2 Sheets—Sheet 1.

F. R. BROWN.

Ore-Crushing Machine.

No. 206,223 Patented July 23, 1878.

Fig. 1.

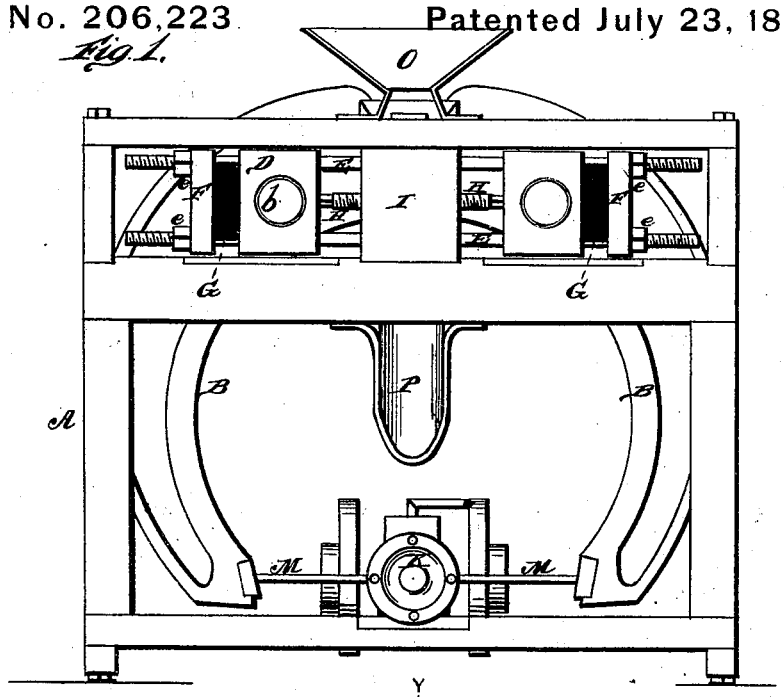
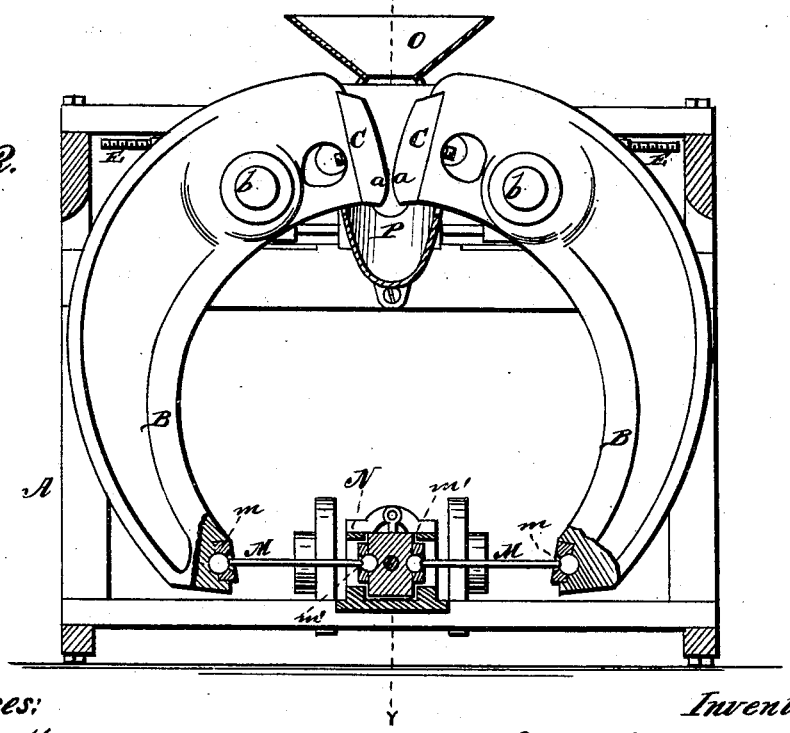


Fig. 2.



