

J. Reese.
Ore - Crusher.

N^o 76100.

Patented Mar. 31, 1868.

Fig. 1.

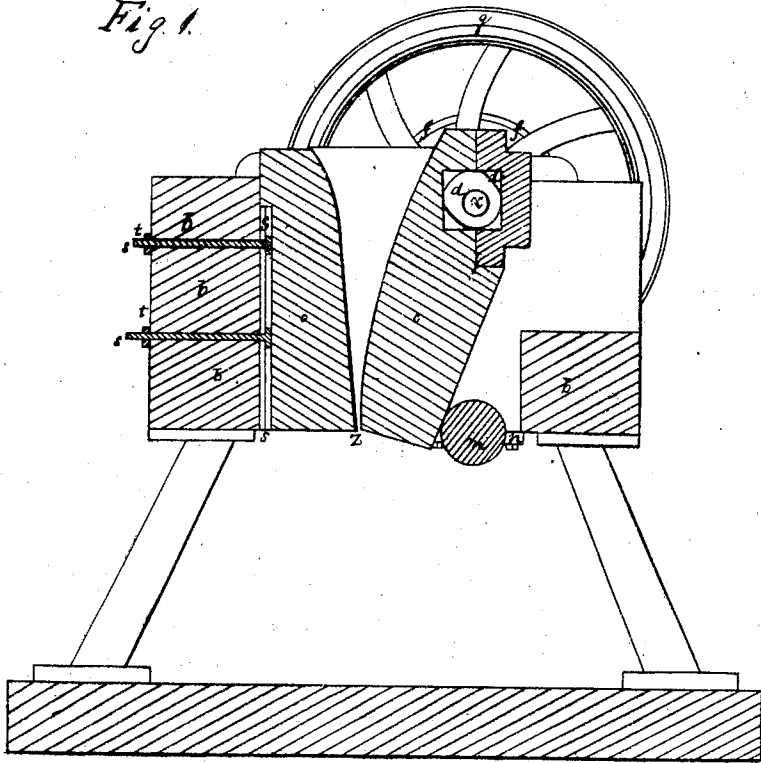


Fig. 2.

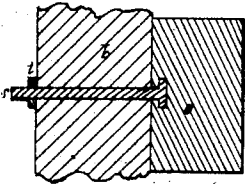
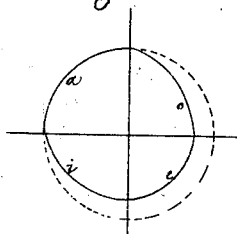


Fig. 3.



Witnesses;
W. Blushing
J. H. B. Kerr

Inventor:
Jacob Reese
by his attorney
Barnwell & Christy.

United States Patent Office.

JACOB REESE, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND
ROBERT C. TOTTEN, OF SAME PLACE.

Letters Patent No. 76,100, dated March 31, 1868.

IMPROVED ORE-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, JACOB REESE, of the city of Pittsburg, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Ore-Crushers; and I do hereby declare the following to be a full, clear, and exact description thereof.

In preparing a "fix" for use in a puddling-furnace, it has heretofore been customary to crush the ore employed in crushers of about one inch aperture at the point where the ore escapes from the crusher, so that the ore is discharged in lumps or kernels. As the ore then has to be melted preparatory to being used as a "fix," some two hours are necessarily occupied in this part of the process of preparation. But by reducing the ore to a state of greater fineness, so that it can be mixed up in the condition of a paste, it can be directly applied as a fix, without the delay attending a separate melting process. My invention relates to the construction of an ore-crusher which will reduce the ore to any required degree of fineness, before discharging it through the aperture of exit; and consists in the construction and arrangement of devices for giving to the movable jaw of an ore-crusher, separate and consecutive crushing and grinding motions, in connection with devices for regulating and adjusting the position of the working-jaws relative to each other, and to the work to be done.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and mode of operation, referring to the accompanying drawing, making a part of this specification, in which—

Figure 1 is a vertical section, running transversely through the crushing-jaws.

Figure 2 is a horizontal section of the stationary jaw, and a portion of the frame, showing the groove and T-head bolt by which the jaw is held in place and adjusted.

Figure 3 shows, in an end view somewhat enlarged, the peculiar shape of the cam employed.

Like letters of reference indicate like parts in each.

