(No Model.) 2 Sheets—Sheet 1.

A. E. ROE.

CRUSHING MILL.

No. 411,614. Patented Sept. 24, 1889.

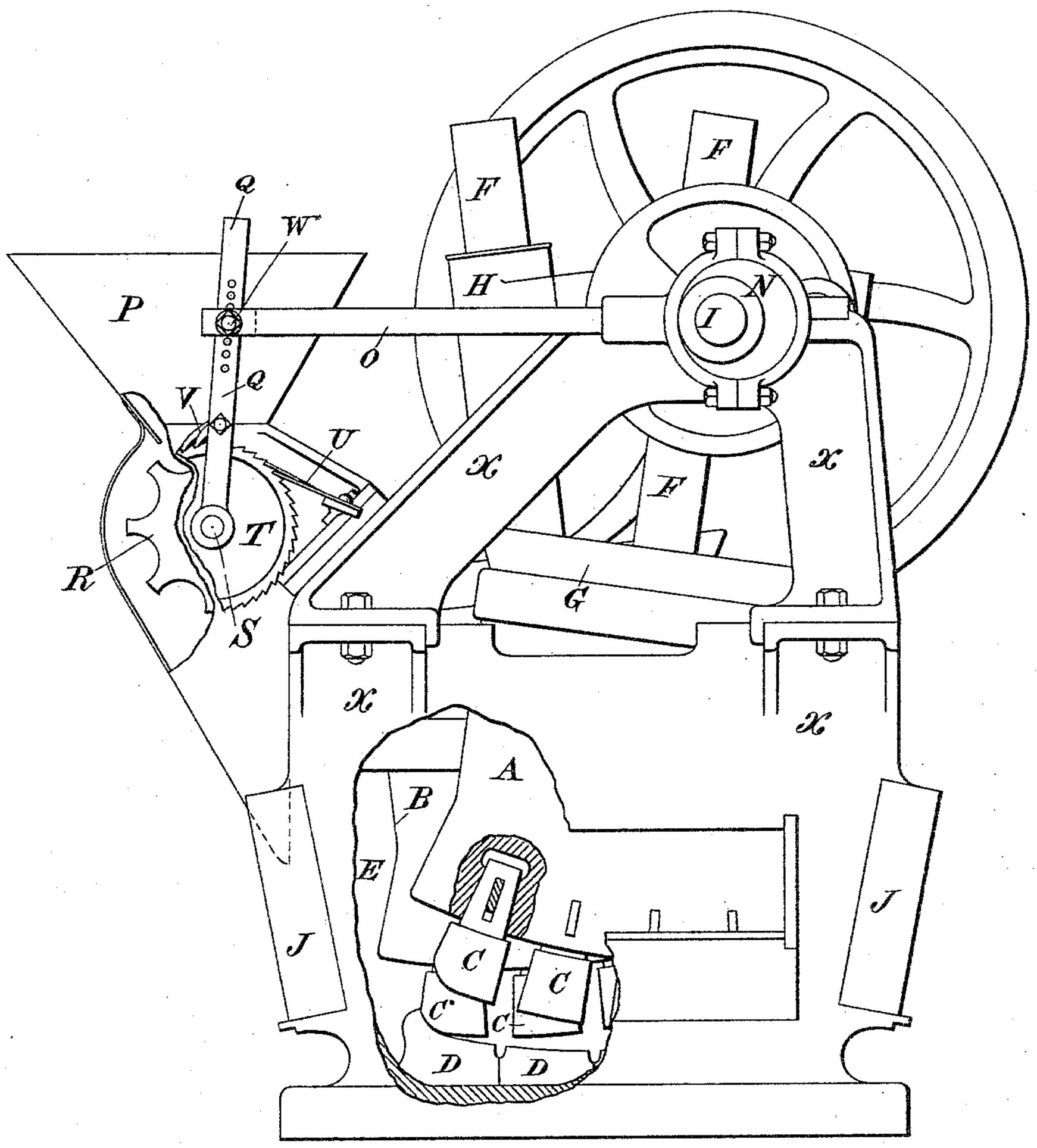

Fig. 1.

Witnesses:
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Inventor.
Alphus E. Roe
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(No Model.) 2 Sheets—Sheet 2.

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CRUSHING MILL.

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Fig. 2.

