2 Sheets—Sheet 1.

R. LANYON.

Ore-Crusher.

No. 197,643. Patented Nov. 27, 1877.

Fig. 1.

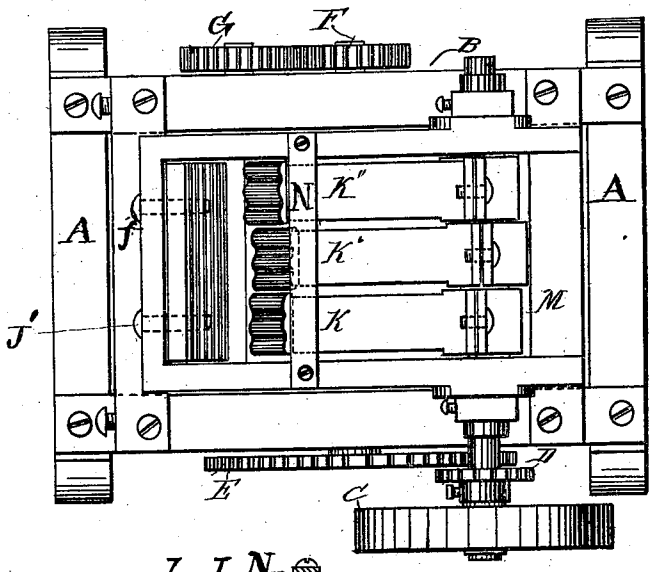


Fig. 2.

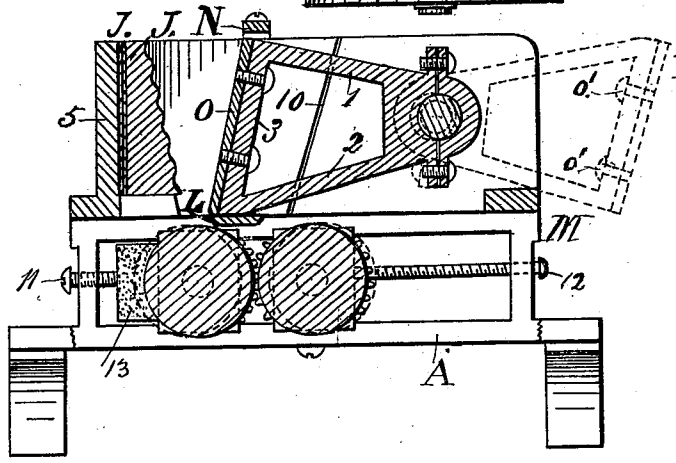
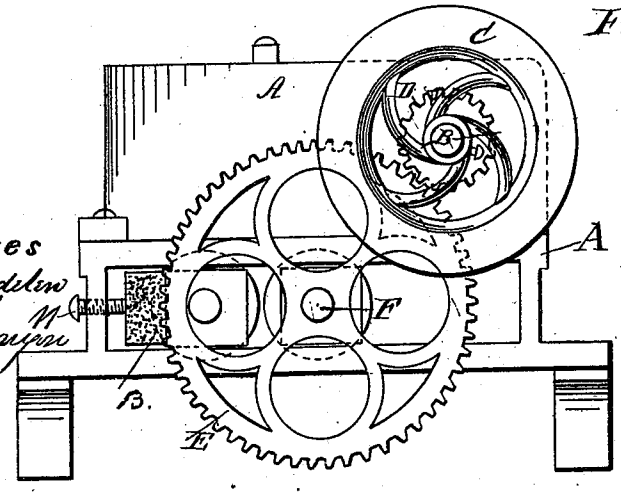


Fig. 3.



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2 Sheets—Sheet 2.

R. LANYON.
Ore-Crusher.

No. 197,643. Patented Nov. 27, 1877.

Fig. 4.

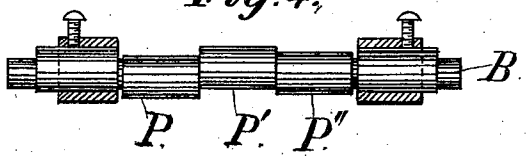


Fig. 5.

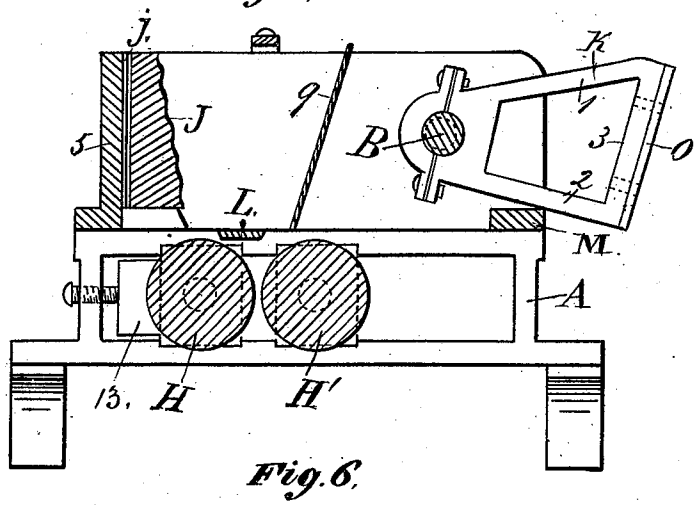
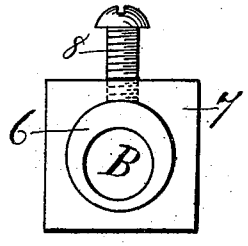


Fig. 6.



