2 Sheets—Sheet 1.

P. C. DUBOIS.
Ore-Crusher.

No. 223,281. Patented Jan. 6, 1880.

Fig. 1.

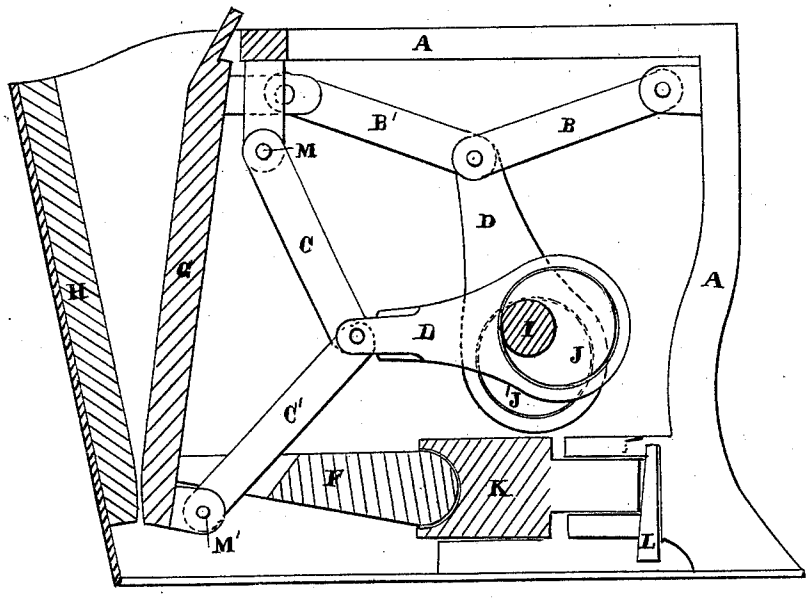
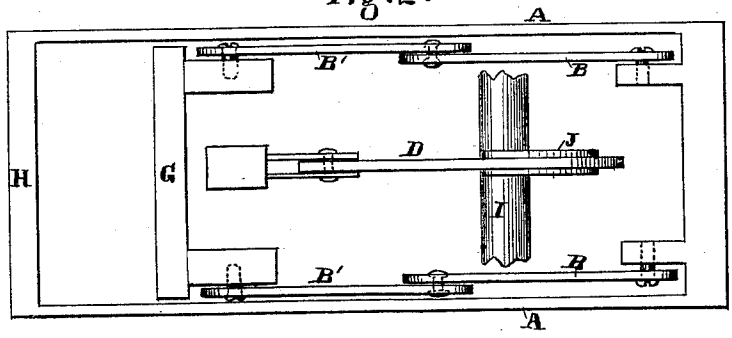


Fig. 2.



