

J. W. COCHRAN.
MILL FOR CRUSHING QUARTZ.

No. 9,013.

Patented June 15, 1852.

Fig. 1.

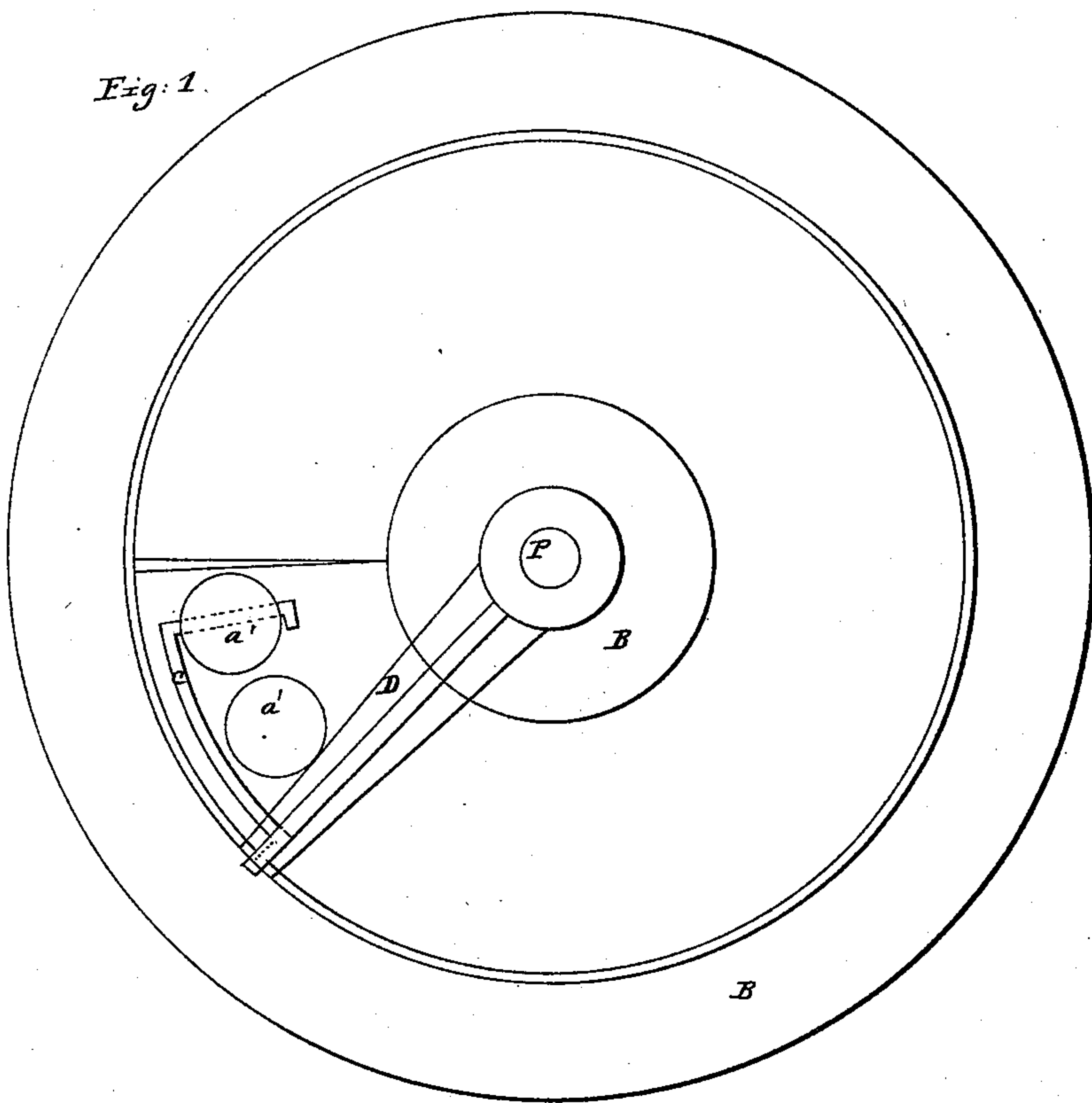
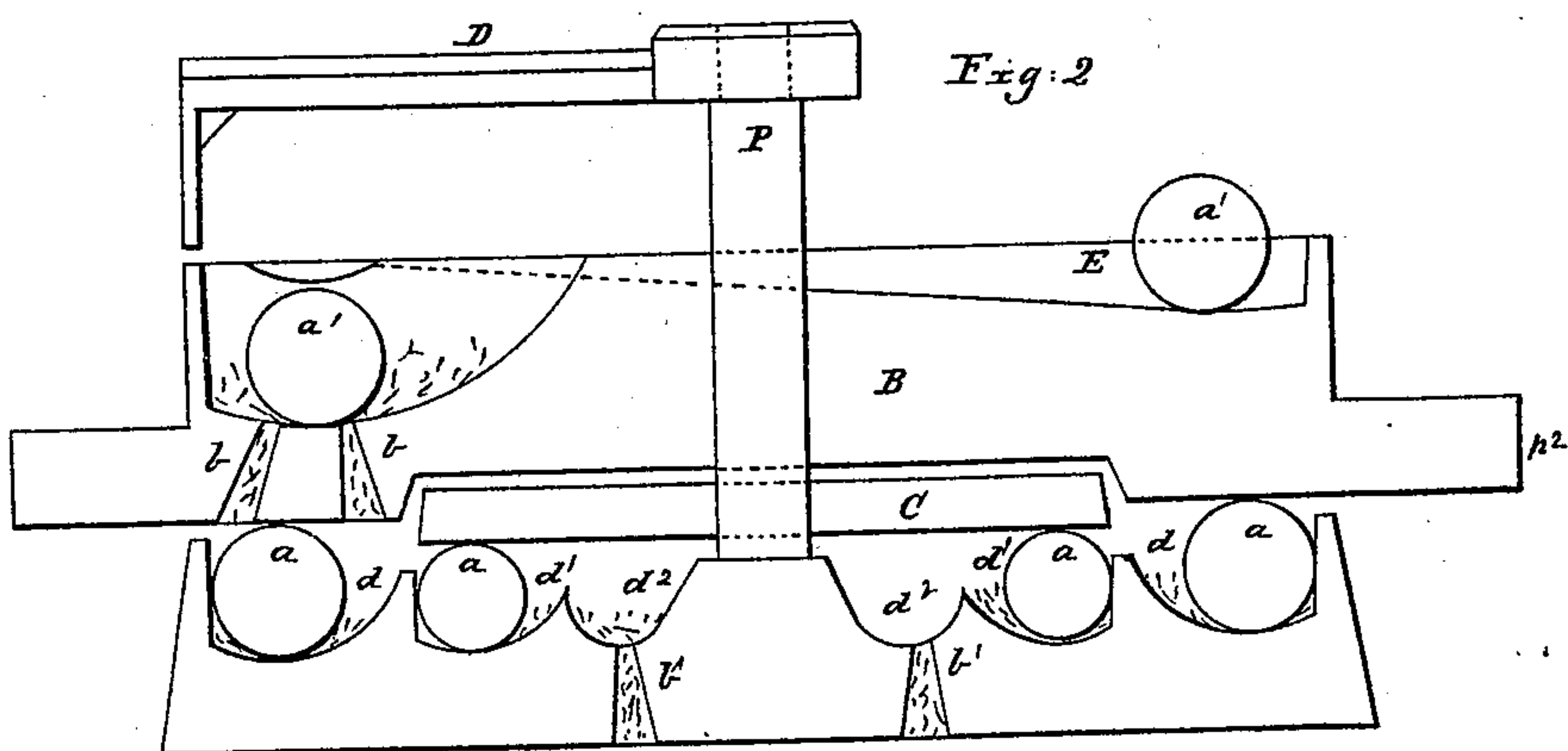


