(No Model.) 5 Sheets—Sheet 1.

U. CUMMINGS.

ORE CRUSHER.

No. 498,424. Patented May 30, 1893.

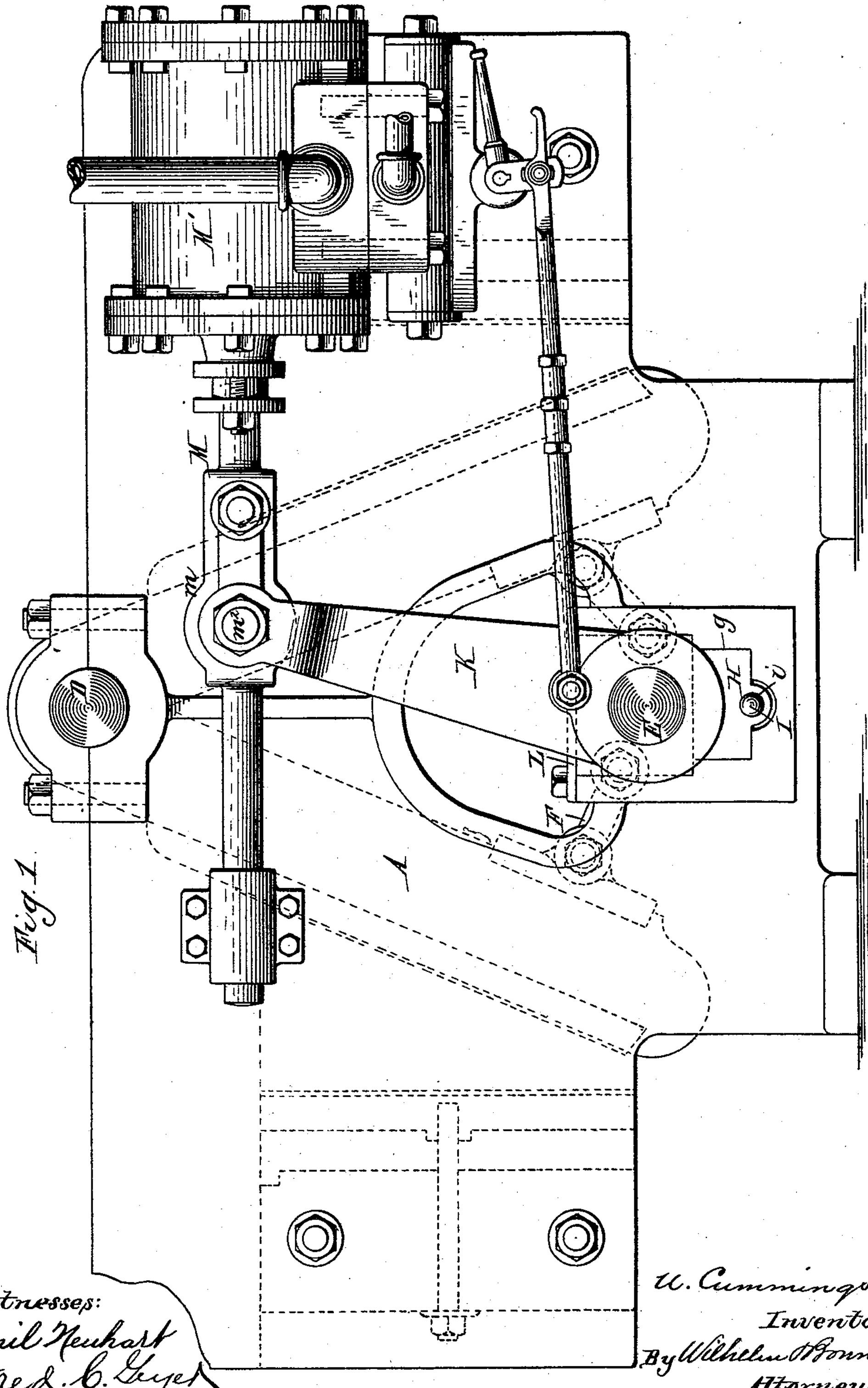

Fig. 1

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Attorneys.