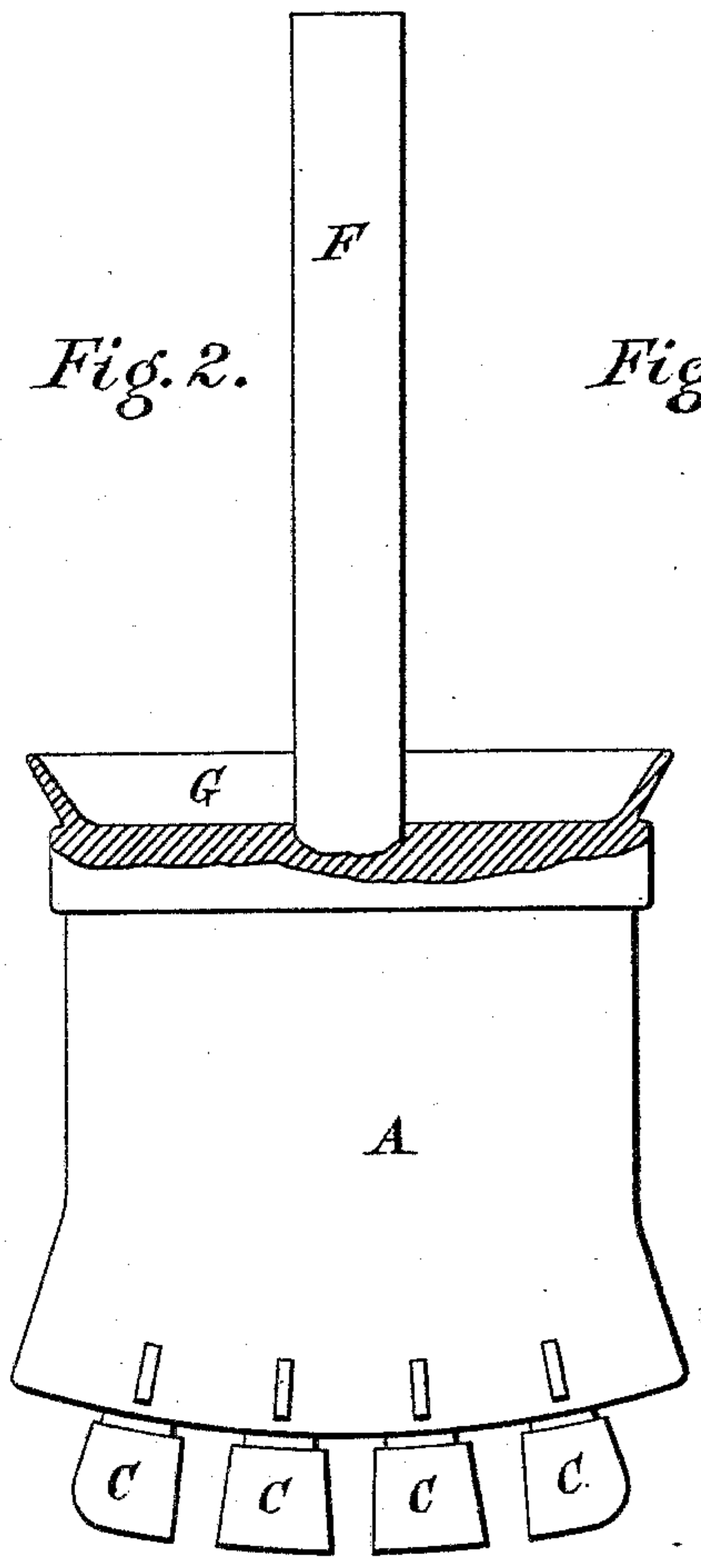


Fig. 3.