Fig. 2.



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Fig. 3.

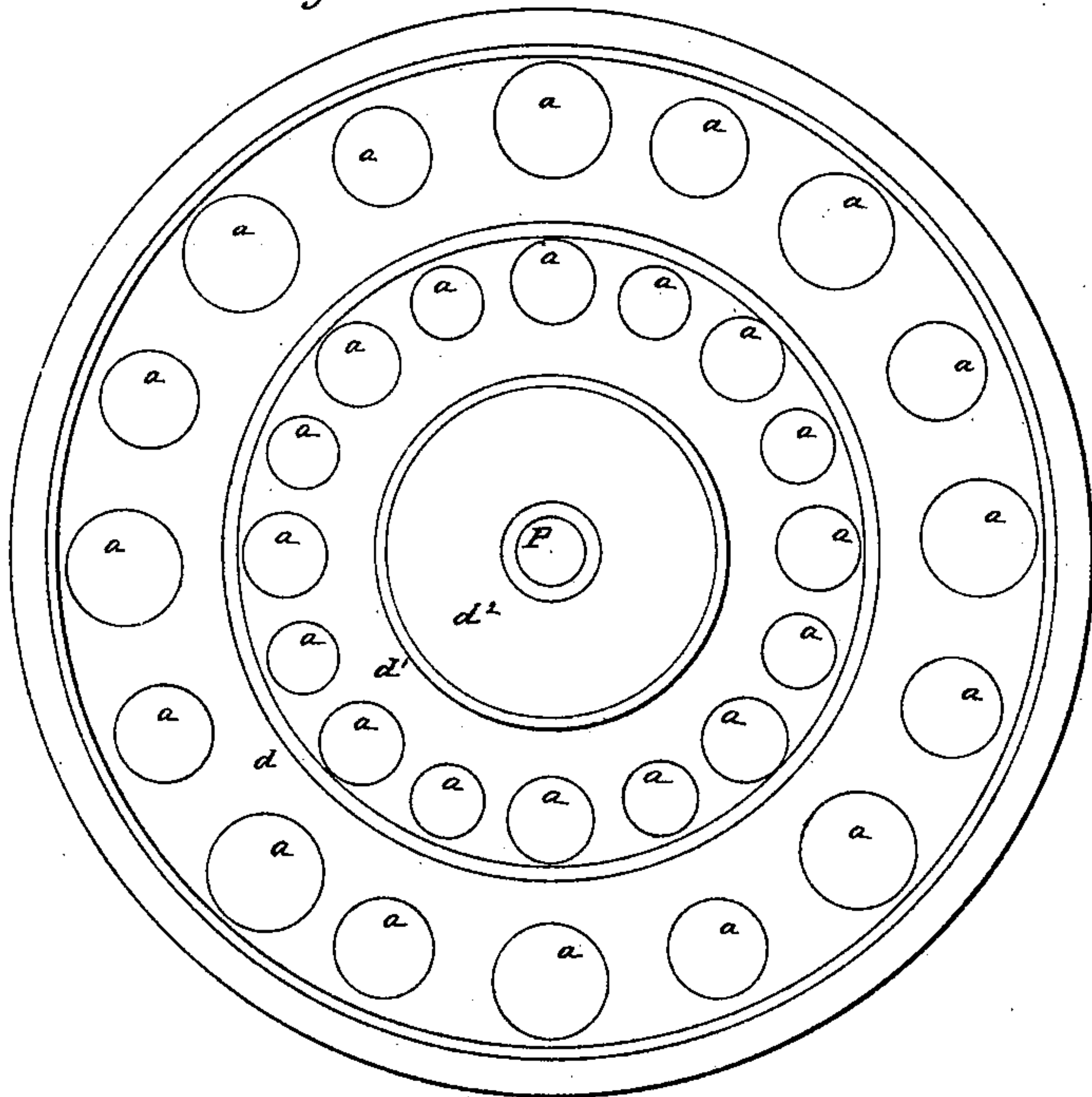
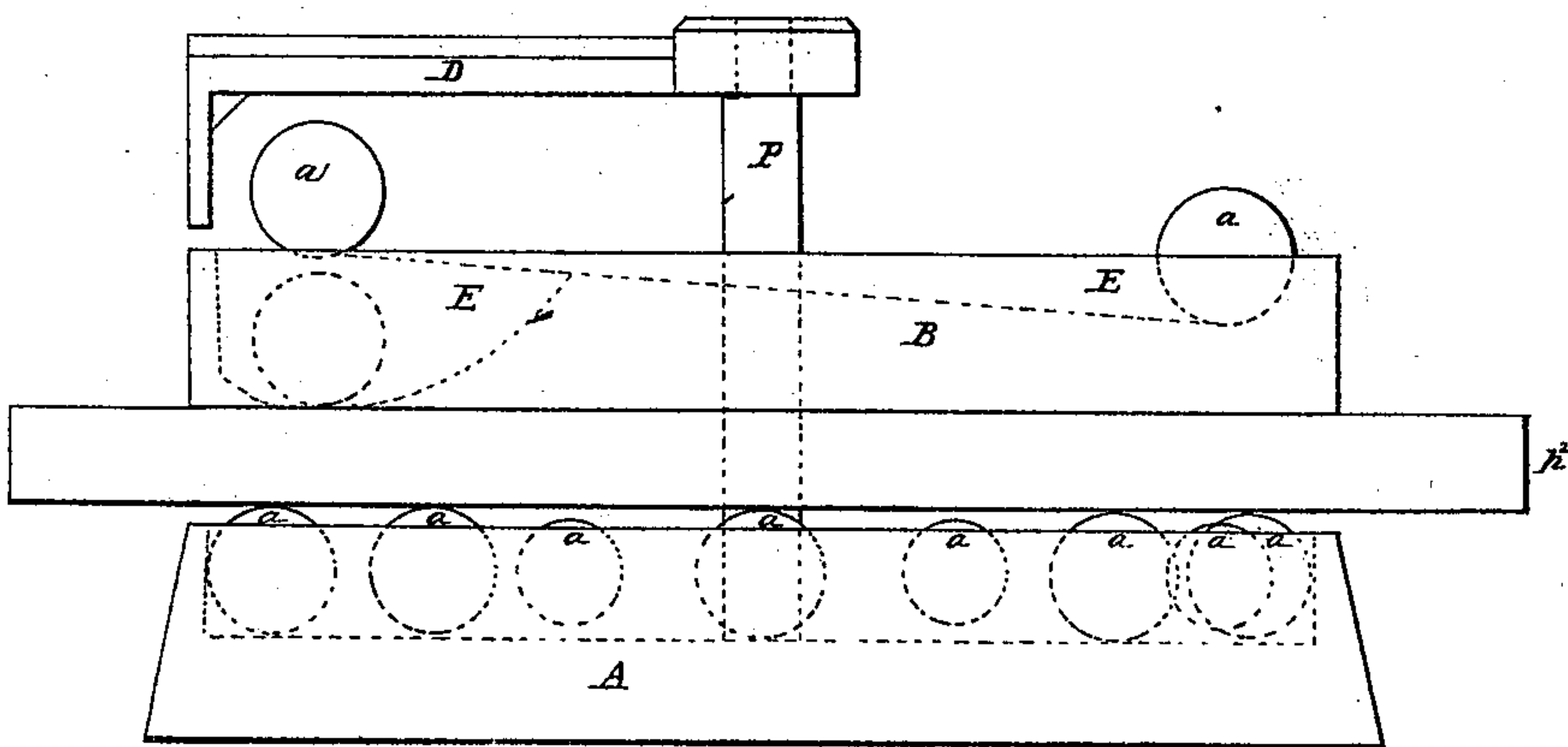