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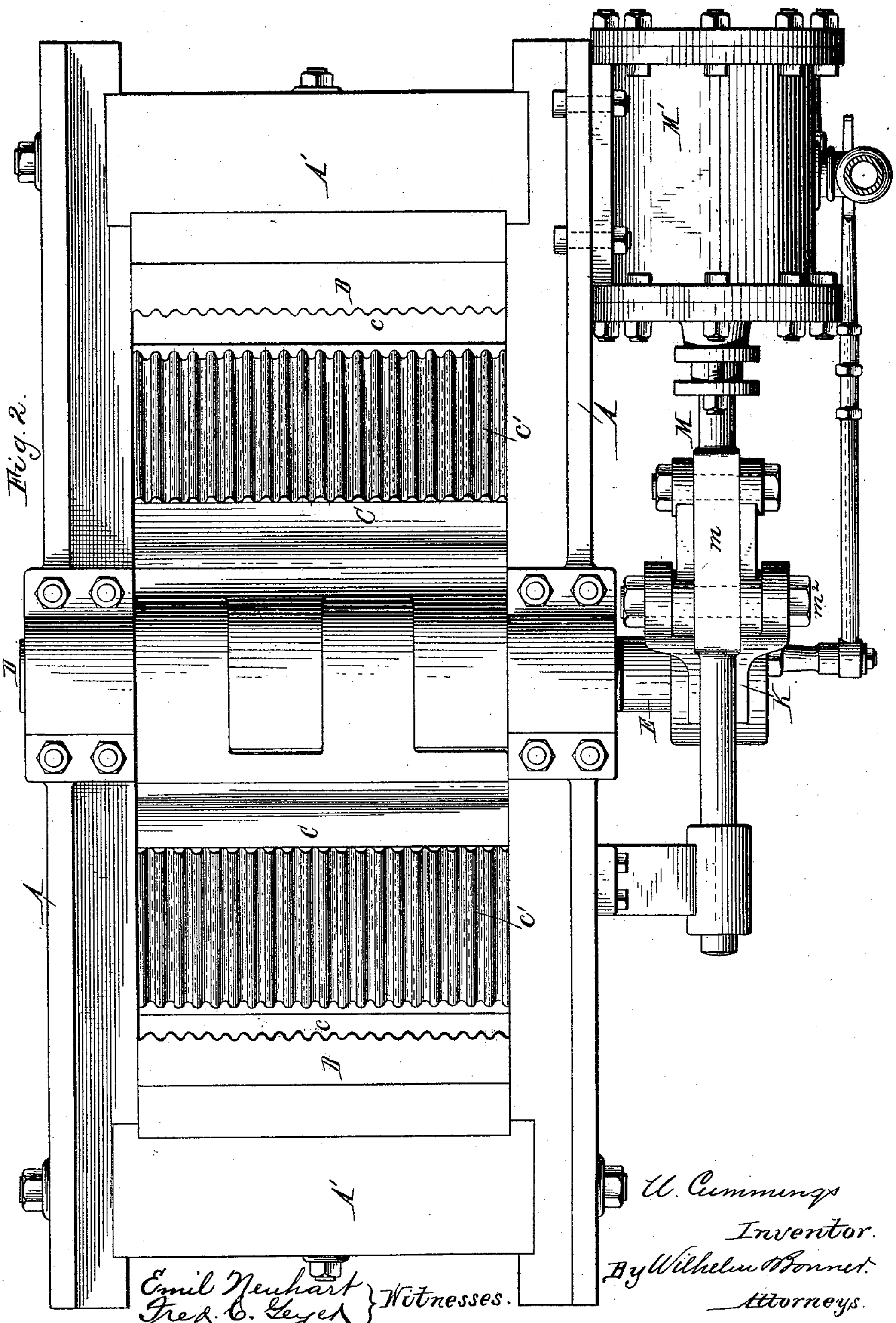
Fig. 2.



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} Witnesses.

