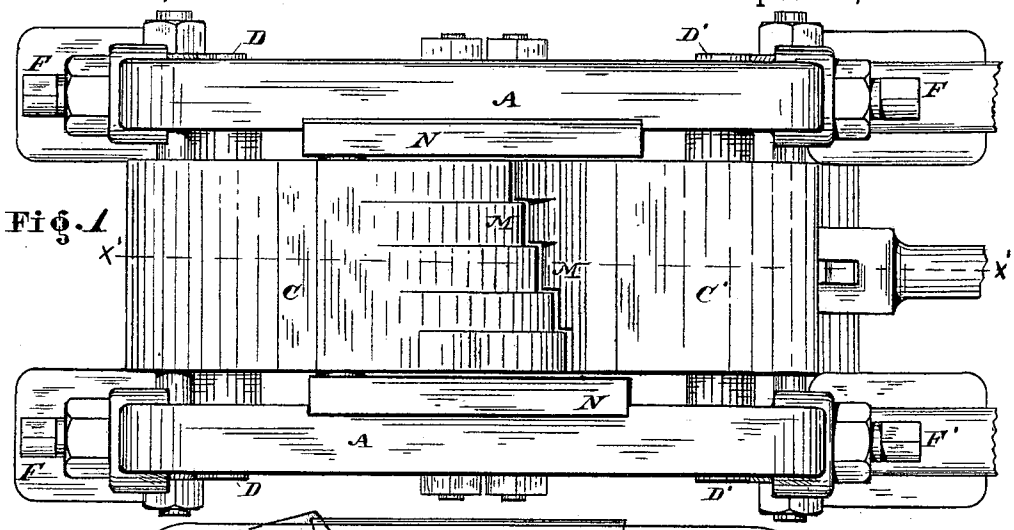
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P. S. BALKWILL.

CRUSHER FOR ORES.

No. 370,002. Patented Sept. 13, 1887.

