G. C. Reeves,

2. Sheets. Sheet 1.

Quartz Crusher.

No. 85,962. Patented Jan. 19. 1869.

Fig. 1.

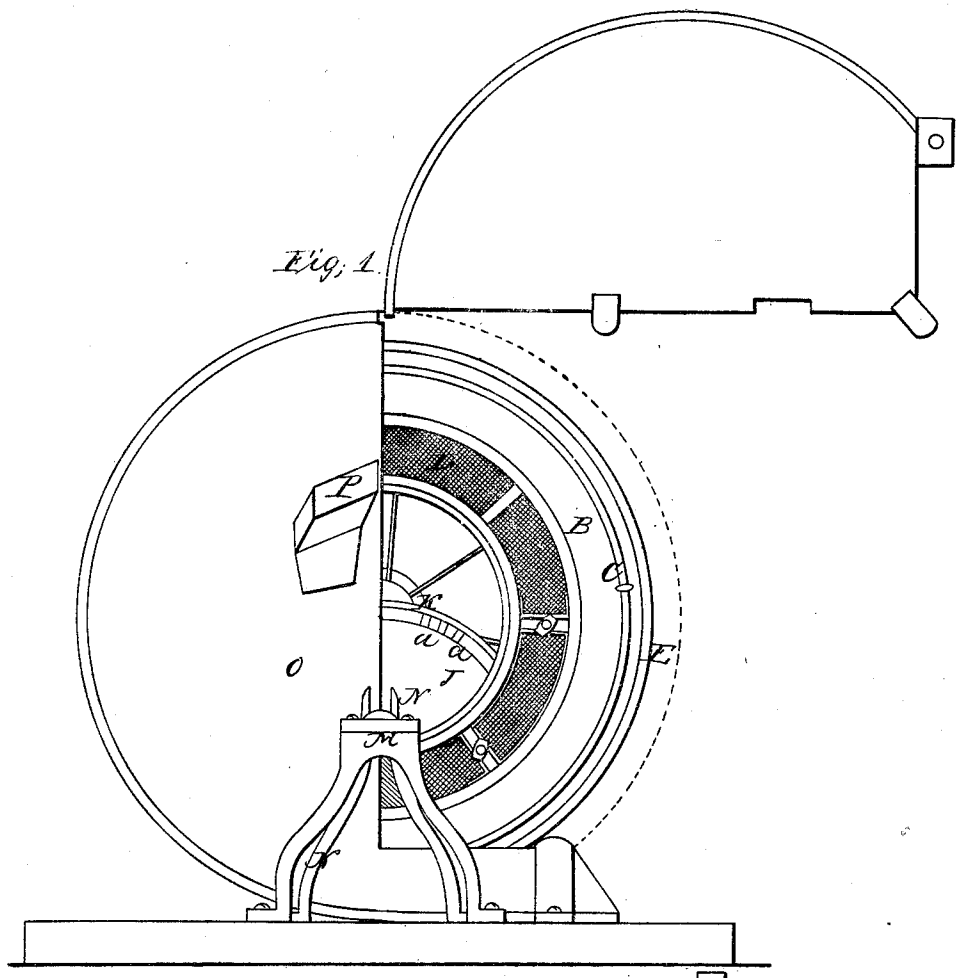
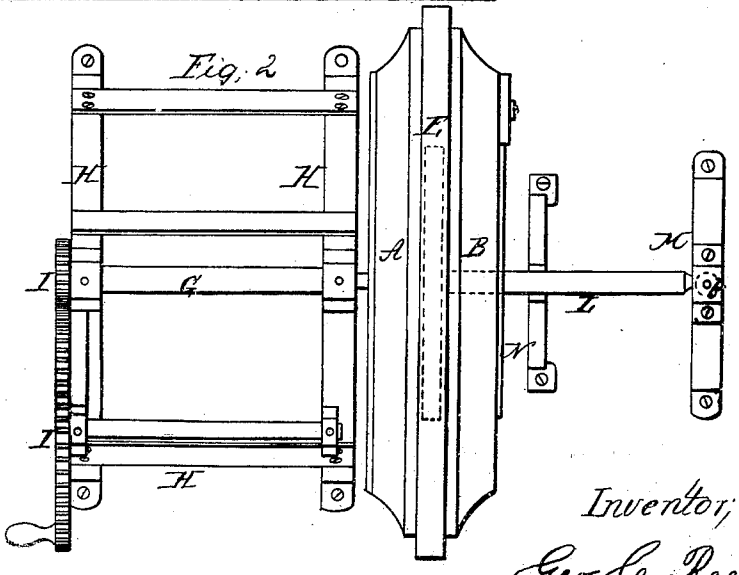