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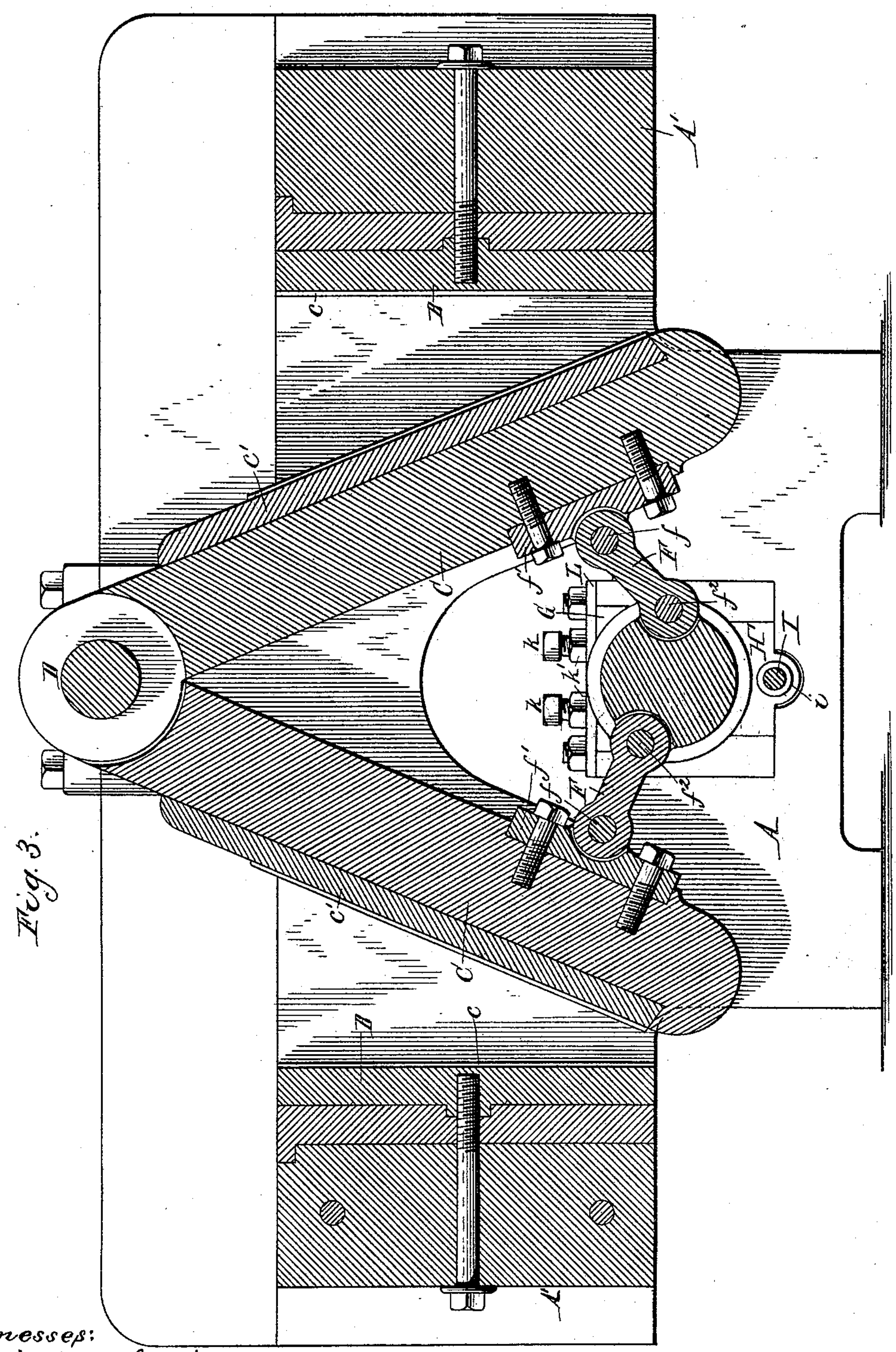

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(No Model.)

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Fig. 5.