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2 Sheets—Sheet 2.

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Fig. 3.

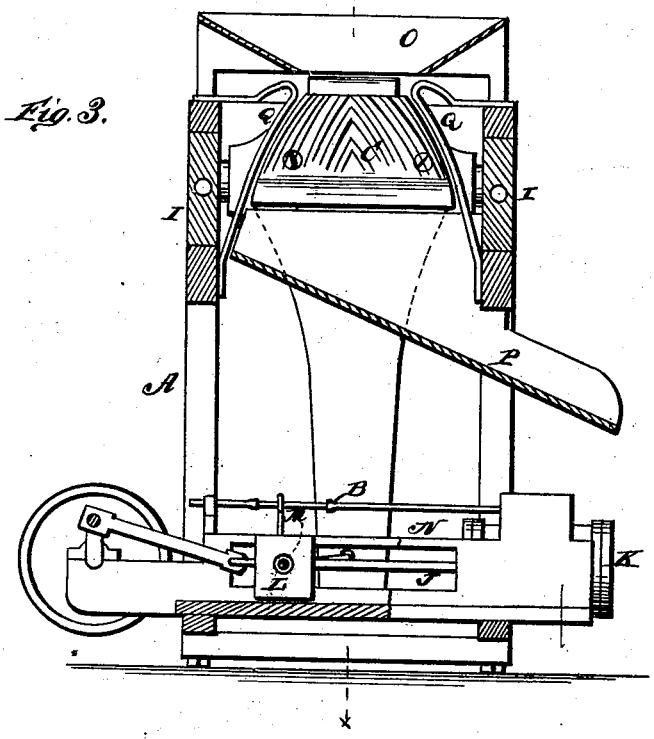
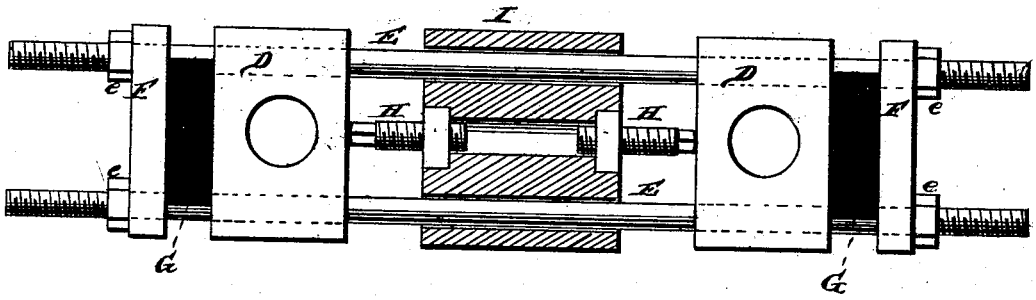


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANCIS R. BROWN, OF DENVER, COLORADO.

IMPROVEMENT IN ORE-CRUSHING MACHINES.

Specification forming part of Letters Patent No. **206,223**, dated July 23, 1878; application filed May 22, 1878.

To all whom it may concern:

Be it known that I, FRANCIS RANDOLPH BROWN, of the city of Denver, and State of Colorado, have invented certain new and useful Improvements in Ore-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 letters of reference marked thereon, which form a part of this specification.

In said drawings, Figure 1 represents a side elevation of my improved ore-crusher. Fig. 2 represents a vertical longitudinal section through the same on the line *x x* of Fig. 3, and Fig. 3 represents a vertical cross-section through the same on the line *y y* of Fig 2. Fig. 4 represents a detail view of one set of bearings and attached parts.

This invention relates to machines for crushing ores and similar substances.

The nature of said invention consists, first, in the construction and combination of certain devices, hereinafter described, for regulating the size of the crushed ore; secondly, in certain devices, hereinafter described, for holding the crushing-jaws in position, but allowing them to yield to excessive resistance, so as to avoid injury; and, finally, in certain other improvements, hereinafter set forth.

