S. Gardiner,

Ore Stamp.

No. 11,368. Patented July 25, 1854.

Fig. 3.

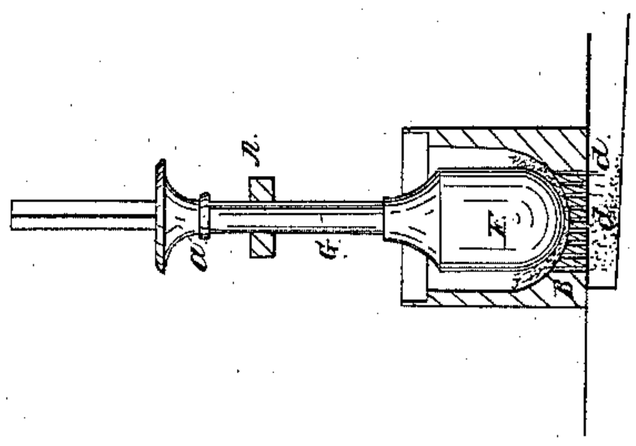


Fig. 2

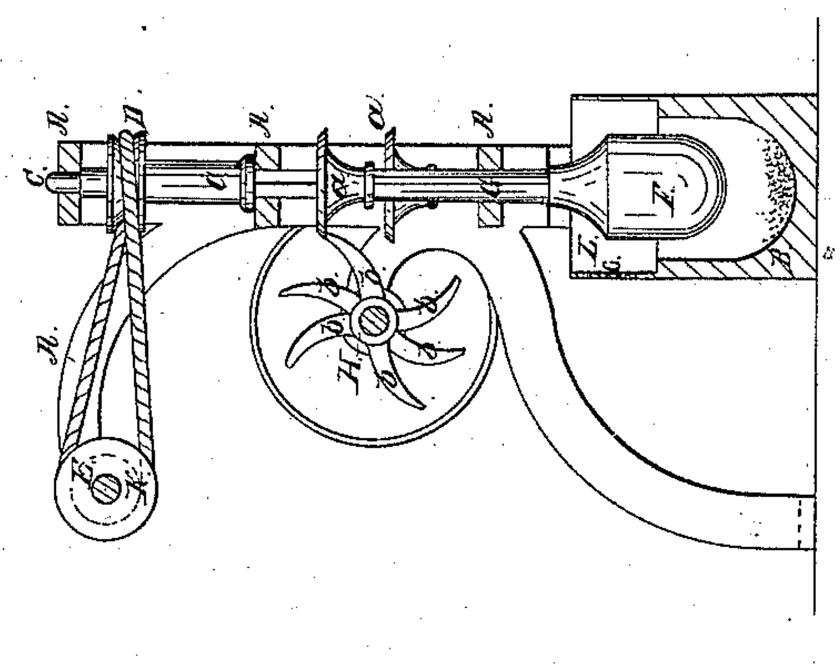
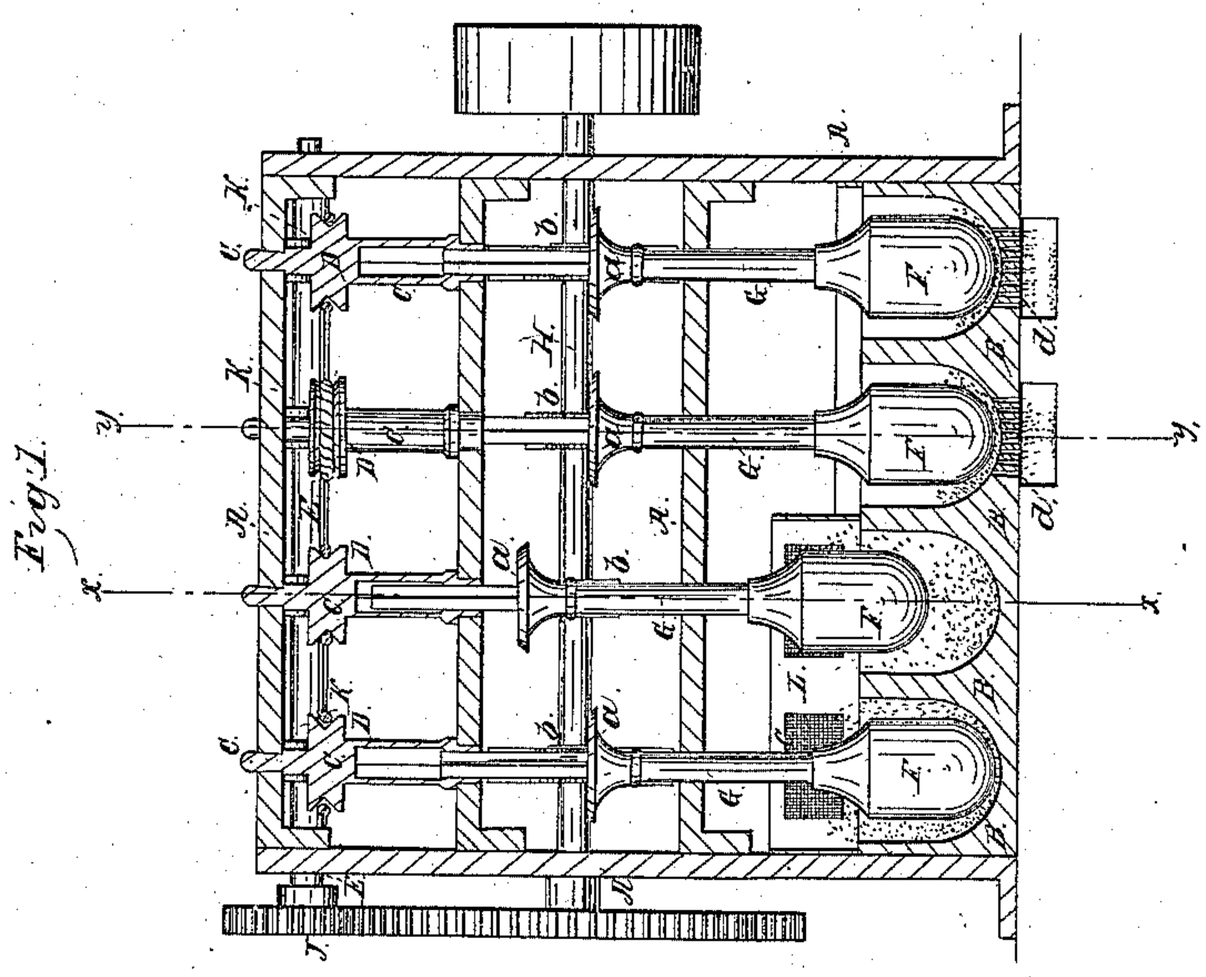