Fig. 1



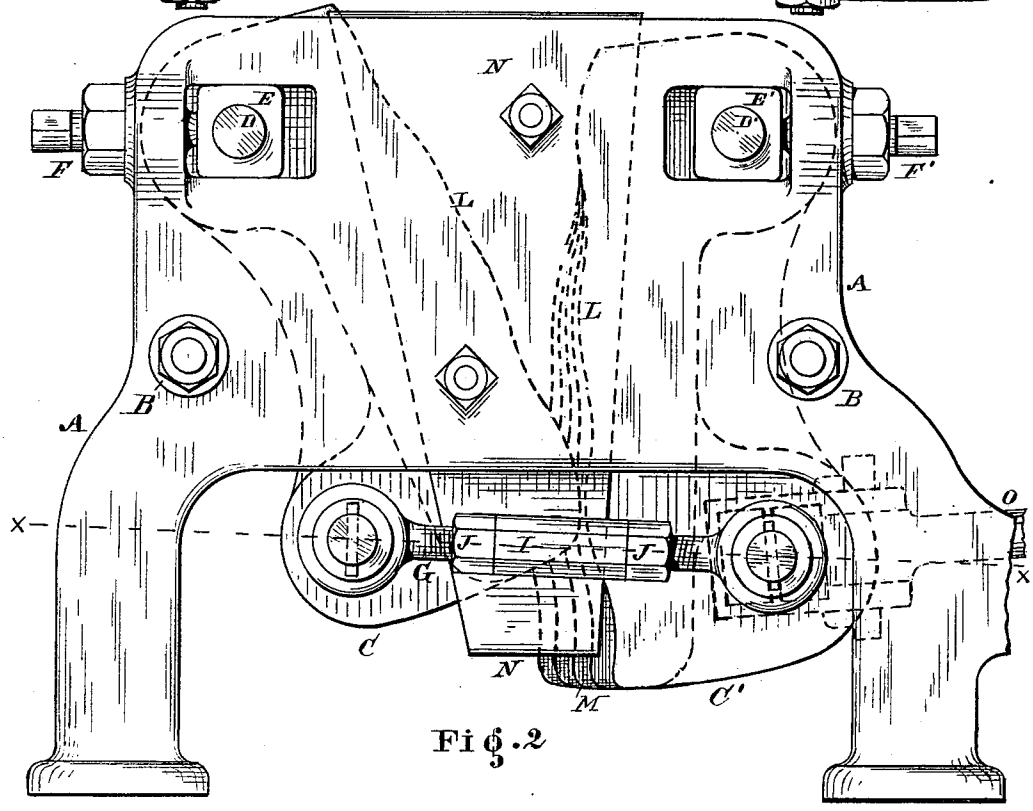


Fig. 2

WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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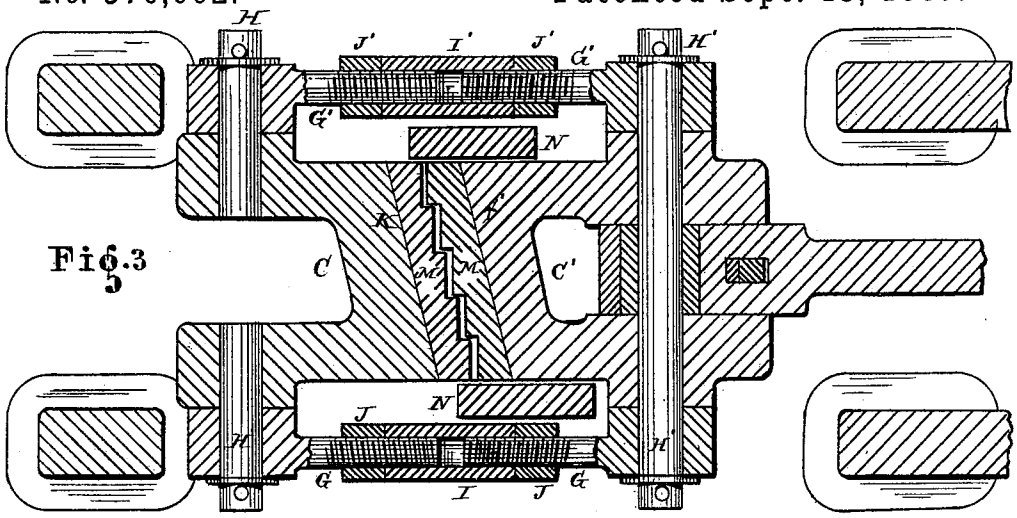


Fig. 3.

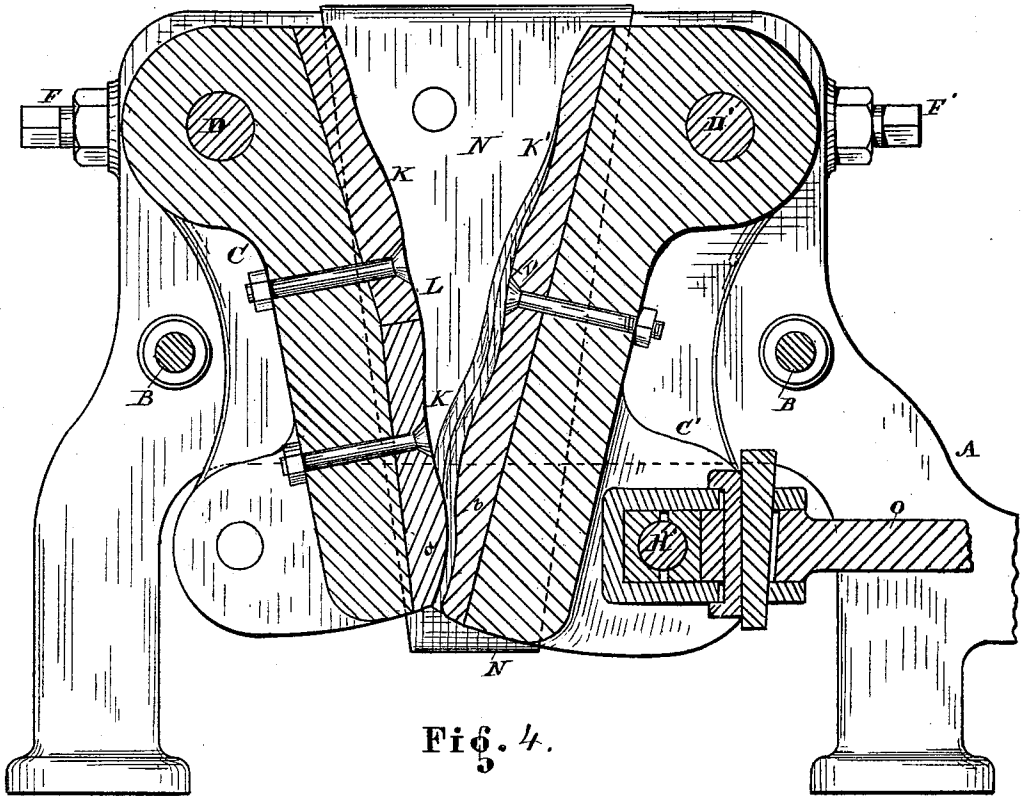


Fig. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

PERCY S. BALKWILL, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO WILLIAM J. RATTLE, OF SAME PLACE.

CRUSHER FOR ORES.

SPECIFICATION forming part of Letters Patent No. 370,002, dated September 13, 1887.

Application filed November 29, 1886. Serial No. 220,192. (No model.)

To all whom it may concern:

Be it known that I, PERCY S. BALKWILL, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and Improved Crusher for Ores; and I do hereby declare that the following is a full, clear, and exact description thereof.

The nature of my improvement relates to ore-crushers; and it consists in the construction and combination of parts, hereinafter described and claimed.

