2 Sheets—Sheet 1.

P. W. GATES.

Ore-Crusher.

No. 202,940. Patented April 30, 1878.

Fig 1.

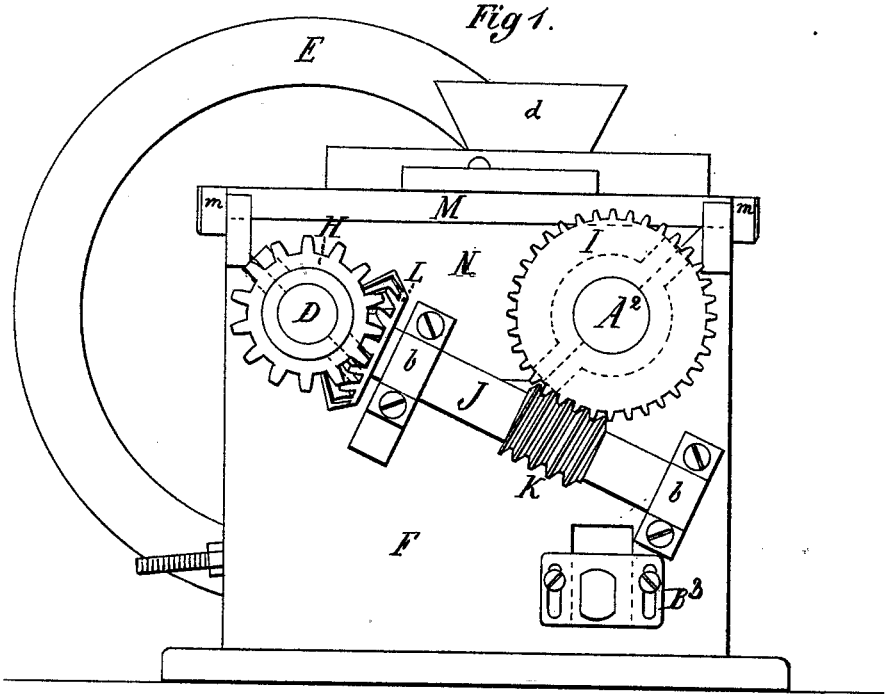
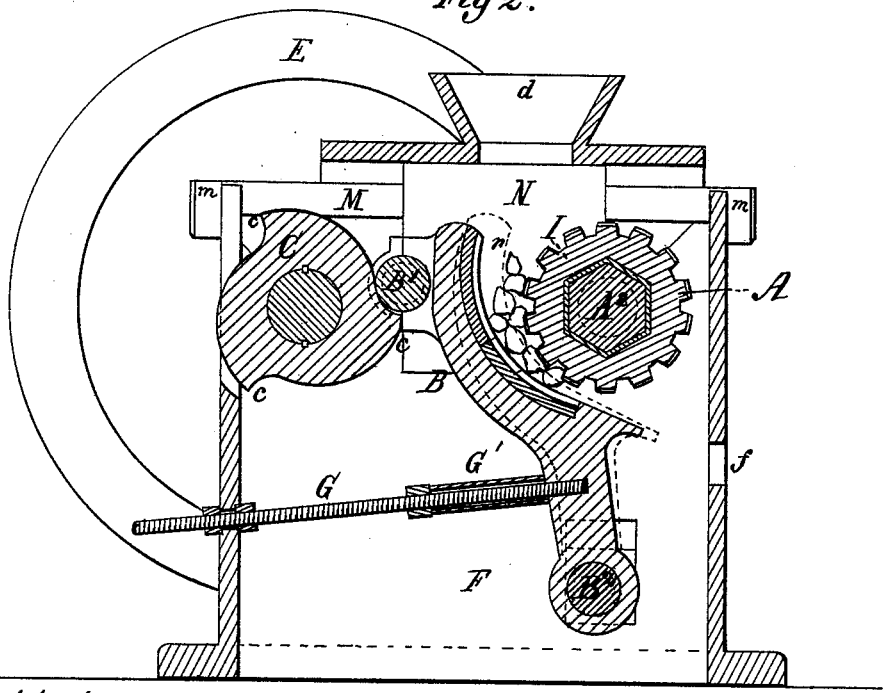


Fig 2.



