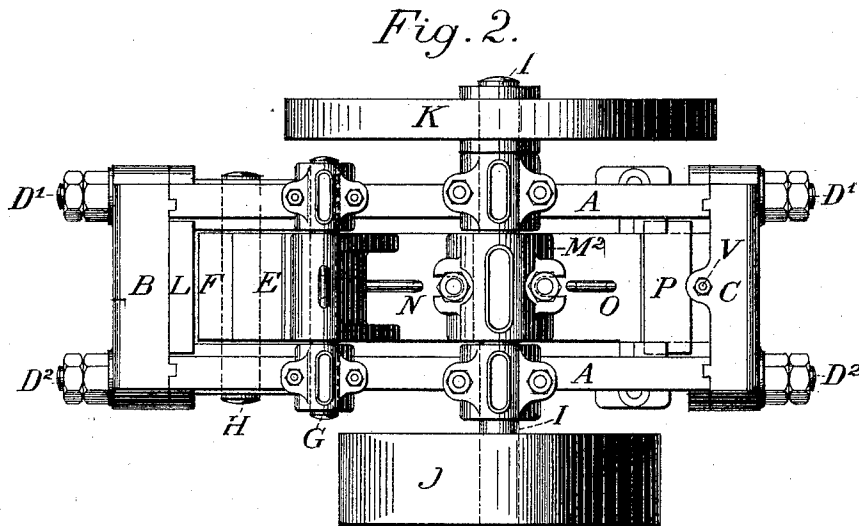
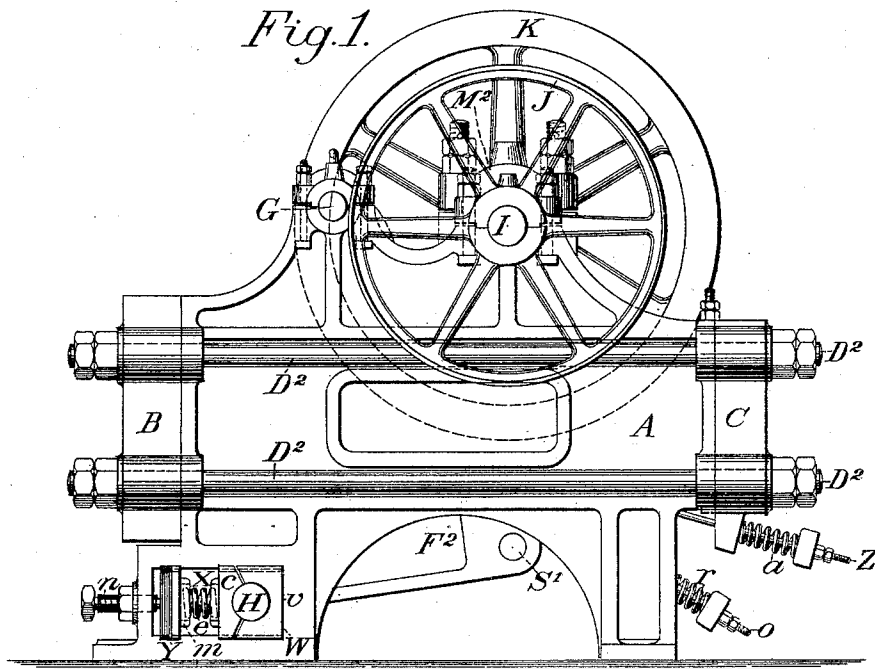


E. H. BOOTH.
STONE OR ORE CRUSHING MACHINE.

No. 473,725.

Patented Apr. 26, 1892.



