I. M. PHELPS.
Quartz-Crusher.

No. 215,968. Patented May 27, 1879.

Fig. 1.

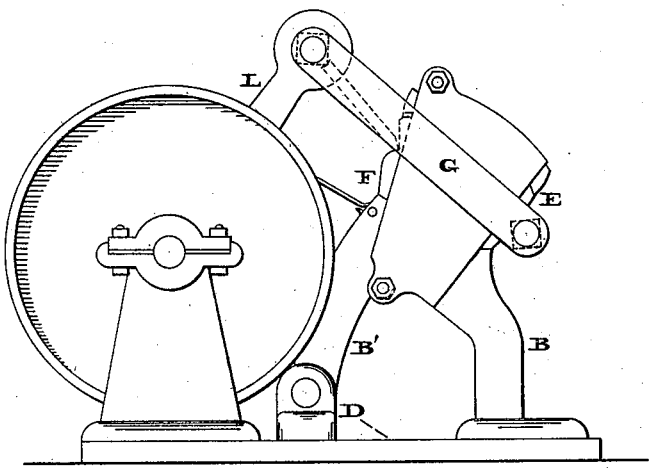


Fig. 2.

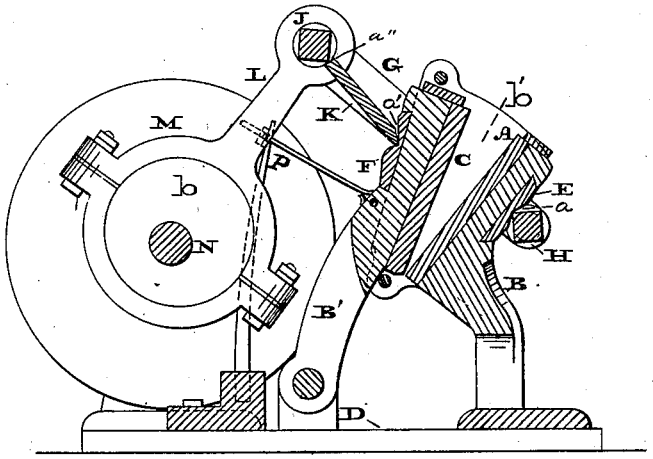
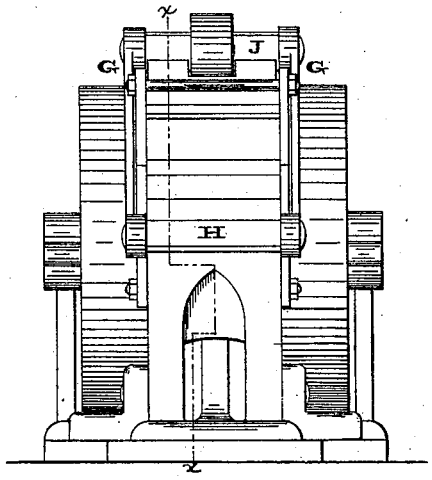


Fig. 3.



Witnesses:

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IRA M. PHELPS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN SHILLITO, JR., OF CINCINNATI, OHIO.

IMPROVEMENT IN QUARTZ-CRUSHERS.

Specification forming part of Letters Patent No. **215,968**, dated May 27, 1879; application filed March 17, 1879.

To all whom it may concern:

Be it known that I, IRA M. PHELPS, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Quartz and other Crushers, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a side elevation of the crusher embodying my invention. Fig. 2 is a longitudinal vertical section thereof in line *x x*, Fig. 3. Fig. 3 is an end view thereof.

Similar letters of reference indicate corresponding parts in the several figures.

My invention relates to that class of machines used in breaking or crushing quartz, ores, and other hard and friable substances to various degrees of fineness above that of pulverization.

The object sought to be accomplished by my invention is the construction of a crusher having great power and strength with the least possible quantity or weight of material.

The invention consists of the fixed and reciprocating jaws, each provided with bearing-blocks, in combination with a rocking bar and toggle-lever, as will be hereinafter set forth.

It also consists of a combination of certain parts forming an improvement in crushers.

Referring to the drawings, A represents the crushing-plate of the fixed jaw B, which latter is securely bolted to the bed-plate D, and C the crushing-plate of the reciprocating jaw B′, which is pivoted, by means of a rod and brackets, to the bed-plate at such a point as to bring its axial center in line with the face of the crushing-plate of the fixed jaw; or, in other words, the reciprocating jaw has its fulcrum or pivotal shaft below the discharge-opening, and in a line which, continued from the face of the crushing-plate of the fixed jaw, bisects the center of said fulcrum or pivotal shaft.

To the outer faces of the upper ends of the jaws B B′ there are respectively fitted bearing-blocks E F, having V or angular grooves *a a′*.

G represents two rods, each of which extends longitudinally at the side of the upper portion of the apparatus.

To one end of the rods there is hung a transversely-arranged rocking bar or cross-head, H, having an angular face which enters the groove *a* of the bearing-block E, and to the other end of the rods there is hung a similar bar or head, J, having an angular face which enters the V or angular groove *a″* at one end of an oscillating plate or toggle-lever, K, the other end of which is pointed and enters the groove *a′* of the bearing-block F, said plate or lever K being suspended by said block F and the cross-head J.

Pivoted or journaled to the center or sides of the cross-head J is the arm L of a yoke, M, which encircles an eccentric, *b*, on the power or driving shaft N.

To the jaw B′ are connected two steel springs, P, whose lower ends are firmly bolted to brackets or proper portions of the bed-plate.

The operation is as follows: The shaft N is properly rotated, and as the yoke M is lowered by the throw of the eccentric *b* the arm L is also lowered, and with it the connected ends of the rods G, the axis of which is the bar H, wherefore the cross-head J and outer end of the plate K are lowered, thus straightening said plate, after the manner of a toggle, and causing powerful pressure to be exerted on the pivoted or swinging jaw B′, whereby the quartz fed to the plates A C will be duly crushed between them.

During the crushing operation the upper portions of the standards, supports, or jaws B B′ are subjected to severe strain; but said portions sustain each other by means of the cross-heads H J, plate or lever K, and rods G, which, together, serve as bracing for both jaws yet indirectly transfer the strain thereto, for while the cross-head H sustains the fixed jaw the strain is transferred to the rods G, cross-head J, and lever K, and consequently to the reciprocating jaw, and vice versa.

When the arm L is raised by the throw of the eccentric *b* it raises the arms G, wherefore the cross-head J and outer end of the lever K are likewise raised, thus removing pressure from the reciprocating jaw. Owing to the springs P, which are suitably connected to said jaw and proper portions of the bed-plate, the jaw B′ is separated from the jaw B, thus permitting the quartz to lower between them preparatory to the next advancing motion.

It will be seen that both jaws are supported in such manner and by such means that any degree of pressure exerted upon one side of the jaw is counterbalanced by an equally-compensating pressure on the opposite side; hence I avoid the very heavy castings as required in machines in which the pressure is wholly from one direction, and obtain from comparatively

head J and block F, the points or angles of the heads, plate, and blocks lessen friction at the contiguous places, thus also easing the operation of the apparatus.

The sides of the quartz-pocket *b'* are properly closed, to prevent escape of the quartz thereat.

Having thus described my invention, what