Fig. 2.



Witnesses;

J. H. Burridge

Frank S. Alden

Inventor;

Geo. C. Reeves

2. Sheets. Sheet 2.

G. G. Reeves.

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Fig. 3.

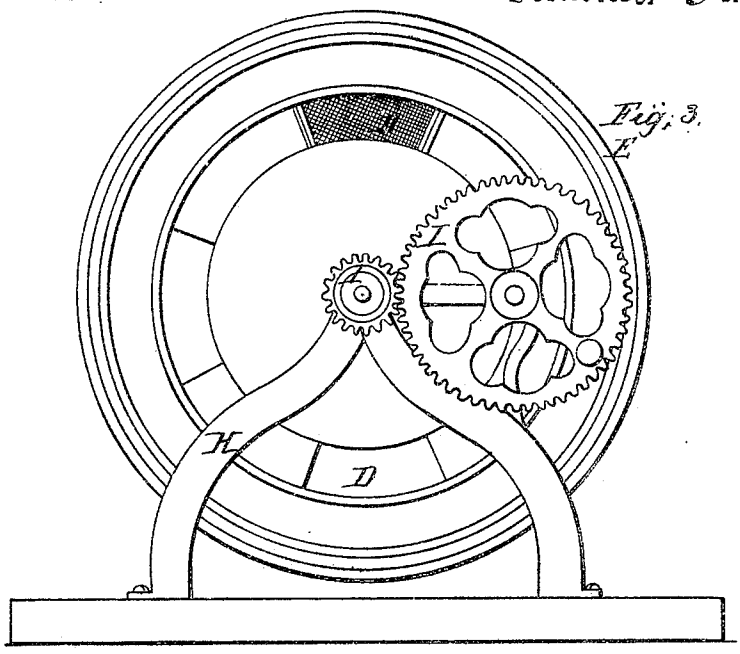
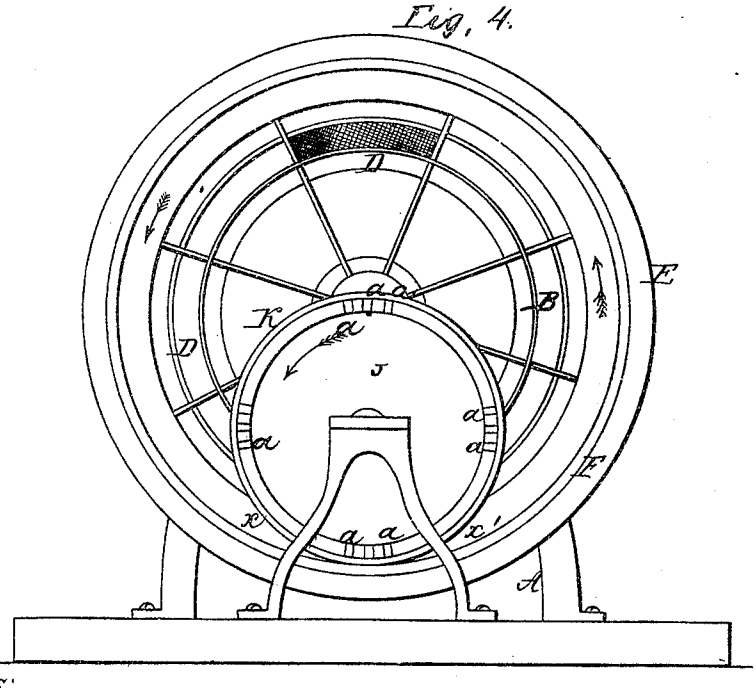


Fig. 4.



