

J. M. MAY.
Quartz Crusher.

No. 53,319.

Patented March 20, 1866.

Fig. 1.

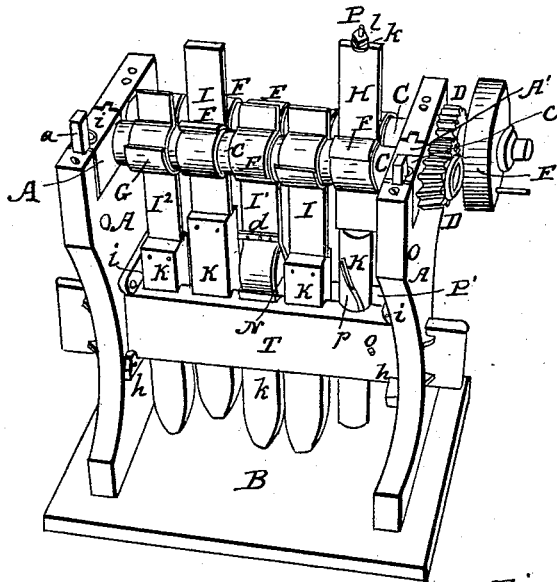


Fig. 2.

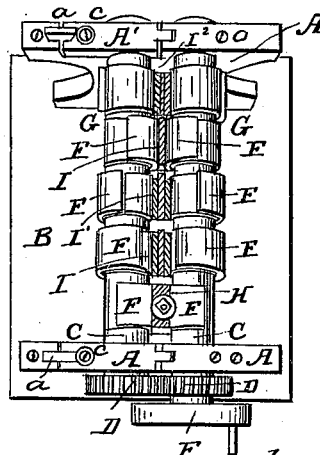


Fig. 5.

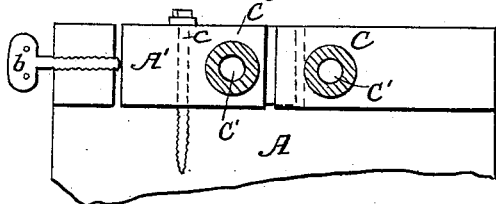


Fig. 3.

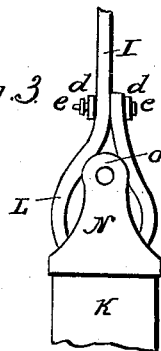


Fig. 4.

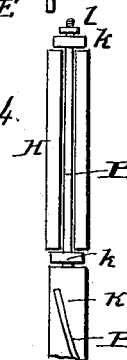


Fig. 10.

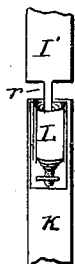


Fig. 11.

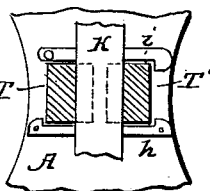


Fig. 6.

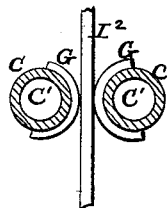


Fig. 7.

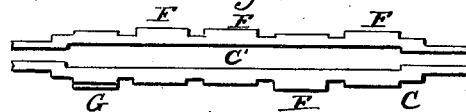


Fig. 8.

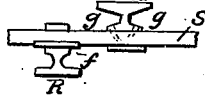
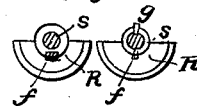


Fig. 9.



witnesses:

Sydney Locke
S. H. Hudson

Inventor:

John M. May

UNITED STATES PATENT OFFICE.

JOHN M. MAY, OF JANESVILLE, WISCONSIN.

IMPROVEMENT IN QUARTZ-CRUSHERS.

Specification forming part of Letters Patent No. 53,319, dated March 20, 1866.

To all whom it may concern:

Be it known that I, JOHN M. MAY, of the city of Janesville, in the county of Rock and State of Wisconsin, have invented a new and useful Machine for Crushing Quartz-Rock, Iron, and other Ores, and for similar Purposes; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in, first, parallel shafts with embossments or enlargements partly around the circumference thereof, for the purpose of lifting stamps by means of straps or bars attached to them, which straps pass between the embossments and are pressed by them as the shafts revolve, and are set free as the embossments are passed; second, parallel shafts with embossments thereon so placed that no two contiguous stamps are lifted and set free at the same time; third, making shafts that have embossments thereon for lifting and setting free stamps for crushing quartz-rock, and for similar purposes, hollow or cylindrical; fourth, parallel solid shafts, to which are attached broken pulleys for the purpose of lifting and setting free, by means of straps or their equivalent that pass between the pulleys, stamps for crushing rock, and for analogous purposes; fifth, a spring at the connection of a strap or its equivalent with a stamp, to relieve the shock and danger of abrasion or rending as a stamp or other heavy body is lifted from a state of inertia; sixth, a spiral slot in the stem of a round stamp, to receive the point of a pin or projection extending from the frame-work of the machine, to revolve the stamp in the path of a horizontal circle; seventh, a hollow strap or bar, or its equivalent, to receive a spindle attached to a stamp to allow the stamp to revolve horizontally as it rises or falls in operating; eighth, a guide formed of two parts, that serve to keep in place a battery of stamps, and by which, when one part of the guide is removed, all the stamps are set free for removal to be repaired or for other purposes; ninth, a general arrangement of a frame, shafts, embossments or broken pulleys, straps, stamps, and guides for crushing quartz-rock and for similar purposes,

In the accompanying drawings the same

letter of reference in each figure represents the same part.