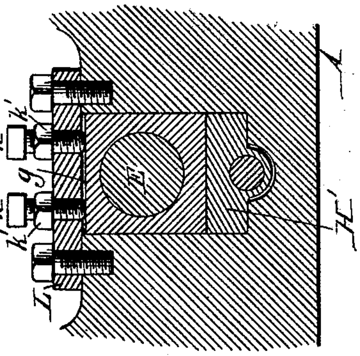
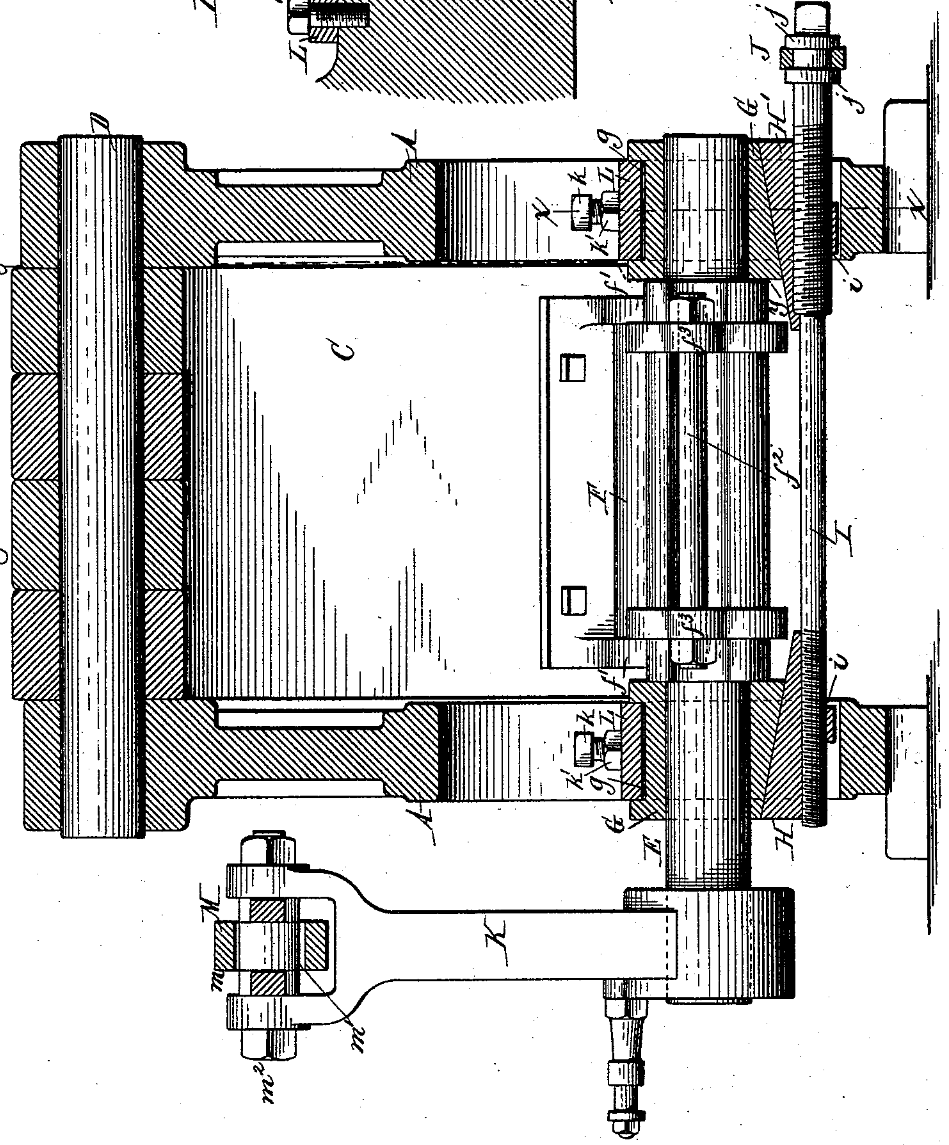


Fig. 4.



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No. 498,424. Patented May 30, 1893.

Fig. 6.

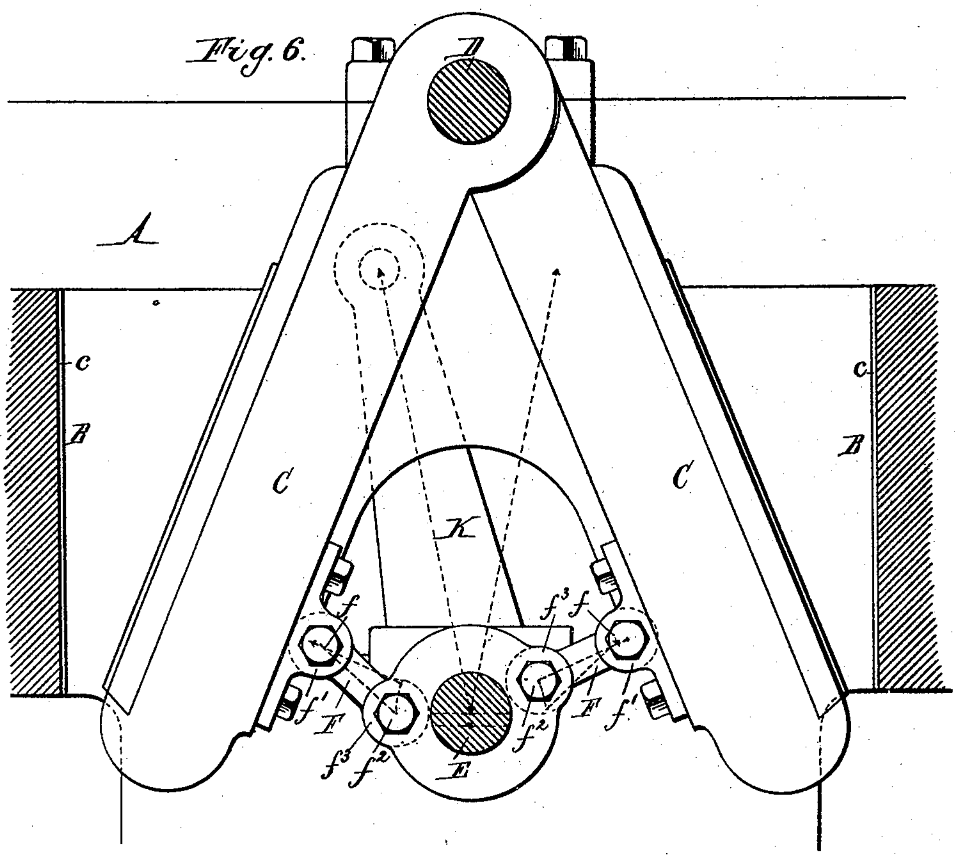
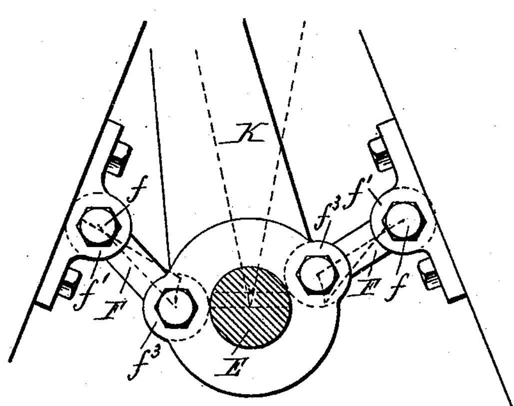