Witnesses

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Fig. 3

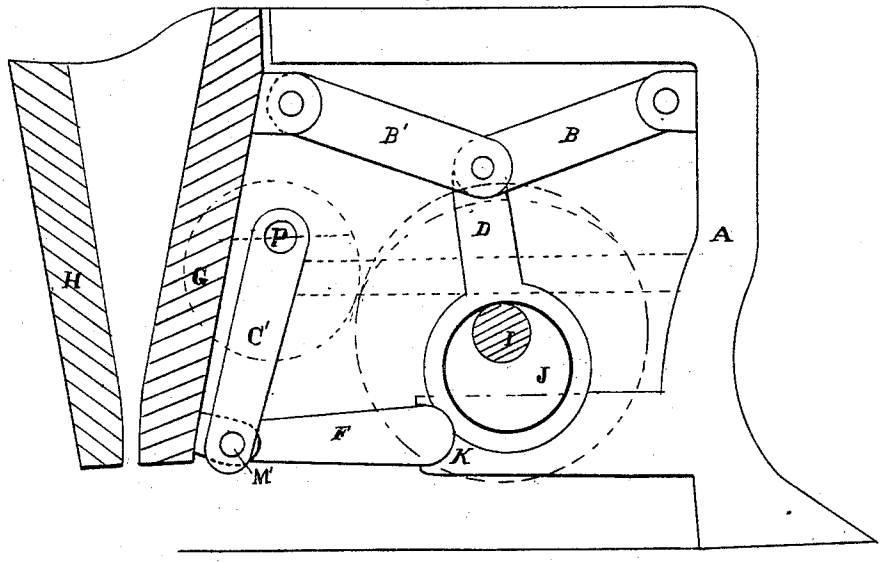


Fig. 4

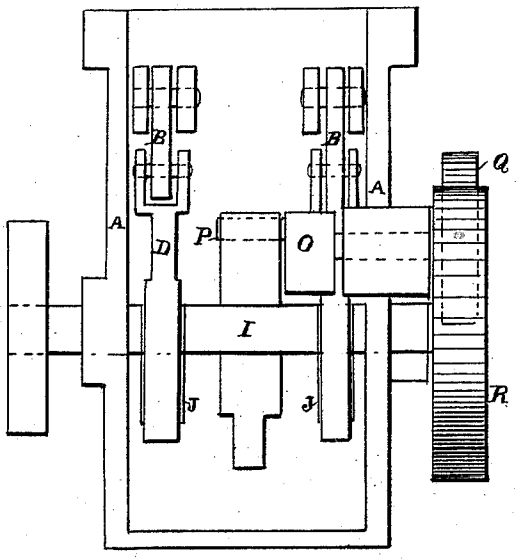
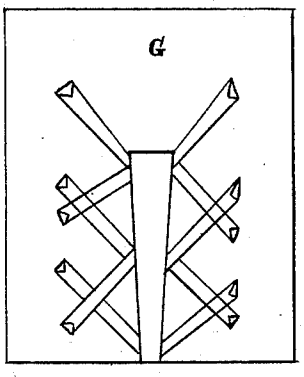


Fig. 5



Witnesses

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UNITED STATES PATENT OFFICE.

PIERRE C. DU BOIS, OF COPPER CITY, CALIFORNIA.

ORE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 223,281, dated January 6, 1880.

Application filed March 15, 1879.

To all whom it may concern:

Be it known that I, PIERRE C. DU BOIS, of Copper City, county of Shasta, and State of California, have invented a Pulverizing Rock-Breaker; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention relates to certain improvements in that class of crushing apparatus in which the rock is broken by means of two jaws placed opposite to each other, one of which jaws is made to alternately approach to and recede from the other stationary jaw.

My invention consists in the novel combination of a breaking, grinding, and sizing mechanism, in which the rock, ore, or other material is broken and pulverized to any degree of fineness. This is effected by a peculiar arrangement and operation of a movable jaw with relation to an oppositely-placed stationary jaw, and in certain mechanism by which this jaw is operated, as will be more fully described by referring to the accompanying drawings, in which—

Figure 1 is a longitudinal section of my apparatus. Fig. 2 is a horizontal section. Figs. 3 and 4 show a modification. Fig. 5 is a view of the face of a die or jaw.

A is the frame of my machine, which is made strong enough to resist the strain upon the jaws. H is the stationary jaw, and G is the movable jaw. This jaw G has a peculiar to-and-fro and up-and-down motion given to it, by which a double action takes place upon the material which is introduced. The jaws are preferably made plain, as experience proves that such jaws will take better hold of the ore than roughened surfaces, and they are placed with their upper edges sufficiently separated to receive the material to be fed to the machine. The lower edges approach each other, and are so curved as to present a portion of their faces, which are nearly or quite parallel in their position, so that the peculiar movement of the machine will give a powerful grinding action. These jaws are adjustable, as will be hereinafter described, so as to stand at any desired distance apart, and as this distance will be fixed by the adjustment so as to be permanent, it will be seen that any degree of fineness may be given to the material, and I thus combine the breaker and pulverizer, while no screens will be necessary, as the ore cannot escape until it has arrived at the desired degree of fineness.

In the construction of the jaws wrought-iron or steel dies may be introduced into the lower or pulverizing portion, if desirable, and the faces of these dies may be grooved, as shown in Fig. 4, to increase the grinding-power; but I have found that very satisfactory results come from the use of plain faces.

The movement given to the movable jaw is one which causes its upper part to approach the stationary jaw and break anything which may lie between the two. At the same time the lower part of the jaw is drawn downward with a rubbing motion, which is extremely effective to pulverize the ore, and it is held at a certain distance from the fixed jaw, so that when the dust escapes it will be reduced to a certain fineness.