Witnesses:

E. A. Brandau

W. D. Bentz

Inventor:

Edgar H. Booth
By his Atty
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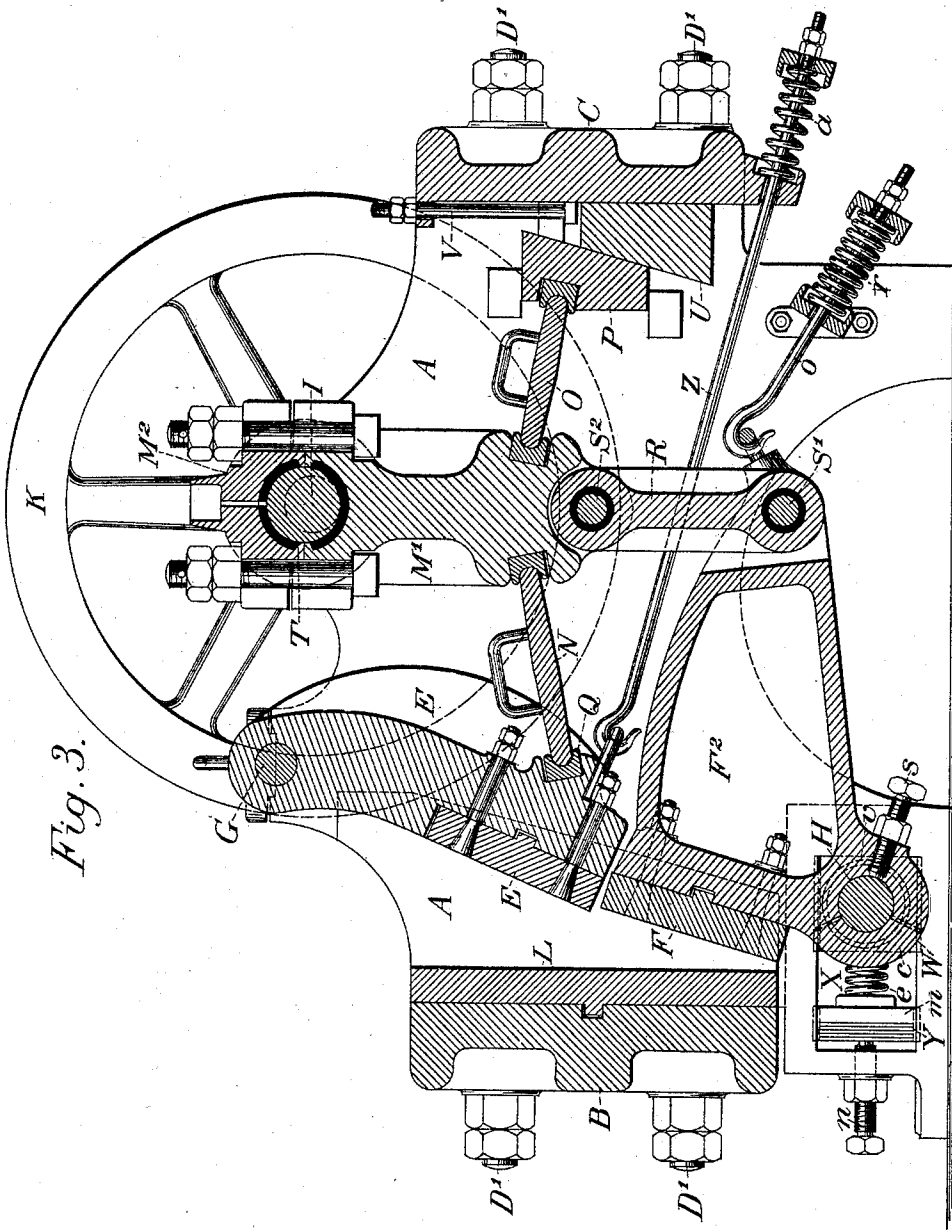


Fig. 3.

Witnesses:

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UNITED STATES PATENT OFFICE.

EDGAR H. BOOTH, OF SAN FRANCISCO, CALIFORNIA.

STONE OR ORE CRUSHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 473,725, dated April 26, 1892.

Application filed June 20, 1891. Serial No. 396,925. (No model.)

To all whom it may concern:

Be it known that I, EDGAR H. BOOTH, a citizen of the United States, residing in the city and county of San Francisco, and State of California, have invented certain new and useful Improvements in Stone or Ore Crushing Machinery; and I hereby declare the following specification and drawings accompanying the same to be a full, clear, and exact description of my invention.

My invention relates to machines for crushing ore, stone, or any kind of mineral substances, reducing them to various degrees of fineness, as their nature and uses may require; and it consists in the construction, arrangement, and combination of the several parts, substantially as will be hereinafter described and claimed.