In any suitable frame *b*, I place the crushing-jaws *c c'*, the former stationary, the latter movable. The upper end of the movable jaw *c'* is supported by a cam-yoke or box, *d*, which surrounds the cam *d'*, and which latter is attached to and operated by an axle, *x*. To the axle *x* motion is communicated by a band-wheel, *f*, or in any other well-known manner. *g* is a fly-wheel of the usual construction. The peculiar shape of the cam *d'* is more clearly shown in fig. 3, where it is somewhat enlarged, the dotted curve being a circle, and the full line an end view of the cam. Through ninety degrees of each, as at *a*, the faces of the circle and cam correspond. In the opposite quarter of the circle, marked *e*, the radius of curvature of the cam is somewhat shorter than that of the circle. In the quadrants *i* and *o* arcs are drawn, connecting the extremities of the arcs *a* and *e*. Then, with a properly-constructed cam-yoke or box *d*, the cam *d'* so shaped, will impart to the jaw *c'* a downward, backward, upward, and forward motion, each motion being distinct, and all coming in the order named. If the cam revolve forward, the quadrant marked *i* becomes the working-face. Having an increasing radius, it moves the jaw forward or otherwise, as above described, and the quadrant *a* having a constant radius, prevents the jaw *c'* from moving in a direction at right angles to the direction of the motion imparted to it by the quadrant *i*. Consequently, as the cam *d'* revolves, it will move the upper end of the jaw *c'* forward in a direct line, toward the other jaw *c*, whereby the ore will be subjected to a direct crushing force. As the jaw *c'* has at this part of its stroke no vertical motion, there is less danger of the ore slipping, and consequently greater certainty of the jaws taking a perfectly secure bite, than would otherwise be the case. The jaw *c'* then receives a downward throw, during which, except as hereinafter to be described, it neither approaches to nor recedes from the opposite jaw *c*. As the faces of the jaws *c* and *c'* converge toward their lower ends, the ore, while being carried downward by this motion, is subjected to a grinding force, and still further pulverized. The upper end of the jaw *c'* is next thrown backward, as the cam *d'* continues its revolution, which allows the ore to fall lower between the converging faces of the jaws *c c'*. Lastly, an upward motion is given to the jaw *c'*, by which the grinding is continued, and the jaw *c'* brought to the proper position for a new forward stroke. As the ore becomes sufficiently pulverized, it falls through between the lower ends of the jaws *c c'*, which are so set as to leave at the whole or some part of the stroke a sufficient aperture, *z*, for that purpose. But in order to increase the grinding efficiency of the machine, I make the lower end of the movable jaw of a gradually-increasing thickness

upward, so that the plane of its rear face shall make an angle with the plane of its front or working-face, and rest it, at a point where the thickness is increasing, against a friction-roller, *m*, which rests on journals *n* attached to the frame *b*. Then, when the jaw *c'* receives a downward stroke, as above described, and consequently acts with a grinding motion, its lower end will be made to roll forward on the roller *m*, still further crushing as well as grinding the partially-pulverized ore, and thereby reducing it to a condition of greater fineness. And by adjusting the jaws *c c'* so that the aperture *z* between their lower ends shall be correspondingly small, the process can be carried on till the ore is ground as fine as may be necessary. But in order that the upward movement of the jaw *c'* shall not unduly enlarge the aperture *s*, I place the friction-roller *m* at such a point that it shall operate against the rear face of the jaw *c'*, a little above its lower end. Then with the backward throw of the upper end of the jaw *c'*, its lower end will be thrown slightly forward, and the breadth of the aperture *z* be slightly lessened, which lessening will compensate for the increase of breadth given to the aperture by the receding of the jaw *c'* on the roller *m*, as the former rises. The jaw *c'* operates as a lever, the roller *m* being the fulcrum, to partially close the aperture *z*, when otherwise it would be too considerably enlarged. I thus provide for keeping an aperture, *z*, of a constant or nearly constant breadth, so that no ore can pass through till it has been sufficiently pulverized.

Under the great amount of friction to which the jaws of ore-crushers are necessarily subject, they wear out with some rapidity, particularly at or near their lower ends. When either or both the jaws *c c'* become so worn as to enlarge the aperture between their lower ends, I provide for lowering the stationary jaw *c*, so that a portion of its working-face less worn shall come opposite to the lower end of the movable jaw *c'*. This I accomplish by making a T-shaped groove, *s*, in its rear face, in which I place the heads of one or more square-head or T-head bolts *s'*, and running the shanks of such bolts through some part of the frame *b*, screw them up snugly by nuts *t*. Then, to raise or lower the jaw *c*, I loosen the nuts *t*, slide the jaw up or down, the square or T-heads of the bolts *s'* sliding in the T-shaped groove *s*. If the face of the stationary jaw *c* becomes so worn that this mode of adjustment will not suffice, I loosen the nuts *t* still more, and place between the jaw *c* and the frame *b*, a lining or backing of any desirable thickness, whereby it will be made to stand sufficiently near to the working-jaw *c'*.

The advantages I claim are durability, simplicity of construction, a freedom from liability to break or get out of order, a more convenient mode of adjustment, and a better mode of combining and utilizing the crushing and grinding motions described, than is found in machines generally in use.

By my machine, with the jaws properly set and adjusted, the ore can be pulverized to any required degree of fineness with ease and rapidity. The faces of the jaws *c* and *c'* may be either plain, or may be corrugated in any desirable direction.

Having described my improvement, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The crushing-jaw *c'* provided with the square opening *d*, in combination with the cam *d'*, friction-roller *m*, and adjustable jaw *c*, all constructed substantially as shown and described.

2. A square head or T-head bolt *s'*, in combination with a correspondingly-shaped groove, *s*, in a stationary jaw for adjusting the stationary jaw of an ore-crusher, substantially as set forth.

In testimony whereof, I, the said JACOB REESE, have hereunto set my hand.

JACOB REESE.

Witnesses:

WM. F. GRAHAM,
GEO. H. CHRISTY.