B B′ are the arms of knee-levers, which are united at the center. One pair of these knees on each side have their outer ends hinged or jointed to stout lugs upon the upper end of the movable jaw G, and the opposite ends of the other levers are jointed to the upper part of the frame. Short pitmen D unite the meeting-points of these levers with the eccentric-straps upon the eccentrics J. These eccentrics are mounted upon the main driving-shaft I, and when rotated their action upon the knee-levers will be to open and close the upper parts of the jaws.

C C′ are another pair of knee-levers, standing between the two pairs B B′. One of these levers has its outer end jointed to the lower part of the movable jaw G at M′, while the other lever has its outer end jointed to the upper part of the frame at M, so that the general direction of the levers is nearly vertical. The meeting-joint of these levers is connected with another eccentric, J′, also formed upon the shaft I, and driven by it. The action of these levers will be to give the jaw G a sliding motion up and down upon the stationary jaw, the grinding or pulverizing effect taking place at the lower or meeting ends of the jaws, as before described.

The eccentrics J and J′ are so set upon the

shaft with reference to each other that they produce by their action upon the two sets of knee-levers a peculiar drawing and rolling motion of the surfaces at the lower end of the jaws, while the movement at the upper end is principally one of opening and closing.

In order to adjust the space between the grinding or pulverizing portion of the jaws, I employ a beam, F, which has its ends rounded or otherwise fitted so that one end will press against the back of the jaw G at the bottom, while the opposite end rests against a sliding arm, K. This arm extends backward through a slot in the frame, as shown, and an adjusting-wedge, L, behind it serves to move it and the beam F forward or back, so as to set the lower or pulverizing part of the jaw G at the desired distance from the stationary jaw.

It will be seen by this description that my apparatus is complete as a breaker and pulverizer, and its action is to receive the rock and first break and reduce it, and then to comminute and pulverize it to any degree of fineness, the space between the lower part of the jaws being such as to only discharge the ore when it has reached the desired fineness, so that I entirely dispense with the subsequent use of a screen, and the machine is complete and perfect in itself.

It may be found, in practice, that the grinding or pulverizing movement must be more rapid than the breaking or crushing motion, in order to pulverize the ore as fast as it is ready; and in order to produce this I have shown a modification in Fig. 3, where the lever C′ is connected with the jaw G and extends up to a short crank or eccentric, O, mounted upon a shaft, P. A pinion, Q, upon this shaft is driven by a large gear-wheel, R, upon the main shaft, the purpose being to obtain a rapid up-and-down motion of the jaw with a comparatively slower to-and-fro motion of the upper part.

It will be seen that while the whole of the jaw G is really subjected to the action of both sets of levers, the attachment of one set at the top and the other at the bottom of the jaw has the effect to give the lower part of the jaw a simple grinding motion, which is very nearly vertical, and it is rendered practically so by the shape of the jaws at this point, which are so curved that their whole movement is parallel. The upper part of the jaw is subjected to the up-and-down motion, and, in addition, to the to-and-fro motion, which makes a compound action at this point, tending to break and carry the ore downward.

I do not claim multiple cams and rods in combination with an undivided jaw of a stone breaker or crusher, for such is not my invention.

I am also aware that a to-and-fro motion has been given to one or both of a pair of crushing-jaws; and I am also aware that a stone or rock breaker having irregular surfaces has been constructed with an eccentric which would give the movable jaw an irregular or rotary motion. I do not, therefore, claim these movements, broadly; but

What I do claim, and desire to secure by Letters Patent, is—

1. The converging jaws H G, with the horizontally-acting knee-levers B B′, pitman D, and eccentric J, and the vertically-acting levers C C′, with their actuating-eccentric J′, whereby a vertical grinding movement is given to the lower ends of the jaws and a vertical and to-and-fro movement is given to the upper part of the jaws, substantially as and for the purpose herein described.

2. The converging jaws G H, with their independently-actuating levers B B′ C C′, in combination with the beam F, sliding arm K, and adjusting-wedge L, whereby an adjustable sizing device is produced, substantially as herein described.

3. The converging jaws H and G, with their independently-actuating levers B, B′, and C′, the lever C′ being driven by the eccentric O, pinion Q, and gear-wheel R, substantially as and for the purpose herein described.

In witness whereof I have hereunto set my hand.

PIERRE C. DU BOIS.

Witnesses:
FRANK A. BROOKS,
CHAS. G. YALE.