Fig. 1.



N. PETERS, PHOTO-LITHOGRAPHER, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SAMUEL GARDINER, JR., OF NEW YORK, N. Y.

MACHINERY FOR CRUSHING AND PULVERIZING ORES, &c.

Specification of Letters Patent No. 11,368, dated July 25, 1854.

To all whom it may concern:

Be it known that I, SAMUEL GARDINER, Jr., of the city, county, and State of New York, have invented a new and useful Improvement in Machinery for Crushing and Pulverizing Auriferous Quartz and Ores; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a longitudinal vertical section of a machine, constructed according to my invention. Fig. 2, is a transverse section of the same, in the line, *x*, *x*, of Fig. 1. Fig. 3, is a transverse section of a mortar, at *y*, *y*, in Fig. 1.

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

In the machinery which forms the subject of this invention, stampers substantially similar to such as have been in use for many years, for crushing ores, are employed working in mortars.

My invention consists in giving the stampers such a rotary motion in addition to a jumping motion, that they will crush the material in the mortars by their fall, and before rising from it will, by their rotary motion, reduce it to a fine powder.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A, is the framing of the machine which is arranged over a row of mortars B, B, of cast iron, or other suitable material, which rest on any suitable firm foundation. The upper part of the framing is so constructed as to furnish bearings for a series of short vertical shafts, C, C, which are hollow for a great portion of their length from the bottom, and provided with pulleys, D, D, to receive bands from a series of pulleys, K, K, on a horizontal shaft, E, which is supported in suitable bearings in the framing, A, A, and is intended to transmit a rotary motion to the said vertical shafts; but instead of the pulleys and bands, gearing may be substituted. The vertical shafts correspond in number with and are placed over the centers, or in line with the axes of the mortars. F, F, are the stampers, whose faces may be in the form of part of a sphere or spheroid of such size, that when resting on the bottom of the mortars, which are of nearly similar form, there is a space left within the mortars, all around them.