Fig. 7.



Witnesses:
Emil Neuhart
Fred. C. Geyer

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UNITED STATES PATENT OFFICE.

URIAH CUMMINGS, OF NEW HAVEN, CONNECTICUT.

ORE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 498,424, dated May 30, 1893.

Application filed August 8, 1892. Serial No. 442,456. (No model.)

To all whom it may concern:

Be it known that I, URIAH CUMMINGS, a citizen of the United States, residing at New Haven, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Ore-Crushers, of which the following is a specification.

This invention relates to that class of ore crushers in which the ore or other material is crushed between two upright convergent jaws, one of which is stationary while the other vibrates toward and from the stationary jaw, and more especially to such machines in which the stroke of the jaw can be increased or diminished.

The object of my invention is to provide a simple adjusting device whereby the stroke of the movable jaw can be conveniently regulated with reference to the character of the material which is to be crushed, so as to obtain the full capacity of the machine whether operating upon hard or soft material.

In the accompanying drawings consisting of five sheets:—Figure 1 is a side elevation of my improved ore crusher. Fig. 2 is a top plan view thereof. Fig. 3 is a longitudinal vertical section of the machine. Fig. 4 is a vertical cross section of the machine, partly in elevation. Fig. 5 is a cross section of one of the bearings of the adjustable rock-shaft, in line x—x, Fig. 4. Fig. 6 is a fragmentary longitudinal section of the machine in line y—y, Fig. 4. Fig. 7 is a similar view, showing the relative position of the parts when the rock-shaft is depressed below the position shown in Fig. 6.

Like letters of reference refer to like parts in the several figures.

In the drawings, my improvements are shown in connection with a double machine having two stationary jaws and two vibrating jaws, but they are equally applicable to a machine having but a single pair of jaws.

A represents the upright stationary side frames of the machine which are connected at their ends by cross-pieces A′.

B B are the stationary jaws secured to the inner sides of the cross-pieces A′, and C C the vibrating jaws facing the stationary jaws and pivoted at their upper ends upon a transverse shaft D which is arranged midway between the stationary jaws B and mounted in bearings secured to the upper portions of the side frames A. The movable jaws vibrate independently of each other and each jaw is provided at its upper end with perforated knuckles through which the shaft D passes. The stationary jaws are provided with the usual upright corrugations c, and the movable jaws with corrugated wear plates c'.