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UNITED STATES PATENT OFFICE.

ROBERT LANYON, OF LA SALLE, ILLINOIS, ASSIGNOR TO JOHN LANYON AND JOSIAH LANYON.

IMPROVEMENT IN ORE-CRUSHERS.

Specification forming part of Letters Patent No. **197,643**, dated November 27, 1877; application filed July 10, 1877.

To all whom it may concern:

Be it known that I, ROBERT LANYON, of La Salle, in the county of La Salle and State of Illinois, have invented certain new and useful Improvements in Ore Stampers and Crushers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention has for its leading object the joinder in one machine, and driven by the same shaft, of an ore stamper or breaker and an ore-crusher, under such conditions that either may be used separately or both together, the main shaft which gives motion directly to the stamper imparting the same by direct gear to the rollers of the crusher.

It consists in combining an ore-stamper and an ore crusher or pulverizer so that they may be separately used each for its own duty or both used together, as circumstances or convenience may demand; in a novel construction and action of a horizontally-reciprocating stamper; in the means for throwing the same out of action, at will, while the roller-crushers remain in operative condition; in means for throwing these roller-crushers out of action while the stampers remain in action; in means for adjusting both the stationary front stamping bed or plate and also the reciprocating plates relative to each other; and in other particulars hereinafter stated.

Figure 1 represents a top view; Fig. 2, a longitudinal vertical section; Fig. 3, a side view; Fig. 4, a detail, illustrating the main shaft, with its boxes and eccentric bearings; Fig. 5, a detail, partly in section, showing the rollers in condition for action, and the stampers placed out of action; and Fig. 6, a detail, showing the devices for adjusting the position of the main shaft.

A is the frame of the machine; B, the main or driving shaft; C, a fly-wheel thereon; D, a small gear on the same shaft, and adapted to be shifted thereon for a purpose hereinafter stated; E, a large gear-wheel on the crusher-roller shaft F, and arranged to be engaged with or be disengaged from the gear D, as required; G, a gear on the shaft of the other reducing or pulverizing roller H; J, the stationary but adjustable stamper bed or plate; K K′ K″, the horizontally-reciprocating stampers or breakers; L, a stationary bar on which these stampers rest and ride when in action; M, a stationary bar on which they rest when thrown over and out of action; N, a removable bar, which, when in place, as shown in Fig. 1, serves, like the bar L as a guide for the movements of the breakers K K′ K″, these bars jointly doing the duty of ways between which these breakers reciprocate in right lines, the bar L preventing the breakers from dropping at their forward or working ends, and the bar N preventing their rising or flying up at those ends, thus securing not only a steady and uniform action of these breakers upon the ore, but the bar N preventing it from being thrown up and out of the machine, and also preventing the lower part of the plates O coming into contact or into too near proximity to the front plate J, and which would risk the stopping or breaking of the machine. It will also be observed that by this construction and action this desirable sliding motion is secured for the stamping breakers or jaws, notwithstanding the same are operated severally from eccentrics P P′ P″ on the main shaft, and that I avoid any toggles or other joints in these movable jaws of the stampers, and actuate the same directly and positively from the shaft, getting the full power of the machine in their action.

The plates J and O may, as customary, be removable, and applied in any well-known manner; but I prefer to attach them by means of bolts or set-screws *j′* or *o′*, respectively, (one or more screws for each plate.) This avoids the need of dovetailing, and prevents the liability of the plates to slide out of position while in operation. The faces of either or both of these plates J and O may have their grooves or corrugations vertical, horizontal, or both, or made irregular in any other well-known manner.

The body or frame of each of the stampers K is cast integral, and with its parts or arms

1 2 connecting the extremities of the front or acting part 3, thus leaving an open space to lighten the weight, while insuring all the requisite strength, and this affords an opportunity to pass the set screw or screws, through the part 3 from the inside of the frame into the plate O, as shown in Fig. 2. I place a series (of any desired number) of these stampers K K′, &c., closely side by side in the cavity in the frame, with no partition between them, so that when the ore is placed in the machine to be treated by them it is all subject to be acted upon more or less by each or all of the stampers. This has also several other advantages, the principal of which is that if, from any cause, either of the plates O becomes worn or broken it may readily and cheaply be replaced without disturbing any of the other plates, while if a single plate extended all across the machine it would be difficult and costly to replace it, and one hopper or chamber answers for all; and when one of the stampers in its advance movement breaks the ore its fragments fall off on one or both sides of such stamper into the space forward of the adjacent but receding stamper or stampers, which next act upon such fragments, and all the stampers thus act upon the material during every revolution of the shaft.