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J. H. Burridge
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Geo. G. Reeves

United States Patent Office.

GEORGE C. REEVES, OF BLACKHAWK, COLORADO TERRITORY.

Letters Patent No. 85,962, *dated January* 19, 1869.

IMPROVED QUARTZ-CRUSHER.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, GEORGE C. REEVES, of Blackhawk, in the county of Gilpin, and Territory of Colorado, have invented certain new and useful Improvements in Quartz-Crushers; and I do hereby declare that the following is a full and complete description of the same, reference being had to the accompanying drawing, making part of this specification, in which—

Figure 1, plate 1, is a side view of the machine.

Figure 2, a top view.

Figure 3, plate 2, a view of the opposite side of fig. 1.

Figure 4, a vertical section showing the inside.

Like letters refer to like parts in the different views.

This invention relates to a machine for crushing ores by means of a wheel, so constructed and arranged within a revolving shell or battery-wheel, and operating therein in such a way that the periphery of said wheel runs upon the inner surface of the revolving shell, and between which the said ore is continuously fed, by being carried over from one side of the crushing-wheel to the other, by the centrifugal force obtained by the rapid revolution of the shell.

The shell or battery-wheel referred to is constructed in three sections, A B E, fig. 2, secured to each other by means of the hook-bolts C, or by any other suitable device, so that the sections may be easily detached from each other, whereby access is had to the inside, for a purpose hereafter shown.

The side of each section is provided alike with an annular series of openings, D, covered with screens, as shown in fig. 1.

The inner surface of the section E forming a central rim of the battery, and to which section A is permanently secured, is provided with a removable lining, F, of wrought-iron, steel, or hard cast-metal, which, when worn out, can be readily replaced by a new one.

G, fig. 2, is a shaft mounted in the frame H, and to which the battery is keyed, and made to revolve by means of the gearing I.

J, fig. 4, is the crushing-wheel, provided with a removable tire, K, of wrought-iron, steel, or chilled cast-metal, and thereto secured, by means of wooden keys *a*, inserted under the tire, in gains or notches cut in the rim of the wheel.

L, fig. 2, is a shaft, one end of which is supported by the standard M, and in which it is journalled, having a ball-and-socket joint, as indicated by the dotted lines *b*, whereby a vertical movement is allowed to the shaft and wheel J.

To the free end of said shaft is keyed the crushing-wheel J, above described, the periphery of which rests upon and is supported by the inner face of the battery-wheel or shell, as shown in fig. 4, and is retained in this position by the guide N, through which the shaft passes.

O, fig. 1, is an outer covering or case, whereby the battery-wheel or shell is completely enclosed, a section of which is represented as being removed or opened.

Having thus described the construction and arrangement of the machine, the practical operation of the same is as follows, viz:

The ore is thrown into the machine through the chute P, fig. 1. The battery-wheel is now made to revolve, thereby giving motion to the crushing-wheel by friction. As the two wheels revolve in direction of the arrows, the ore is brought under the crushing-wheel at the point X, fig. 4, thence to the opposite side X′. From this point the reduced material is carried over again to X by the centrifugal force obtained by the speed of the battery-wheel passing again under the crusher to X′, thence to X, and so on continuously, until the ore is reduced to the degree of fineness necessary.

It will be obvious that a certain velocity must be given to the battery, in order to overcome gravitation, and carry the material over from one side to the other of the crusher, otherwise it would accumulate at X′, and therefore not pass under the wheel J but once. In consequence of this rate of velocity, a concussive action is brought to act upon the ore, which is therefore reduced to powder by the combined action of the weight of the wheel J, and the concussion of the same upon it, in consequence of the great velocity of shell or battery.

By this means the reduction of the quartz is rapidly effected, and to any required degree of fineness. Also, by thus giving to the wheels a high velocity, less weight will be required for the crushing-wheel J, which in the ordinary machines is of great weight, the crushing being done solely by the weight of the wheel run at a low speed.