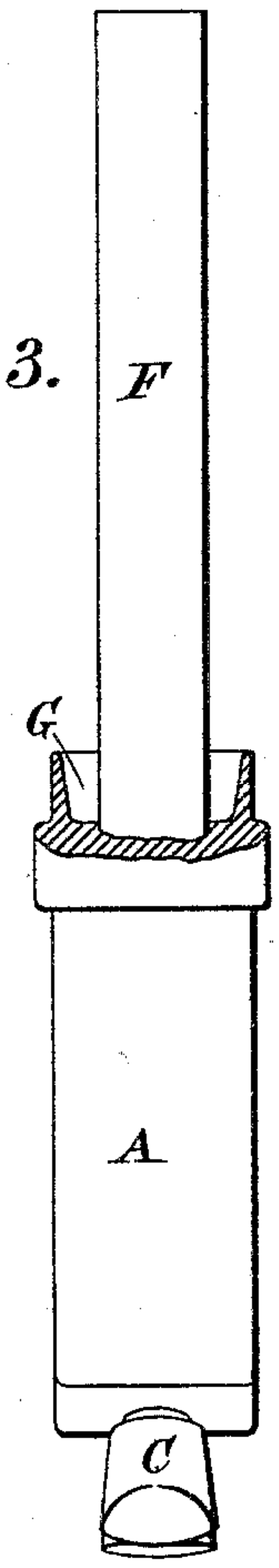
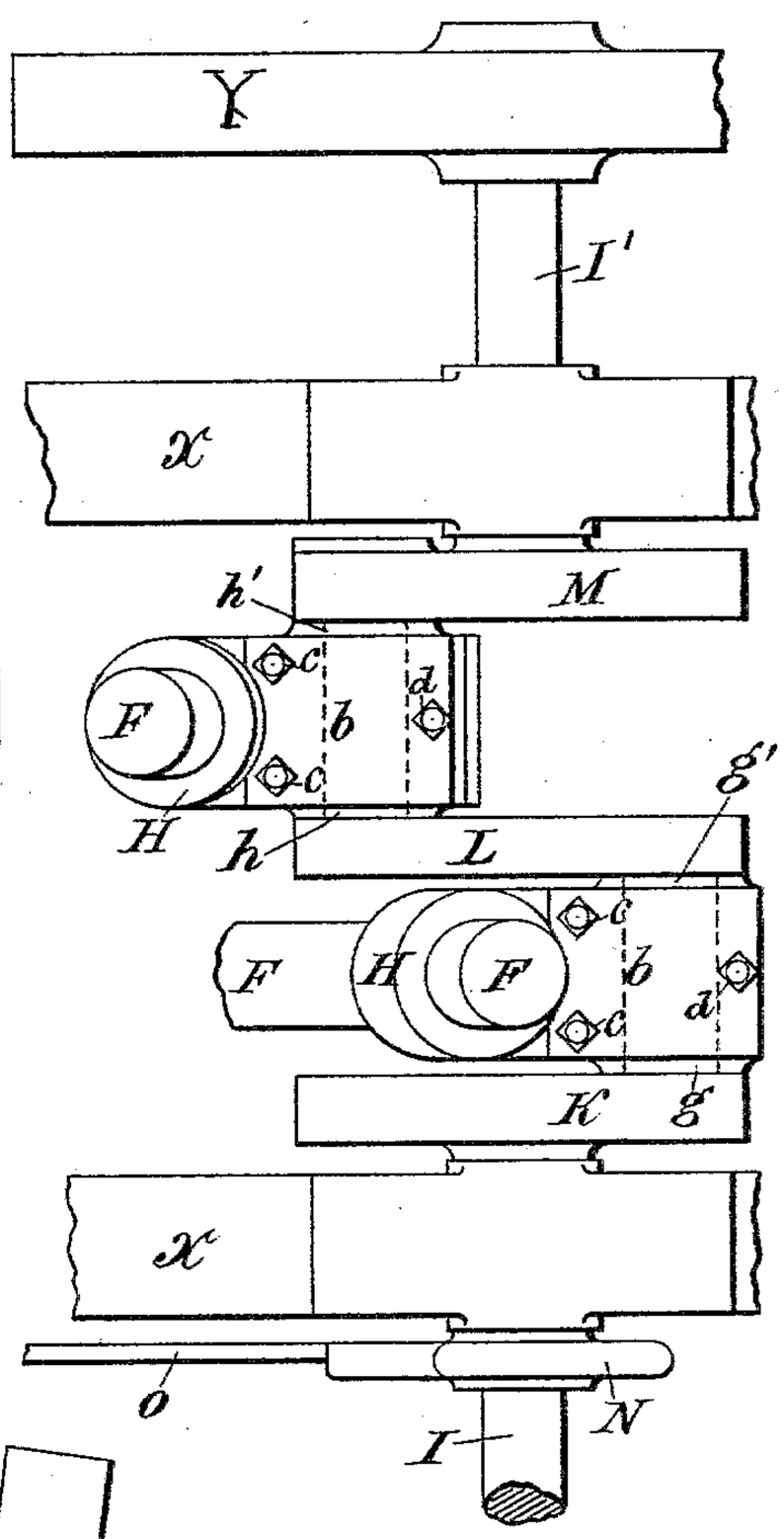


Fig. 4.