The shaft B is provided or made with as many eccentrics P thereon as there are frames K, such eccentrics having their positions such as to cause the frames to act successively, or at least not simultaneously, in the forward or breaking action, thus equalizing or distributing the power, and it has its bearings in hollow eccentrics *b*, which are fitted in the boxes 7, a set-screw, 8, for each box and eccentric, serving to hold the eccentric in any position to which it may be turned upon the shaft, and thus to permit the shifting of the shaft B, and consequently the plates O, nearer to or farther from the stationary plates J, as the size of the ore or stones or circumstances may demand. The same result may be attained by adjusting the plate or plates J by placing flat or wedge-shaped iron plates *j* between them and the front part 5 of the body of the machine, this also serving to adjust the plate or plates J to any desired inclination or angle relatively to the plates O.

When it is desired to throw out of operative action the stamping or breaking jaws J and O, and to employ only the rollers H H′, the frames K K′, &c., are first freed from the cross-bar N by unscrewing and removing or swinging the same to one side; then the frames K are lifted and turned over until they lie upon the opposite side of their shaft B, resting on the bar M, as shown in Fig. 5, and in dotted lines in Fig. 2. Then the plate 9, (see Fig. 5,) is inserted in the grooves 10 10, and forms the back of the hopper for supplying the rollers. The same driving-shaft, however, continues to operate the crushing-rollers in the same manner and by the same instrumentalities as before. The cross-bar L is preferably so located that it may not cover the space between the rollers, but rather over one of the rollers, so as to relieve it from the weight or friction of the mass of ore or quartz in the hopper.

When it is desired to place the crushing-rollers out of operative action, and to employ only the stamping-jaws J and O, the gear E may be disengaged from its driving-gear D in two different ways: first, by shifting this gear D laterally on the shaft B until its teeth are out of engagement with gear E, in which condition the rollers are not actuated; secondly, by shifting the boxes in which is journaled the shaft F of the large gear E, until this gear is moved back out of engagement with the gear D, set-screws 11 12, at either or both ends of the machine, permitting of such adjustments. Rubber or other springs 13, or mere blocks of wood, allow the rollers H and H′ to separate from each other in case a piece of steel or other foreign matter not readily crushable should pass between these rolls, these springs or blocks, in such case, preventing the breaking or stopping of the machine.

The rollers and their gears, by means of their adjusting-screws, may be separated from each other, so that their gearing will not work, and thus leaving a space for the broken ore from the breakers to fall through between these rolls. The breaker-shaft B revolves faster than the roller-shafts, not only because repeated actions are wanted to break the ore, but more especially because if the rolls work the faster there would be a needless waste of power to drive them beyond the actual work required of them in crushing the broken ore delivered to them from the breakers.

The machine may be made double by having another set of movable frames K, stationary jaws J, rollers, &c., on the opposite side of the shaft B, each eccentric shown in the drawing thus being connected with and operating a frame, K, and jaw-plate O on each side of itself, such additional frames being hinged either at the top or bottom of the housing or box of the frames K to permit the requisite motions.

This machine is found in practice to be very rapid and efficient in its action, while at the same time it is simple in construction, having but few parts likely or liable to get out of order, and when out of order readily repaired, and all the movements are direct and positive.

I claim—

1. In an ore-crushing machine, the combination, with the frame having an open top and rear, of the series of breakers hung directly on and driven by the main shaft, the combination permitting the turning over of these breakers upon such shaft to swing and retain them out of operative action, substantially as and for the purpose set forth.

2. In combination, the series of movable jaws or jaw-frames, the shaft B, the series of eccentrics thereon, and the guide-bars N and

L, substantially as and for the purpose described.

3. In combination, the series of breaking-jaws K K′, &c., the shaft B, and its series of eccentrics on which said jaws are hung, journal-boxes 7, and adjustable bearings 6 within such boxes, substantially as and for the purpose set forth.

4. In combination with the driving-shaft B, the series of breaker-frames K K′, &c., sustained thereon and operated directly therefrom, and the rest-bar M, the frames being adapted to be turned over on the shaft as a center, and to rest when out of action upon upon the bar M.

5. The side walls of the machine, provided with inclined grooves 10 10, adapted for the reception of a plate, 9, to form a rear wall of a hopper when the breaker-jaws are swung out of operative action.

Dated this 29th day of June, 1877.

ROBERT LANYON.

Witnesses:
W. H. PECK,
R. H. WHITE.