve, and a handle stem extended upward from said valve.

3. In a crushing mill, means for supporting a mass of material, a stationary member having crushing chamber on its under face, a crushing die adapted to enter said chamber, means for producing a hammer stroke upon the lower face of said die, and means operated by the die for controlling the passage of material to the crushing chamber.

4. In a crushing mill, means for supporting a mass of material, a stationary member having a crushing chamber on its under face and reciprocating crushing means located below said chamber and constructed and arranged to simultaneously crush the material therein and permit the escape of crushed material by gravity during its movement in one direction.

5. In a crushing mill, a stationary crushing member, a hopper carried thereby, a movable member below said hopper, and a cut-off valve for said hopper having a depending stem disposed to be engaged by said movable member to open said valve.

6. In a crushing mill, a stationary crushing member, a hopper carried thereby, a reciprocating crushing member mounted to cooperate with the under face of the stationary member, and a convexed cut-off valve disposed at the lower portion of said hopper and having a depending stem extending into said crushing chamber to engage said reciprocating member.

7. In a crushing mill, means for supporting a mass of material, means for crushing a portion of said material upon the under face thereof and permitting the escape of the crushed material, and means coöperating with said supporting means for automatically controlling the delivery of the material to the crushing point.

8. In a crushing mill, standards, a mortar block supported at the upper portion thereof and provided with a crushing chamber upon its under face, an anvil adapted to enter said chamber, and means for raising said anvil into said chamber and for imparting intermittent hammer stroke thereto.

9. In a crushing mill, standards, a mortar block supported at the upper portion thereof and provided with a crushing chamber upon its under face, an anvil adapted to enter said chamber, means for raising said anvil into said chamber and for imparting intermittent hammer strokes thereto, and a cut-off valve for controlling the feed to said crushing chamber automatically in the movement of said anvil.

10. In a crushing mill, standard, a crushing block supported at the upper end thereof, an anvil adapted to coöperate with said block, and means for raising said anvil and for imparting independent reciprocating intermittent hammer strokes thereto while it is in raised position.

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

HIRAM S. RANKIN.

Witnesses:

SAMUEL A. WORCESTER,

P. H. MCHUGH.