Fig. 4.



UNITED STATES PATENT OFFICE.

JOHN W. COCHRAN, OF NEW YORK, N. Y.

IMPROVEMENT IN MILLS FOR CRUSHING QUARTZ.

Specification forming part of Letters Patent No. 9,013, dated June 15, 1852.

To all whom it may concern:

Be it known that I, JOHN WEBSTER COCHRAN, of the city, county, and State of New York, have invented certain new and useful improvements in machines for crushing and grinding quartz, rocks, and stones, and other substances requiring to be crushed and ground, and for amalgamating and separating gold and other metallic substances therefrom; and I do hereby declare that the following is a full and exact description thereof.

In constructing my machines I employ a stationary foundation plate or disk flanged or curbed on its periphery, with a groove or grooves at suitable distances from the outside flange, encircling the plate the same as the outside flange. In these grooves I place a number of balls or spheres, to which motion is given by a second plate or disk, which is made to revolve, its weight being supported by the balls. The upper surface of the revolving plate or disk is made with inclined planes, upon which I place another set of balls or weights, which are so held by stationary fixtures that they cannot revolve with the inclined planes; but as the plate and planes revolve the balls roll up the planes, from which they fall by their own gravity, as the planes move under them, to the base of the planes. At the place where the balls strike, the plate is perforated.

The machine being ready for operation and power being communicated to the upper or revolving plate or disk, the quartz or other material is placed upon the upper surface between the inclined planes. As the plate and planes revolve, the weights rise and fall upon the material, crushing it to a suitable fineness to pass through the perforations in the revolving plate. The material then in its crushed or broken state is further ground and pulverized by the balls between the two plates. The motion of the balls between the stationary and revolving plates or disks may be compared to a planetary or planispherical motion, as by the weight and motion of the revolving plate they are made to revolve upon their own centers, and at the same time to revolve around the plate in the grooves in which they are placed, their action being at the same time both a rolling and grinding motion. I find it

desirable to have each alternate ball of a smaller size, and not moved directly by the revolving plate above, but moved by the larger balls in the same direction with them, while on their own centers they revolve in a contrary direction. These smaller balls thus prevent any tendency to bind in the movements of the machine.

If it is required to amalgamate and separate gold or other metallic substances from the material ground, I place quicksilver with the balls in the grooves in the stationary plate nearest the center, when, as the balls revolve, the gold and quicksilver are amalgamated, while the earthy matter is floated by the current of water in which the quartz is generally ground. If the amalgamation is to be performed at the same time with the process of grinding, the revolving plate which moves the amalgamating-balls may be a separate plate from that which carries the grinding-balls, but both plates may be connected so that they may revolve together; but the whole series of balls may be used either for grinding or amalgamating, separately or in combination.

The revolving plates are fitted onto the shaft or spindle around which they revolve in a loose manner in order that the plates may rise and fall to accommodate themselves to hard particles which the balls may pass over without readily crushing. The revolving plate is formed in such a manner that it may receive any additional weight required to give greater grinding effect to the balls on which the plate rests.

The capacity of this machine for grinding is in proportion to the weight of the revolving plate; but the power required to operate it does not increase with the additional weight. When the weight is doubled, the extra power required is scarcely perceptible.

The machines may be made of any required size and material. If for grinding quartz, they may be made wholly of cast-iron. If for artists' colors, they may be made of glass or porcelain, or other incorrosive material.

In the accompanying drawings, Figure 1 represents a top plan view of the machine; Fig. 2, a vertical cross-section thereof. Fig. 3 shows a plan view of Fig. 4 with all above

the red lines removed, and Fig. 4 a side elevation.

A is the stationary foundation plate or disk.

B is the revolving plate or disk.

D is a stationary arm attached to the shaft

P. To the end of the arm a rod is attached, which holds the balls or weights a' in position while the inclined planes pass under them.

E are the inclined planes.

P is a center shaft for holding the revolving plate in position.

$a a a a$ are the balls to be put in motion by the weight and movement of the revolving plate B.

d and d' are the grooves in the foundation-plate in which the balls revolve, each alternate ball being of smaller size.

b are perforations or holes in the revolving

plate, through which the crushed material passes to the grinding-balls $a a$.

d^2 are ports for discharging water and earthy matter floated off by the current passing through the machine when in operation.

C, Fig. 2, shows an inner plate for moving the balls in d' when the machine is used with quicksilver as an amalgamator.

Having described the manner in which I construct my machines, what I claim as my invention, and desire to secure by Letters Patent, is—

Giving motion to the balls between the two plates or disks, in the manner and for the purpose substantially as above specified.

J. W. COCHRAN

Witnesses:

MILES B. ANDRUS,

HENRY C. PARKHURST.