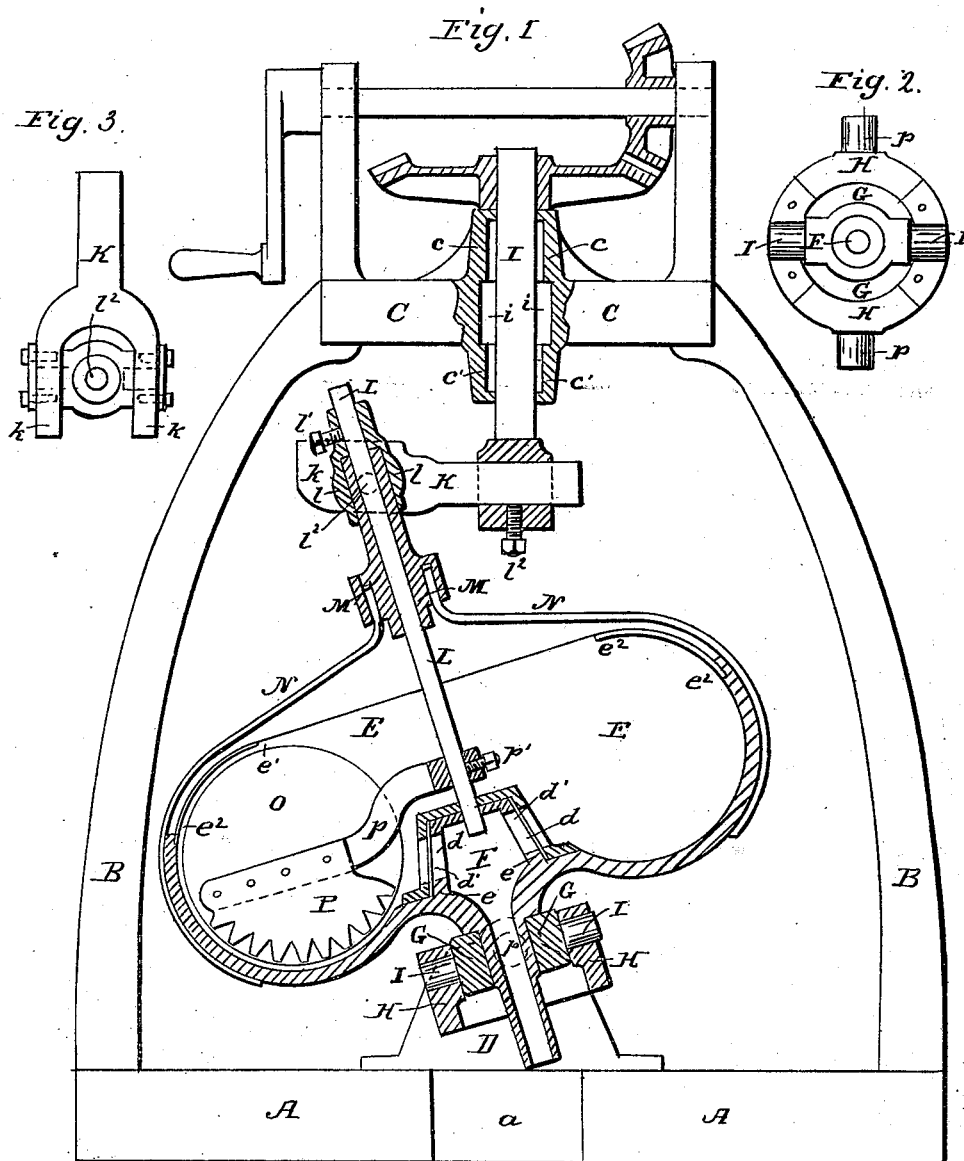


P. G. GARDINER.

Ore Mill.

No. 46,462.

Patented Feb. 21, 1865.



Witnesses.
J. D. Staples
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UNITED STATES PATENT OFFICE.

PERRY G. GARDINER, OF NEW YORK, N. Y.

IMPROVEMENT IN QUARTZ-CRUSHERS.

Specification forming part of Letters Patent No. **46,462**, dated February 21, 1865.

To all whom it may concern:

Be it known that I, PERRY G. GARDINER, of the city, county, and State of New York, have invented certain new and useful improvements in machinery for crushing and pulverizing quartz or other ores, for the purpose of preparing the same for the separation of the gold or other precious metals contained in said ores; and I do hereby declare that the following is a full and exact description of my said improvements, reference being had to the drawings accompanying and making part of this specification.

Figure I is a vertical cross-section through the center of the machinery, showing all the parts in section. Fig. II is a horizontal section of a compound joint, C H, showing the parts in detail; Fig. III, a top view of the arm K, showing some of the parts in detail.

My present improvements are designed upon certain machinery for crushing and pulverizing ores described in certain Letters Patent of the United States issued to me, bearing date the 7th day of June, 1853, the patent being numbered 9,769, and the said machinery, so far as the same is embraced in the invention now presented, I shall herein describe in connection with the improvements and modifications now claimed as new.