In the accompanying drawings, A designates the frame of the machine, which frame is, preferably, of wood. B designates two upright curved metallic levers, forming a yoke, and bearing on their inner faces, at their upper ends, crushing plates or jaws C C. These curved levers are constructed so as to have together the shape of a yoke with its opening downward. They are pivoted much nearer to their upper than to their lower end, so as to secure the maximum of power consistent with the proper working of the jaws. They taper downward, so that their thick short upper arms nearly balance their tapering lower arms. This lessens the resistance due to gravity and inertia, without in the least impairing the power of the levers. Their curved shape allows short connecting-rods to be used, and lessens the space occupied by the machine. The crushing plates or jaws are curved, and increase in width from top to bottom. This prevents the crushed ore from crowding against the check-plates. Said levers are pivoted by journals *b* to bearing-blocks D, supported by said frame A. The two bearing-blocks on each side of said frame are connected by heavy wrought-iron tie-bolts E, which pass through them, and are clamped at each end by nuts *e* to end plates F. Elastic cushions G are interposed between said bearing-blocks and said end plates F, and serve to allow the jaws and levers to yield a little in case of extraordinary resistance. Said bearing-blocks on each side are made adjustable toward or from each other by means of adjusting screw-threaded rods H, which work into the opposite sides of an interposed bridge-block, I, and also into said bearing-blocks. This enables me to regulate the approach of the jaws or grinding-plates C to one another, and thus determine the size of the ore after grinding. The arrangement and construction of one set of bearing-blocks, bridge-block, adjusting-rods, cushions, and end plates are shown in detail in Fig. 4. The two sets on opposite sides of frame A are counterparts. The said levers B B receive their oscillation from the piston J of an engine-cylinder, K, through a cross-head, L, and connecting-rods or pitmen, M. Each of these rods is connected to the lower end of its lever B by a ball-and-socket joint, *m*, and has a similar connection, *m'*, with the cross-head. Said cross-head moves in guideways N, and as it reciprocates it causes said levers to oscillate on their pivots *b*, and thereby produces the rocking motion of said crushing plates or jaws C, already described.

The ball-and-socket connection, above stated, allows pitmen M to work at any angle and avoids binding. Any form of engine may be employed, provided the connection is made directly, as stated, and not through intermediate gearing, which would necessarily cause friction. The same piston J may also be employed to rotate a shaft for operating other machines connected with the treatment of ore.

The ore is supplied to this crusher through a hopper, O, which is supported on said frame A above said jaws C C; and it passes from them to a discharge trough or chute, P. Curved guide-plates or check-plates Q, ar-

ranged one on each side of the space beneath said hopper, prevent the ore from escaping while being crushed. These check-plates may be attached to the frame A or the levers B, or supported in any other convenient manner.

This machine is adapted to crush any kind of mineral, coal, or other hard granular substance, for any purpose whatsoever; but is especially applicable to preparing ore or quartz for concentration.

It is obvious that various changes may be made in the form and construction of the various parts of said machine without departing from the spirit and scope of my invention. I avoid the necessity for a heavy cast-iron frame, and therefore allow the working mechanism to be below the working-floor of the mill.

Having thus fully described the said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a crushing-machine, the combination of movable bearing-blocks D D, interposed bridge-block I, and adjusting-rods H H, for the purpose of regulating the size of the crushed ore, substantially as set forth.

2. In a crushing-machine, the combination of bearing-blocks D D, tie-rods E E, flanges F F, and elastic cushions G G, interposed between said flanges and said bearing-blocks, for the purpose set forth.

3. In a crushing-machine, yoke-shaped levers B B, pivoted near their upper ends and tapering to their lower ends, in combination with connecting-rods M M and cross-head and piston of a steam-engine, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

FRANCIS RANDOLPH BROWN.

Witnesses:
EMANUEL W. HERSHE,
JAMES W. SPRAGUE.