That the invention may be fully understood, reference will be had to the following specification, and to the annexed drawings, making part of the same, in which—

Figure 1 is a plan view of a machine embodying my improvements. Fig. 2 is a side elevation, the interior parts being shown in dotted lines. Fig. 3 is a transverse section in the direction of the line *x x*, Fig. 2; and Fig. 4 is a vertical section in direction of the line *x' x'* in Fig. 1.

Like letters designate like parts in the description and drawings.

A A represent the housing and sides of the frame, which are secured together by screw-bolts B and other intermediate fastenings suitable for the purpose, but not shown.

Within the housing or frame A A are two vibrating interlapping jaws, C C', which are attached to and supported by the journals D D' in the adjustable bearings E E', Fig. 2, in each of the housings. At the ends of the housing are adjustable screws F F', provided with set-nuts. By means of these screws, which are in contact with the boxes in which are journaled the jaws, the upper portions of the said jaws are adjusted closer together or farther apart, as the character of the ore may require.

It will be noted that the openings for the boxes E E' in the housing admit of a movement of said boxes to or from each other as may be needed in crushing ores, while for the same purpose the jaws are connected together on each side at the lower ends by connecting-rods G G', Figs. 2 and 3, which rods have a jointed attachment to the wrist-pins H and shaft H', respectively, as seen in Fig. 3. Each of the rods G G' is in two parts or sections, and each two sections are connected together by sleeves I or I'. The connecting-rods G are threaded into the sleeves I by right-and-left screws, with set-nuts J at the ends of the sleeves. The rods G' are also threaded into sleeves I' by right and left hand screws with set-nuts J' on the ends, as shown in Figs. 2 and 3. These connections of the sleeves with the connecting-rods and set-nuts are essentially alike on both sides of the machine, by which the jaws C C' may be adjusted as to relative or approximate contact. This adjusting mechanism, as described, admits of the adjustment of the jaws more or less, as may be required, according to the character of the ore or material to be crushed.

To the jaws are bolted or otherwise fastened one, two, or more face-plates, K K', which have corrugated or undulating surfaces in the longitudinal line of the jaws, being as indicated at L, Figs. 2 and 4, and which form a series of interlapping sections, M, in an angular or oblique direction, as indicated in Figs. 1 and 2.

The crushing-jaws may be made either in one piece or in sections, and these separate parts secured together to form the jaws, as set forth. These interlapping sections, extending from one jaw and lapping on the sides of the opposite sections of the other jaw, present more effective cutting and crushing surfaces to the ore than by the ordinary means, as the interlapping jaws have a cutting as well as crushing action upon the ore. These face-plates are preferably made of chilled cast-iron for durability, and, being in sections, one may be removed on being worn out and a new one replaced without disturbing the other sections.

On the inside of the housing on both sides are shield-plates N N, which are bolted or otherwise secured thereto. The plates extend from top to bottom, or the entire length of the jaws, as seen in Figs. 2 and 4, and are wider at the top than at the bottom. This difference in width is for the purpose of lapping over the space between the top and bottom of the jaws, as shown in the drawings. The jaws vibrate between the plates and are in close proximity thereto. The purpose of the shield-plates is to protect the housing from

the grinding and wearing action of the ores when being crushed, and the worn-out shield-plates may be readily removed and replaced by new ones without injury to the housing.

To the shaft H′, secured to the jaw C′, is attached a connecting-rod, O, by means of a strap-joint, in the usual way, for the purpose of operating the jaws by any suitable motor connected with the connecting-rod O, or otherwise operated for the purpose designed.

The ore is entered between the crushing-jaws from above by means of a hopper or otherwise. On the vibration of the jaws the ore receives a grinding and a crushing action, which constantly acts upon the ore from the first contact of the jaws, and is continued during its passage to the point of discharge at the lower end. The corrugations of the face-plates in their conjoint co-operation with the interlapping sections M M cut and grind up the ore as the jaws vibrate, and as the jaws gradually are placed closer together from the top to bottom the ore is ground up finer as it passes down through between the jaws. The swell on one face-plate has a corresponding depression on the opposite one, and one section or part M on one side overlaps a section of the opposite jaw, and vice versa. At the part *a b* of the jaws the crushed ore from above receives its last crushing, and as the jaws vibrate from the position in Fig. 4 to that in Fig. 2 the ground ore drops out from between the jaws. On the return of the jaws from the position in Fig. 4 to that in Fig. 2 this peculiar movement of the jaws in vibrating is resultant in the pulverizing and grinding effect upon the ore between them.

The ore may be reduced to a more or less finely-ground condition by the described adjusting devices connected with the jaws for this purpose.

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

In an ore-crusher, the combination of the casing with the vibrating adjustable jaws, the faces of said jaws being oblique to the axis of vibration and formed with interlapping step-like offsets, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

PERCY S. BALKWILL.

Witnesses:

W. H. BURRIDGE,

B. F. EIBLER.