Figure 1 is a perspective view of the machine. Fig. 2 is a vertical view, also in perspective. Fig. 3 is a view of a strap the lower end of which is formed into a loop, that incloses at its connection with a stamp a rubber or other suitable elastic spring, which spring yields somewhat as the power is applied to lift the stamp. Fig. 4 is a view of a round stamp with a spiral slot or groove, the upper end having a spindle extending longitudinally through a hollow strap or bar, so that the stamp may revolve horizontally as it rises or falls. Fig. 5 is a view of box-bearings for the shafts—one of the bearings fixed to the frame and the other movable. Fig. 6 is a vertical cross-section, showing the hollow shafts with elastic embossments thereon and a strap between them. Fig. 7 is a longitudinal section of a hollow shaft cut through its center. Fig. 8 is a longitudinal section of a solid shaft with movable embossments or broken pulleys. Fig. 9 is a vertical cross-section of the same. Fig. 10 shows another form of a spring—as a convolute steel spring—at the connection of the stamp and strap, and is an equivalent of that shown in Fig. 3. Fig. 11 is a vertical section, showing the manner in which the guides are secured or retained in proper position to allow a stamp to rise and fall freely.

A A are the posts of the frame, resting on base B, though I do not confine myself to any style of frame-work to receive the shafts and guides and other mechanism of the machine.

T is a girth connecting the posts, and also forms one-half of the guide, or the guide may be attached thereto, while T' is the movable half of the guide, which is more particularly shown in Fig. 11, and which is kept in place by stationary hook *h* and lifting-hook *i*, and when removed allows the stamps K K K K and K' to be removed for repair or other purposes; or the guides may be made separate and attached to the frame-work in any suitable manner to allow the stamps to fall freely without lateral pressure.

K K K K are square stamps or stems of stamps, to which may be attached at their lower ends shoes of chilled iron or otherwise, of any desired shape or size, while K' in Figs. 1 and 4 is a round stamp or stem of a stamp that is

caused to revolve by means of a spiral slot, *p*, and pin *o*. The end of the pin fits the slot and turns the stamp as it rises and falls, which revolving motion gives a grinding effect as well as a crushing one to the quartz-rock or ores or other substances underneath. To allow this revolving motion of the stamp the bar or strap *H* is made hollow to receive the spindle *P*, Fig. 4. A cushion, *k*, of rubber or other suitable elastic material at the upper end of the spindle, may serve substantially the same purpose as spring *L* in Fig. 3.

The stamps are lifted and set free by means of straps, as *I* *I*, *I'* *I'*, and *H*, attached to the upper ends of the stamps. The straps extend upward and between the hollow shafts *C*, upon which shafts are the embossments *F F F F* and *G*, as seen in Figs. 1, 2, 6, and 7, or solid shafts *S*, with heads or broken pulleys, as *R R*, thereon, as seen in Figs. 8 and 9. These broken pulleys are fastened on the solid shaft by keys *f* or set-screws *g*, or in any suitable manner.

The strap *I'* is a metallic or other rigid strap or bar that passes between elastic embossments, *G G*, of rubber or other suitable material. (Represented in Figs. 1, 2, and 6.)

Straps *I* and *I* are designed to represent leather or rubber attached firmly to the stamps and pass between metallic embossments *F F*.

Strap *I'* in Figs. 1 and 3 is looped at its lower end and receives the spring *L*, of rubber or other suitable material, for the purpose of preventing the strap from being torn or rent from the stamp, and also to prevent abrasion or wear of the strap by the embossments during the operation of the machine in rapidly lifting and setting free heavy weights. The yielding of the spring as power sufficient to lift a great weight is applied prevents a sudden strain and remedies the difficulty. This object is also attained by the convolute spring *L'* in Fig. 10, which has a stem, *r*, extending downward from the strap *I'* through the spring, the lower end of which has a nut, *m*, to retain the spring in position on the stem, while the upper end of the outside coil of the spring is met by a flange inside of the upper end of the box or yoke that contains the spring, which box or yoke is on the upper end of the stamp.

A spiral or other suitable spring may be employed for the same purpose.

When the spring shown by *L* in Fig. 3 is used extensions *N* from stamp *K* receive the loop and spring and are connected by pin *O*.

The bars *d* and bolts *e*, Figs. 1 and 3, may be used in forming the loop, or the connections of the stamp, spring, and strap, or stamp, spring, and bar, may be made in any suitable manner.

The shaft *C*, having the belt-pulley *E*, has fixed box-bearings on the frame, while the other shaft, that is caused to revolve by means of gears *D D*, has movable box-bearings *A'*, which are moved by means of keys *a*, as shown in Figs. 1 and 2, or by means of set-screws, as

seen in Fig. 5, or may be moved to and from the belt-pulley shaft in any suitable manner.