Witnesses:
James Martin Jr
J. P. Theodore Lang

Inventor:
Philetus W. Gates
by Mason, Fenwick & Lawrence

P. W. GATES.

Ore-Crusher.

No. 202,940. Patented April 30, 1878.

Fig. 3

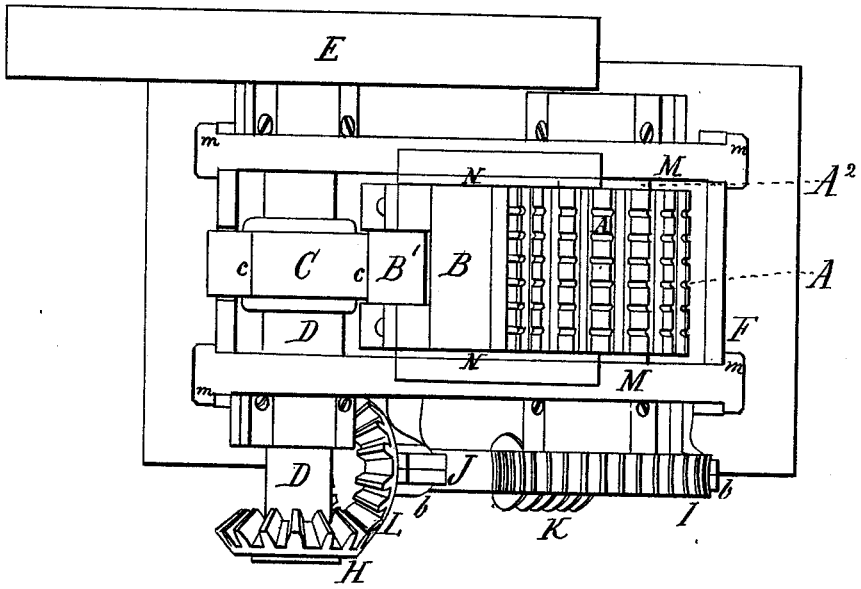


Fig. 4

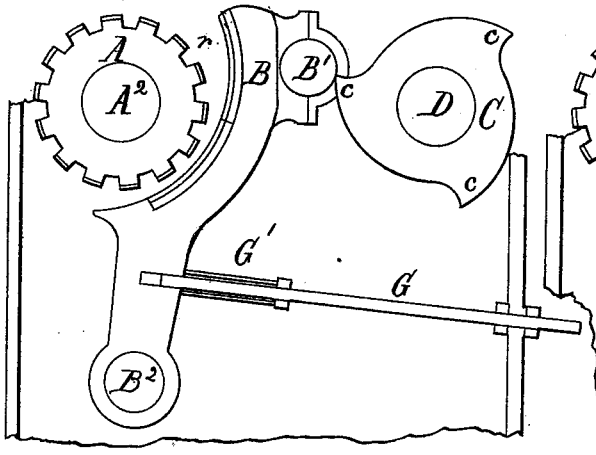
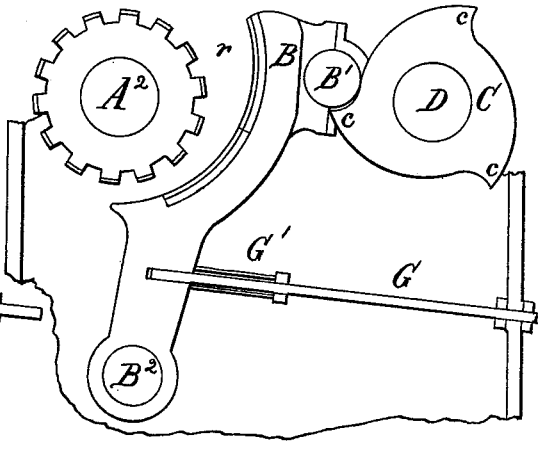


Fig. 5



Witnesses:
James Martin Jr.
J. P. Theodore Lang

Inventor.
Philetus W. Gates
by
Mason, Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

PHILETUS W. GATES, OF CHICAGO, ILLINOIS, ASSIGNOR TO HIMSELF, ABIGAIL E. GATES, RYERSON D. GATES, AND PHILETUS W. GATES, JR., OF SAME PLACE.