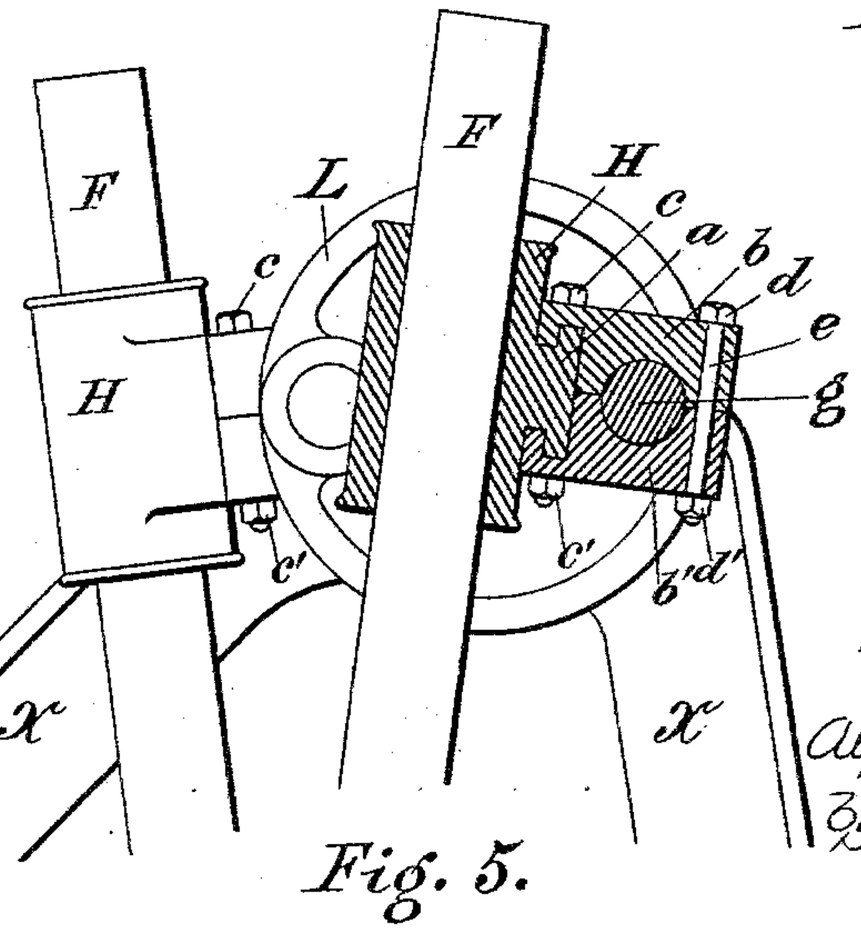


Fig. 5.

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UNITED STATES PATENT OFFICE.

ALPHEUS E. ROE, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO HENRY L. TATUM AND J. J. BOWEN, OF SAME PLACE.

CRUSHING-MILL.

SPECIFICATION forming part of Letters Patent No. 411,614, dated September 24, 1889.

Application filed April 26, 1889. Serial No. 308,674. (No model.)

To all whom it may concern:

Be it known that I, ALPHEUS E. ROE, of the city and county of San Francisco, in the State of California, have made a new and useful invention—to wit, an Improvement in Crushing-Mills; and I do hereby declare the following to be a full, clear, and exact description thereof.

My improvement relates to certain improvements in crushing-mills which are especially used for crushing the ores of valuable metals; and it consists in the mechanisms and details of construction hereinafter described.

Figure 1 is a side elevation of my machine complete, having an ore-feeder attached and the lower portion cut away in part to show the interior of the mortar. Fig. 2 is a side elevation of one of the crushing-blocks; and Fig. 3, a front elevation of the same, the upper portion being cut away to show the oil-cup G. Fig. 4 is a plan view looking down upon the top of the crushing-blocks and operating-disks. Fig. 5 is a sectional elevation showing the method of attachment between the stems of the crushing-blocks and the driving mechanism.

X X is the frame-work of the mill, made of heavy iron in two parts bolted together, as shown in Fig. 1.

A and B are two heavy crushing-blocks of metal, having their lower faces curved in the arc of a circle. From the upper end of each of these blocks a vertical stem F projects, and G is an open cup at the base of the stem to catch any oil or other particles that might otherwise drop into the mortar.

C C C C are stamps fitted into the curved faces of the crushing-blocks in such manner that their lower or crushing faces extend downward in a similar curved arc.

E is a mortar, in which the crushing-blocks operate, and D D are dies placed in the bottom of the mortar, so that the material fed into the mortar will be crushed between the operating-surfaces of the stamps and dies.

In the drawings I have shown two crushing-blocks side by side in a single mortar; but more than two such blocks may be used when it is desired to increase the capacity of the mill, or a single block may be used.