In my machine the crushing-wheel is of much less weight, and run at a high speed, and is therefore more effectual and rapid in the performance of its work, in consequence of the concussion of the wheel upon the ore.

No supplementary device or appliance is required to feed the ore to the wheel, and cause a continuous agitation of the same, this being done by the centrifugal force generated by the velocity of the battery-wheel.

As above said, the shaft of the crushing-wheel J is secured to the standard M by a ball-and-socket joint. By this means the wheel can readily adjust itself to different-sized pieces of quartz in the battery, when rolling therein, and upon the ore, and is therefore unrestrained in the freedom of its vertical motion. It also prevents the wheel from any longitudinal movement, keeping at all times at the centre of the battery-wheel.

The lining F, on the inside of the battery-wheel, and against which all the force of wheel J, in crushing the quartz, is spent, is liable to great and continual wear; hence it is necessary to make it of hard metal, and removable.

The tire K, upon crushing-wheel J, is also removable, and, with my construction, easily taken off from the

wheel, when worn, and a new one replaced, which adds materially to the cheapness of the machine, as it does not necessitate the loss of any other part of the machine, and takes but little time to effect the change.

The sides of the battery being connected to each other, as above said, one side can be removed for cleaning up, or for the replacing of the worn-out lining by a new one, or for any other needful repairs.

Another advantage in the construction of this machine is, that when driven by a steam-engine, by a direct connection thereto, it serves as a fly-wheel, thus combining in one a fly-wheel and ore-crushing machine, thereby dispensing with the use of a separate wheel or balance.

I am aware that revolving cylinders, having other cylinders, wheels, or rings revolving within them, and caused to revolve by the outer cylinder, have been used for crushing quartz or ores, but such construction is entirely different from mine, as, in every instance where such devices are used, the outer cylinder or shell revolves slowly, and the inside wheels or rings are corrugated, or have teeth or ridges upon them, which take hold of and are revolved by similar ridges upon the inside of the shell or outer cylinder; or if the faces are smooth, there are two or more inside crushing-wheels, yoked together in such way, that by their weight, the quartz is crushed when between such wheel and the outer cylinder or shell. Further, these inside wheels or rings being free, with nothing to prevent them, would, if the outside cylinder were revolved rapidly enough to overcome their gravitation, be carried around on the inside of and adhering to the shell, and could not produce any result, by reason of the wheels or rings upon the inside, with the quartz being carried continuously around without change of position, with relation to each other, and the inside of the cylinder or shell, while in my mill the crushing-wheel is prevented by shaft and guide from leaving its intended position, however rapidly the outside shell may revolve, but the quartz or substance to be crushed is carried in contact with the shell or battery-wheel successively around, and caused to go between the crushing-wheel J and the shell or battery-wheel, until it is reduced to the proper fineness.

I am also aware that horizontal-revolving wheels, in connection with crushing-wheels or balls, have been used for pulverizing quartz and ores, and such wheels convey the unground quartz to the grinding-wheels or balls by a slow motion or revolution. Such construction or operation I do not claim, as my invention is entirely different, both in construction and operation, being an upright revolving shell upon a horizontal shaft, and having an upright-revolving crushing-wheel within it; and the outer shell revolves so rapidly that it carries the unground quartz, by centrifugal force, along with its inner surface, and continually presents the quartz to the crushing-wheel, at every revolution, until it is reduced to powder, and escapes through the openings in the shell for such purpose; while in a horizontal mill the wheel revolves slowly, and the crushing is entirely done by the weight of the crushing-wheel.

What I claim as my improvement, and desire to secure by Letters Patent, is—

1. The revolving shell or battery-wheel A B E, as the means for feeding the unground quartz to the crushing-wheel J, when operating substantially in the manner described.

2. The wheel J, when constructed with the removable tire K and keys *a*, in the manner and for the purpose described.

3. The combination of the revolving sectional shell or battery, with the crushing-wheel J, shaft, L, ball-and-socket joint, and standard M, arranged to operate in the manner and for the purpose described.

GEO. C. REEVES.

Witnesses:

J. H. BURRIDGE,

E. E. WAITE.