IMPROVEMENT IN ORE-CRUSHERS.

Specification forming part of Letters Patent No. **202,940**, dated April 30, 1878; application filed November 16, 1877.

To all whom it may concern:

Be it known that I, PHILETUS W. GATES, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Machines for Breaking Stone; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side view of my improved stone-breaking machine. Fig. 2 is a vertical central section of the same. Fig. 3 is a top view of the same, with cap and hopper removed. Fig. 4 is a sectional diagram of the machine as it appears when stone to be broken is not between its crushing-surfaces. Fig. 5 is a like diagram of the machine as it appears when stone to be broken is between its crushing-surfaces.

The nature of my invention consists in the combination of a crushing and discharging cylinder, a vibrating crushing-jaw, a revolving cam on the driving-shaft, a screw-wheel on the shaft of the cylinder, a bevel-wheel on the driving-shaft, and a worm-cylinder and a bevel-wheel on a shaft, the worm-cylinder gearing with the worm-wheel of the crushing-cylinder, and the bevel-wheel of the shaft of the cylinder with the bevel-wheel of the cam-shaft. By this combination the vibrating jaw makes a greater number of vibrations than the revolutions of the driving-shaft, and a very slow continuous revolution of the crushing-cylinder is secured.

In the accompanying drawings, a revolving cylinder, A, a vibrating jaw, B, with friction-roller B^1, a cam, C, with three projections, *c*, a driving-shaft, D, with a balance-wheel, E, a sustaining-bar, G, with a spring, G′, for the jaw to bear against, two longitudinal tie-rods, M, for strengthening the frame, two lateral shields, N, for retaining the uncrushed stone within the crushing-space, and two reversible eccentric-slides, B^3, serving as adjustable supports of the pivot B^2 of the jaw, are shown on a frame, F. These parts named, as well as their frame, are all constructed to operate in the same manner as described and shown in my patent granted October 16, 1877, and No. 196,082, and therefore need not be more particularly referred to here.

On one end of the shaft D of the cam C a bevel-wheel, H, is fastened, and on one end of the shaft A^2 of the crushing-cylinder A a worm-wheel, I, is fastened. J is an inclined shaft, supported on one side of the frame F in boxes *b b*, so as to revolve. On this shaft, under the worm-wheel, a worm, K, is applied, which gears with the worm-wheel, and on the upper end of said shaft a bevel-wheel, L, is fastened, which gears with the bevel-wheel H, as shown.

The stone to be crushed is introduced through the hopper *d* at the top of the frame F, between the crushing-surfaces of the cylinder A and jaw B. The cylinder and cam are revolved, the former by the worm and screw gearing, and the latter by the bevel-wheels. The weight of the stone, together with the action of the ribs or knobs of the cylinder upon it as the cylinder moves, causes the jaw to overcome the force of the spring G′, and to fall back from the position shown in Fig. 4 to the position shown in Fig. 5, and when this takes place the projections of the cam strike the jaw, and cause it to move up to its work three times during each revolution of the driving-shaft. The cylinder makes a very slow motion during the crushing operation, and thereby aids in feeding down the stone to be crushed in proper manner, and assists in the discharge of the crushed stone at the bottom of the flaring crushing-space *r*, which is between the jaw and the cylinder. The crushed or broken stone is conducted by a chute through the aperture *f* in the end of the frame F. When the feeding of the stone ceases, and the machine is still running, the cam cannot strike the jaw and wear out its friction-roller B^1, inasmuch as the spring G′ forces the jaw forward to its normal position. (Shown in Fig. 4.) If it is desired, the cam-projections *c* may be decreased or increased in number.

The main advantage of my present invention is the production of a very slow rotary motion

of the crushing-cylinder, while a very rapid vibration of the vibrating jaw is effected, and at the same time a very compact machine is produced.

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

The combination of the worm-wheel I, worm-cylinder K, shaft J, and bevel-wheels H L with the crushing-cylinder A, vibrating jaw B, and cam C, substantially as and for the purpose herein described.

Witness my hand in the matter of my application for a patent for a stone-breaking machine this 2d day of June, A. D. 1877.

PHILETUS W. GATES.

Witnesses:

JOHN W. MABBS,

CHARLES ANDERSON.