To each of the stems F is attached a sleeve H, by means of which the stem is connected with the driving mechanism, and which sleeve loosely embraces the stem F, so as to slide up and down thereon. The sleeve H has a T-shaped extension *a* on one side, as shown in Fig. 5. Into the slots formed by the T is fitted a pair of similar shaped blocks *b* and *b'*, fastened together by bolts *e* and nuts *d d' c c'*, and having a hole through their center for the crank-pin *g g' h h'* to work in, thus forming a journal-box for said crank-pin, and thereby establishing a connection between the crushing-block and driving mechanism.

I is a short shaft, with its outer end working in a journal-box in the frame-work of the mill. Upon the inner end of this shaft is a fixed disk K, and a crank-pin *g g'* projects from this disk, extends through the box *b b'*, and has its other end fixed in another disk L, which lies between the stems of the crushing-blocks, as shown in Fig. 4. From a point in the disk L opposite the pin *g g'* another pin *h h'* projects, extending through the box on the stem of the second crushing-block similar to that of the first, and its outer end is fixed in a disk M, similar to disk K. The center of this last disk is securely keyed to the driving-shaft I', the inner end of which turns in a journal-box in the frame-work of the mill in a line with the journal-box of the shaft I opposite. To the outer end is attached the pulley Y, by means of which power is imparted to the shaft I' to operate the crushing-blocks.

P is an ore-hopper permanently attached to the frame-work of the mill. Immediately underneath and extending longitudinally across the bottom opening is placed a feed-roller T, having corrugations R longitudinally across its periphery and journaled at S, so as to be rotated.

Q is an upright arm journaled to the end of the feed-roller, and O is a cross-arm attached to the upright arm at W by means of a bolt and nut. Several bolt-holes are represented on the arm Q, so that attachment between the two arms may be raised or lowered at will, and thereby be rendered adjustable. The other end of the cross-arm O is attached to shaft I by means of an eccentric N. To the arm Q are fixed downwardly-projecting pawls V,

which engage the teeth of the circular ratchet-wheel attached to the end of the feed-roller, as shown in Fig. 1, and thereby rotate the roller.

U is another pawl, with one end permanently fixed to the frame-work and the other end working in the teeth of the ratchet-wheel, so as to keep it in check and prevent counter-rotation.

J J are screens placed at each end of the mortar.

The operation of the machine will be as follows: The hopper P being filled with ore, power is imparted to the shaft I′ and transmitted through the medium of the pins *h h′* and *g g′* and the disks M, L, and K to the crushing-blocks A and B. Thereby said blocks will be given an alternate oscillating back-and-forth motion within the mortar. The ore from the hopper will fall upon the feed-roller into the corrugations R, which, being rotated by means of the arms V and O, eccentric N, and pawl and ratchet V, will precipitate the ore into the mortar upon the dies D D. The alternate oscillations of the blocks A B will throw the ore alternately from one side of the crushing dies and stamps to the other or crowd it sidewise into the path of the blocks, thus greatly increasing the effectiveness of the mill, and the motion of the stamps also tends to throw the ore toward the ends of the mortar, so that when sufficiently pulverized it passes readily through the screens J J.

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

1. In combination, the mortar E, the crushing-block A therein, the feed mechanism for supplying material to the mill, the shaft I, and driving-connections between said shaft and the block and between said shaft and the feed mechanism, substantially as described.

2. In combination, the mortar E, the block A therein, the feed mechanism consisting of the hopper P, the roller R, and ratchet T, driving-connections between the shaft I and the crusher A, and driving-connections to the ratchet, consisting of the eccentric N on the shaft I, the rod O, lever Q, adjustably connected thereto, and the pawl, substantially as described.

3. In a crushing-mill, the combination of a mortar with a crushing-block having an upwardly-extending stem, a sliding sleeve loosely embracing said stem, a driving-shaft, and a connection between said sleeve and driving-shaft for imparting power to the crushing-block, substantially as described.

4. In combination, the mortar, the crushing-block having a stem F, a shaft I, positioned to one side of the stem, and a connection between the stem and shaft, consisting of the disk K and crank-pin *g g′*, fixed in its face, sleeve H on the stem, having the extension *a*, of T shape, and blocks *b b′*, embracing the crank-pin and said extension.

5. In a crushing-mill, the mortar and a crushing-block, said block having an upwardly-extending stem and having its upper part formed into an oil-receptacle G, substantially as described.

In witness whereof I have hereunto set my hand and seal, at San Francisco, California, this 26th day of December, A. D. 1888.

ALPHEUS E. ROE. [L. S.]

Witnesses:
J. H. MILLER,
H. L. TATUM.