E is a transverse rock-shaft which is arranged directly underneath the pivot shaft of the movable jaws and from which the latter are vibrated by links F. The outer ends of these links are pivoted to the movable jaws by transverse bolts f passing through perforated lugs f' secured to the rear sides of the jaws near their lower ends, while the inner ends of the links are pivoted by similar bolts f^2 to lugs or ears f^3 arranged on opposite sides of the rock-shaft E. This rock shaft is journaled in vertically adjustable bearing-boxes G which are guided in upright slots g formed in the side frames of the machine and which rest upon wedges H H′ arranged to slide transversely in the lower portions of the slots g. The wedges H H′ are shifted simultaneously in opposite directions by an adjusting screw I having right and left hand screw threads which engage respectively with the correspondingly threaded openings i arranged in the lower sides of the wedges lengthwise thereof. The adjusting screw I is free to turn in either direction, but is held against lengthwise movement by a stationary bearing J which embraces the outer portion of the screw between two collars j formed on the screw. The screw is made square or flat-sided at one end so that it can be turned by a lever or wrench.

k are adjustable stops or clamping screws bearing against the upper sides of the bearing boxes of the rock-shaft and whereby the shaft is held against upward displacement. These clamping screws are arranged in threaded openings formed in horizontal plates L which are secured to the stationary frame and extend across the upper ends of the ways in which the bearings of the rock-shaft slide, as shown in Fig. 5. The clamping screws are provided with jamb-nuts k'. The rock-shaft E is actuated by means of a rock-arm K secured to one end thereof and to which motion is imparted in any desired manner. In the construction shown in the drawings, the upper free end of the rock-arm is connected directly to the piston rod M of an actuating cylinder M′ which is mounted upon the frame of the machine. The piston rod is formed with an enlargement m in which is formed a vertical slot m', as shown in Fig. 4, and the rock arm is bifurcated at its upper end and attached to the piston rod by a transverse bolt m^2 passing through its jaws and the slot of the piston rod. The slot m' permits the requisite vertical play of the rock arm on the piston rod in raising and lowering the rock shaft.

The rocking motion of the shaft E produces, through the medium of the links F, a vibrating motion of the movable jaws toward and from the stationary jaws, one of the jaws being moved forward while the other is moved backward.

The length of the stroke of either of the movable jaws depends upon the angle which its actuating link assumes with reference to the jaw when the latter is at the end of its backward stroke, the length of the stroke of the jaw being greater the more obtuse the angle of its link in relation to the jaw, when the latter is at the end of its backward stroke. It will thus be seen that by raising or lowering the rock shaft E, this relative angle of the links is changed and the length of the stroke of the jaws varied accordingly. This vertical adjustment of the shaft is effected by loosening the clamping screws of the bearing-boxes, turning the adjusting screw in the proper direction and then again tightening said clamping screws. The stroke of the movable jaws can, by this means, be nicely regulated in accordance with the toughness and hardness of the material under treatment, thus enabling the full capacity of the machine to be utilized in crushing comparatively soft material as well as hard material, the stroke being increased for soft material and reduced for hard material.

As the link of each movable jaw is pivoted at one end to the jaw, and at its opposite end to the rock shaft, it moves the jaw positively in both directions, thus dispensing with the spring which has been heretofore employed in ore crushers of this class for retracting the movable jaw.

I claim as my invention—

1. The combination with the stationary frame, a stationary jaw and a vibrating jaw, of an actuating shaft capable of adjustment toward and from the pivot of the vibrating jaw, and a connection whereby the vibrating jaw is operated from said actuating shaft, substantially as set forth.

2. The combination with the stationary frame, a stationary jaw and a vibrating jaw, of a rock shaft movable toward and from the pivot of the vibrating jaw, an adjusting device whereby the rock shaft is shifted, and a link connecting the vibrating jaw with the rock shaft, substantially as set forth.

3. The combination with the stationary frame, a stationary jaw and a vibrating jaw, of an actuating shaft capable of movement toward and from the pivot of the vibrating jaw, a wedge whereby the actuating shaft is adjusted, and a connection whereby the vibrating jaw is operated from said actuating shaft, substantially as set forth.

4. The combination with the stationary frame, a stationary jaw, and a vibrating jaw, of a rock shaft mounted in vertically movable bearings, wedges whereby said bearings are shifted, an adjusting screw whereby said wedges are simultaneously moved, and a link whereby the vibrating jaw is vibrated from the rock shaft, substantially as set forth.

5. The combination with the stationary frame, a stationary jaw and a vibrating jaw, of a rock shaft mounted in vertically movable bearings, wedges whereby said bearings are shifted, an adjusting screw whereby said wedges are simultaneously moved, a clamping device whereby said bearings are held against upward displacement, and a link connecting the vibrating jaw with said rock shaft, substantially as set forth.

Witness my hand this 4th day of August, 1892.

URIAH CUMMINGS.

Witnesses:
FRED. C. EARLE,
H. E. COLE.