By moving the shafts together, as described, or in any convenient manner, the pressure of the embossments on the strap or bars is regulated with great precision, the intensity of which requires to be regulated by weight of stamp to be raised, or the pressure will be wholly removed by moving the shafts asunder, which allows one shaft to revolve while the other shaft and stamps cease moving.

The embossments *F F F F* (shown in Figs. 1, 2, and 7) may be cast with the shaft and the surface of the embossments and the bearings of the shafts made with accuracy to insure an even pressure of the embossments on the straps or bars. The embossment *G* is of rubber, leather, or other suitable elastic material to receive and operate against a metallic or rigid bar. The several styles of stamps and attachments thereto to be operated by the revolving shafts and embossments show that any or all of them may be used in a battery, yet it is preferable that all the stamps and attachments in a battery be of the same style.

It is obvious as the belt-pulley shaft revolves in a right-hand direction the gears cause the other shaft to revolve in a left-hand direction, causing the strap or bar between the embossments to ascend, and by the gravity of the stamp attached to the strap or bar to fall as soon as the broken pulleys or embossments shall have revolved so far as to cease their pressure on the straps; and thus as the shafts revolve the stamps or other weights are lifted and set free with great rapidity.

It is also obvious that the height the stamp is lifted depends upon the circular length of the embossment or broken pulley that presses the strap, yet this distance may be lessened by changing the gear so that one embossment-surface passes, in revolving, a given distance before the surface of the embossment on the other shaft is reached, so as to give the pressure on the strap, and is set free as soon as the two surfaces cease to press the strap or bar.

The adjustability of the height or distance the stamp is raised is important, as when the rock to be crushed is soft, or for other reason a more rapid and lighter force of blow of the stamp is desired, or if the rock is hard a less rapid and heavier force of blow is desired, which may be done by separating the gears, revolving one shaft as much as is desired, and throwing into gear again, or in any manner accomplish the object of giving a greater or less distance of pressure of the circular length of embossment or pulley on the strap or bar.

It will be observed that the height to which the stamp is raised is uniform, so that if the quartz-rock, ore, or other substance prevents the stamp from descending to the bottom of the pan, trough, mortar, or vessel that contains it, the embossments or broken pulleys commence to operate at a lower part of the strap or bar, and thus raise the stamp the

same height relatively as though the stamp reached the bottom of the pan or mortar, and the same force of blow is always attained, which is of great importance, as it crushes more rapidly. Also, it will be observed that the embossments may be placed on the shaft so that no two contiguous stamps shall fall together or consecutively. This gives an important advantage in preventing the material to be crushed from being gradually accumulated at one end of the pan.

Constructing shafts hollow, substantially as shown in Figs. 5, 6, and 7, is much less in cost than when made solid, and gives sufficient diameter for the embossed portion thereof to make them entire, saving the expense of making the shafts and embossments in separate pieces and connecting them together. The thickness of iron, when castings are used, should be as nearly the same at the portion composing the embossment as the other parts of the shaft, both for strength and safety in shrinking, as the iron cools after being cast.

I do not confine myself to any particular number of embossments or stamps, though five is deemed a convenient number in a battery, and each battery may be operated by an independent belt or gear; or the shaft described as a belt-shaft may form with other shafts a continuous line from the point of applying the power.

Making embossments and shaft all of one piece of material lessens the original cost and is less liable to get out of repair than when made of separate pieces.

In a patent granted to L. M. Gilmore and J. M. May, dated September 11, 1860, a mode of lifting and setting free a rock-drill is described, wherein an elastic strap attached to the drill and operated by cams or broken pulleys is described; and I do not claim that device *per se*, or independently of the manner

herein described of using an elastic strap to lift and set free weights. Also, in a patent granted to John M. May, dated September 19, 1865, a broken pulley faced with rubber or other suitable elastic material, for operating a non-elastic strap or bar to lift and set free a rock-drill, is described; and I do not claim herein, broadly, that device. Also, in same patent there is described a hollow bar operated by broken pulleys, that receives the stem or spindle of a rock-drill to allow the drill to revolve horizontally, and I do not herein claim that device independent of the manner herein described of applying and using it.

I am aware that springs to connect two bodies, to relieve from danger of injury when power is applied suddenly, have been used as the spring that connects the railroad-car bumper or coupling with the car, whereby a gradual and even strain is given as the power is applied; and I do not claim, broadly, connecting two bodies together with a spring, but only when the weight to be lifted is moved in a vertical direction by a sudden and repeated application of power, as lifting a stamp from a state of inertia with great rapidity; but

What I do claim as my invention, and desire to secure by Letters Patent of the United States, is—

A quartz-rock or other crusher constructed, substantially as described, so that the distance the stamp is raised above the substance to be crushed is adjustable, substantially as described, and that said distance as adjusted will be uniform and produce a uniform force of blow upon a greater or less quantity of material to be crushed, substantially as described and set forth.

JOHN M. MAY.

Witnesses:

S. A. HUDSON,

CHARLES R. GIBBS.