A, Fig. I, is a bed-plate of iron of a circular form substantially and strongly made, upon which the whole machinery rests and operates. Upon this is constructed the frame B B, which consists of four strong pieces of iron, converging toward the top in the form of a frustum of a cone, and secured at the top to the circular top plate, C. These frame-pieces and top plate may be all cast in one casting with the bed-plate, but when the machine is a large one may and should be cast separately and secured together by bolts and joints. In the center of the bed-plate is a circular aperture, *a*, and on opposite sides of this aperture are firmly fixed upon the bed-plate two parallel pillow-blocks, one of which is shown in the drawings at D. These pillow-blocks support the working and operating parts of the machinery, which are constructed as follows:

E is an open circular cast-iron basin, curved inward at the upper rim, and rising at the center so as to form a trough all around the basin, and its hub fits onto a hollow shaft, F, and which hub is made with slots or open

spaces, so as to afford a communication through them from the trough of the basin into the hollow shaft F. These open spaces in the hub are to be covered with a grating or sieve (shown in the red lines at *d'*.) The hollow shaft F extends downward from its junction with the hub of the basin to the opening in the bed-plate *a*. The bottom of the hub of the basin is fast to a supporting-ring or bush-block, G, which block also surrounds and is fast to the hollow shaft E. This ring or block G is supported by the outer hollow ring or bush-block, H, by means of gudgeons *g*, working in the journal-boxes fitted to receive them in the block H. H is supported upon gudgeons *h*, working in the pillow-blocks D, by which the whole operating parts above are sustained. The gudgeons *h* and *g*, being placed at right angles to each other, forming a compound joint, by which the oscillation of the basin is permitted with facility, as hereinafter described. The gudgeons of the two rings or bush blocks G H, must be arranged so as that both shall have the same center of motion, and this center of motion must always be in the same vertical line as the center of motion of shaft I. The parts constituting the compound joint are shown more fully in section in Fig. II. Through the center of the top plate, C, passes the driving-shaft I, working in journal-boxes, which are held in the projecting flanges *c'* of the top plate so as to make a long supporting and steadying bearing for the shaft I. The lower end of shaft I is bored horizontally, so as to receive and fit the arm K, which is made so as to be adjusted longer or shorter, and fastened in position by means of a screw-pin, *i*². The outer end of the arm K, is forked *k*, Fig. III, and is connected with the inclined shaft or axle L, upon which, at its upper end, is placed the sliding ring or bush *l*, the parts of which should be very firm and strong, adjustable upon the axle, and fastened by the screw-pin *l'*. Through the forks *k* openings are provided with journal-boxes, upon which the gudgeons *l*² at the ring or bush *l* are supported and turn, thus forming an adjustable joint adapted to the motion or inclination of the axle L, which oscillates without rotating the basin as hereinafter described. The lower end of shaft L is connected with and rotates in the hub of the basin, and extends into the head of the hollow shaft F. Upon the axle or shaft L is adjusted

the ring or bush M, which is fitted with slots to receive and hold firmly the iron bands or straps N at their upper ends, their lower ends extending round to the under side of the basin, and are there fastened to the basin strongly. The object of these bands or straps is to support and strengthen the basin, and to allow it to be made with less weight of metal than it would be prudent otherwise to have it. Within the basin and in the trough before described is placed the ball O, which is to pulverize the ore when operated, as will be hereinafter described.

In order to prevent the hardening and packing down of the crushed ore by the ball J provide a strong rake, P, which is fastened by an arm, p, to the shaft L, so as to be adjustable by the screw-pin p'. This rake is adjusted so as always to rotate in front of the ball, the teeth, which are adapted to the shape of the trough, being intended to plow up the broken and crushed mass, so that it shall not become smooth and hard. The upper part of the driving shaft I is extended above the top plate, C, so as to receive a drum or pulley, which may be connected by a belt with any prime mover.

The oscillating basin for a full-sized machine should be about six feet two inches diameter and about twenty-eight inches in depth, and in such a machine the iron ball should weigh about three thousand pounds. To prevent the water from passing over the basin and not to have the basin too heavy, I place an extension at the main kettle or basin on its upper edge, as shown at E² E².

The operation of the machinery is as follows: Motion being given to the driving-shaft I, the arm K communicates motion to the axle L. This axle revolves but does not revolve the basin, but being out of perpendicular, its upper end describes a circle, the circumference of which is regulated by the length of the arm K, and causes the basin to perform a progressive oscillatory motion, and bringing in succession every part of the basin to the lowest point of the oscillatory movement. The ball following the oscillatory movement acquires a velocity equal to the motion of the arm, and the ores being thrown into the trough

are crushed by the weight and rapid motion of the ball, and are also ground by a secondary vertical motion of the ball, which it receives from impinging upon the sides of the basin, and this compound motion contributes to the efficiency of its operation in pulverizing the ores.

The ore, as it is pulverized, is made to pass through the gratings in the hub, and then through the hollow shaft F, and that finishes the operation of the machinery. The pulverized ore is carried off through the gratings and hollow shaft by means of a current of water passing into the basin and out through the gratings and hollow shaft.

Having thus described my machinery and improvements, what I claim therein as my invention, and for which I now desire Letters Patent, is—

1. The combination and arrangement of the vibrating bush-blocks G and H and the pillow-blocks D, operating in the manner and for the purposes described.

2. The combination of the bush blocks, double joint, and pillow-blocks with the hollow shaft and basin, acting in the manner and for the purposes described.

3. The manner of strengthening and supporting the sides of the basin by means of the bands or straps N, having their bearings in the ring or bush-block M, whereby support is given to the basin, so that it can be constructed with less weight of metal than would otherwise be required.

4. The combination of the vertical shaft I, the forked arm K, and the inclined shaft or axle L with the basin, whereby the progressive oscillatory but not rotating motion is given to the basin by the rotation of the vertical shaft I, as described.

5. The combining and arranging of a rake P, with the inclined shaft L and the basin F, so as always to be in part of the ball and to oscillate with the basin and shaft, for the purposes and in the manner described.

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Witnesses:

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