The object of my invention is to provide a crushing-machine for stone or ore with a wider range of capacity as to the size of material fed in and amount crushed with relation to the power employed and the fineness of the product when crushed, also by pivoting the upper or first jaw above the arc in which it swings produce a movement best suited for preliminary crushing, and by pivoting the lower jaw below the arc in which it swings adapting that one to finishing or fine crushing.

Another object of my invention is to attain nearly-continuous action of the machine by reason of the alternating motion of the two jaws, and thus avoid in a great degree the strains such machines are subjected to when their work is done during one-half only of each revolution of the driving-shaft, also the unequal wear on the principal working parts caused thereby, and thus the strains in my improved machines for a given work being approximately only one-half as much at any instant of time as when such machines are single-acting or have only one reciprocating jaw.

In the drawings, Figure 1 is a side elevation of one of my improved stone and ore crushing machines. Fig. 2 is a plan view of the same machine with a few of the details omitted; and Fig. 3 is an enlarged longitudinal vertical section through the same machine, showing the various operating parts in their relative positions and connections.

Like letters of reference on the different figures indicate corresponding parts of the machine.

The main frame of the machine is made with the two side members A A and the two end members B and C, the whole being joined by the heavy rods or bolts D' and D², provided at the ends with screw-nuts, as shown. The upper or first crushing-jaw E is pivoted or fulcrumed above its crushing-face on the shaft or pin G in the upper part of the frame and the lower or finishing crushing-jaw F is pivoted or fulcrumed below its crushing-face on the shaft or pin H in the lower part of the frame. The shaft I, carrying the eccentric T, is driven by the pulley J and is provided, also, with a fly-wheel K, or two fly-wheels—one at each side—can be employed. The present machine is shown with one, because the equalizing effect of such wheels required is less than is the case with machines having one movable jaw. The stationary jaw L is shown in an approximately vertical position, with the movable jaws E and F standing at an inclination thereto. The stationary die L and front member B of the main frame, constituting the fixed jaw of the machine, are made long enough to accommodate the action of both jaws E and F, the crushing-faces being, as usual, faced, as shown, with hard material to resist abrasive wear of the faces.

M' is the driving link or pitman, receiving its motion by means of the eccentric T, fixed on the shaft I, revolving within its head M² and operating the upper jaw E by means of the toggles or thrust-plates N and O, taking their abutment on the thrust-wedge P and against a die Q in the back of the jaw E, as shown in Fig. 3. The link R is an extension of the link M' and receives its motion from it through pin S², which is transmitted through pin S' to lever F², cast on or attached to back of jaw F. It will be seen that the downward movement of the link M' produces a forward or crushing movement of the jaw E, and the upward movement of the same, by reason of the link R, produces a forward or crushing movement of the jaw F, these movements being reciprocal, one movable jaw receding from stationary jaw L while the other is making a forward crushing movement, and all working strains in the machine of whatever

kind are thus divided and more equally distributed on the eccentric-shaft I, falling on each half-revolution thereof, and as nearly continuous as the action of the reciprocating jaws E and F will permit. The position of the upper jaw E is governed by the adjustable wedge U, acting against the thrust-wedge P, being moved up or down by the screw-bolt V, as the nature of the work may require or to compensate for wear of the crushing-faces. The jaw F can also be adjusted by means of the bearings W, one bearing being in each side of the main frame A, and can be moved forward or back in the slot X by changing the filling in plates Y to the back or front of the bearings W, as the wear on the face of the jaw F or the fineness of the material to be crushed may demand. The bearings W are made in two parts, the lower or cap-piece *c*, as well as the bearing W itself, being held firmly against the abutment at *v* by means of the spring *e*, the plate *m*, and set-screw *n*, as shown in Fig. 3, the jaw F being held on the shaft or pin H by set-screws *s*, so the latter will turn in the bearings W, the object being to take up all lost motion and prevent noise or pounding in the bearings W due to wear, which can be done by adjusting the tension of the spring *e* with the set-screw *n*, thus forcing the cap-piece *c* against the shaft H and holding it firmly in bearing W. To the rear of the upper jaw E, I attach a rod Z, passing through a spiral spring *a*, the latter causing an elastic tension against the toggles N and O and pulling back the jaw E after each forward movement in the usual manner. To the rear end of the lever or jaw F², I attach a similar rod *o*, also strained by a spring *r* and having the double function of preventing lost motion in the bearings of the pins S' and S² of the link R and of pulling back the jaw F after each forward movement.