The stamper shafts, G, G, to which the stampers are firmly secured, are made cylindrical near the bottom, to fit in guides in the lower part of the framing, the cylindrical part being long enough to allow them to slide freely up and down far enough to admit of the necessary jumping motion of the stampers, and of a rotary motion at the same time. The upper parts of the stamper shafts are square, and fit easily in squares in the lower parts of the hollow shafts, C, C, so that the latter shafts admit of the jumping motion of the stampers, while they compel them to rotate with them. The stamper shafts, G, G, are furnished with tight collars, *a*, *a*, at such a height as to allow them to be lifted, and then set free to fall by the action upon the said collars of a series of wipers, *b*, *b*, on a horizontal shaft, H.

The horizontal shaft, H, is the driving shaft of the machine, and is geared by a pair of spur wheels, I, J, with the shaft, E, and when rotary motion is given to the driving shaft, the stampers receive a constant rotary motion, and the usual jumping motion.

The relative sizes of the wheels I, J, and pulleys D, K, should be such as to give the stampers several revolutions for every jumping operation, in order that a considerable amount of rotary action of the stampers may take place during the time that they are allowed to remain in contact with the material after their fall. In a practical working machine, it will be well to give five revolutions for every jumping operation, though a much greater amount may be given, and perhaps a little less would work successfully, but I have employed those relative proportions between the two motions with success.

The quartz or ore is fed to the mortars by an inclined plane, or any suitable means, and is broken by the fall of the stampers, and pulverized by their rotary action, which is not only effective when the blow is struck, but for some time after, as each stamper remains for some time in its respective mortar, before being lifted to repeat the blow.

The rotary stampers are applicable either to the pulverization of quartz or ore, in a wet or a dry state; and in order to illustrate

this, two of the mortars represented in the drawing, are shown constructed for pulverizing and washing at the same time, as is practiced on auriferous quartz, and two for pulverizing iron, or other ores in a dry state. The former mortars have no opening in their bottoms, but have their mouths surrounded by a box, L, with a screw, *c*, on one or more sides, so that when a stream of water is supplied, overflowing the mortars, the water and powdered quartz or dirt, escapes through the screen while no solid unpulverized matter escapes. The mortars for dry pulverizing have perforations, *d*, *d*, in their bottoms, of such size, as to allow the escape of the ore, when sufficiently pulverized.

In addition to effecting the perfect pulverization of the ore, the rotary stamper possesses a great advantage over the common stampers, in wearing evenly, so as not to impair their effectiveness, while it is well known that the common stampers wear most on the side where the material is supplied, and in a short time require to be new faced, or altogether renewed. They possess also, an advantage over all quartz and ore crushers known to me, in performing effectively, at one process, what is usually done by two machines, as the ore is not usually submitted to the operation of other pulverizing machines, until it has been previously broken by stampers.

I am aware that a machine for crushing ores, containing a stamper having a rotary, as well as a jumping motion, has been patented by William Ball, March 23d, 1852, but in that machine the rotary motion of the stamper is for an object widely differing from mine, not being intended to produce a pulverizing effect, and not having sufficient rotary motion to produce such effect, as it is his intention to pulverize, in another distinct machine, the ore which is broken by his stamper; but merely making a very small portion of a revolution for every jumping motion of the stamper in order to change the position of the stamper in the basin, and prevent its wearing more on one side than another. In my machine, I consider the rotary grinding action of the stampers performs a duty more important than their jumping motion, the latter motion only preparing the material for the final pulverizing action of the former, by reducing it into pieces of proper size.

Having thus fully described my invention, I disclaim the employment of stampers having a rotary action when such rotary action is not sufficient to produce pulverization of the quartz or ore, but only to change the position to equalize the working surface. But

I claim and desire to secure by Letters Patent—

The employment of one or more stampers having such a jumping motion as to leave them for some time in contact with the quartz or ore after every descent, and such a rotary motion that while they remain in contact with it between one descent and their next ascent, their rotary action will be sufficient to pulverize to a proper degree, that which was prepared by the breaking or crushing action of their descent, substantially as herein described.

SAML. GARDINER, Jr.

Witnesses:

Salem H. Wales,

J. W. Hamilton.