Having thus explained the nature and objects of my invention and the manner of applying and constructing the same, what I claim as new, and desire to secure by Letters Patent, is—

1. In a crushing-machine, the combination of the stationary jaw, the upper movable jaw, which is fulcrumed above its crushing-face, the lower movable jaw, which is fulcrumed below its crushing-face, the actuating-shaft eccentric thereon, a pitman which receives its motion from said eccentric, a connecting-toggle between the pitman and the upper jaw, a link pivoted to the lower end of the pitman, and an extension or lever upon the lower jaw, to the end of which extension the lower end of the said link is pivoted, substantially as described.

2. In a stone and ore crushing machine with two jaws E and F, the eccentric T, fixed to driving-shaft I, and the link or pitman M', actuated by said eccentric and transmitting its motion through toggles or thrust-plates N and O to the upper movable jaw E, pivoted

above its crushing-face, in combination with the extension-link R, transmitting its motion through lever F² to the lower jaw F, pivoted below its crushing-face, so as to produce alternate and approximately continuous crushing movement of jaws E and F and divide the strains upon eccentric-shaft, together with the abutment or end member C, substantially in the manner and for the purposes specified.

3. In a crushing-machine, the combination, with the stationary jaw, of a jaw having a rearward lever or extension, a spring-rod arranged to act as a tension device on the rear end of the said lever, the actuating-shaft, an eccentric thereon, a pitman operated by said eccentric, and a link pivoted to said pitman and to the lever on the jaw, substantially as described.

4. In a stone and ore crushing machine, the jaw F, pivoted below its crushing-face, with the fulcrum or pivot pin H, in combination with the bearing W, in which pin H rests, the cap-piece *c*, the spring *e*, the plate *m*, set-screw *n*, and the movable plates Y, substantially as herein described.

5. In a stone and ore crushing machine, the combination of the stationary jaw L, the movable jaws E and F, one being fulcrumed or pivoted above its crushing-face and the other placed beneath it and pivoted or fulcrumed below its crushing-face, so that the material will fall from the upper edge E to the lower edge F, the drive-shaft I, eccentric T thereon, link M', actuated by said eccentric, toggles N and O, said toggle N being situated between the pitman M' and the jaw F and said toggle O being situated between the pitman M' and the wedge P, the end abutment C, the link R, pivoted to pitman M' and to the extension F² on the rear side of the jaw F, the spring-rod Z, connected to the jaw E, and the spring *o*, acting upon the jaw F, substantially as described.

6. In a stone and ore crushing machine, the combination of the main frame having the side members and the end members, the stationary jaw L, the movable jaws E and F, said jaw F having a rearward extension F², the shaft I, eccentric T thereon, pitman M', driven by said eccentric, toggles N and O, the adjustable wedge U, acting against the thrust-wedge P, which is adjusted up or down by the screw-bolt V, and the link R, pivoted to the lower end of the pitman M' and also to the extension F², substantially as described.

7. In a stone and ore crushing machine, the combination of the main frame having the side members A and the end members B and C, the stationary jaw L, the movable jaws E and F, located opposite thereto, the drive-shaft with an eccentric thereon, and the pitman operated by said eccentric, the toggles N and O, said toggle N being located between the pitman and the jaw E and said toggle O being located between the pitman and the wedge P, adjustable wedge U, the screw-bolt V, upon

which the wedge P is adjusted up or down, the link R, connecting the pitman M' with the lever F² on the rear of jaw F, the spring-rod Z, connecting with the movable jaw E, and the spring-rod o, connecting with the extension F² on jaw F, all substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

EDGAR H. BOOTH.

Witnesses:

ALFRED A. ENQUIST,
W. A. ALLEN.