

(No Model.)

L. C. SPRINGER.

ORE CRUSHER.

No. 260,796.

Patented July 11, 1882.

Fig. 1.

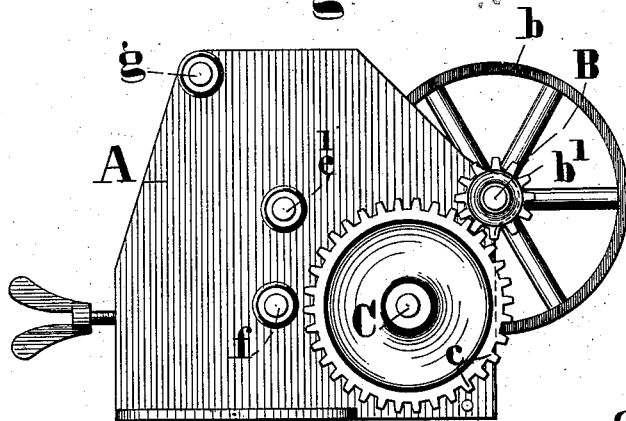


Fig. 2.

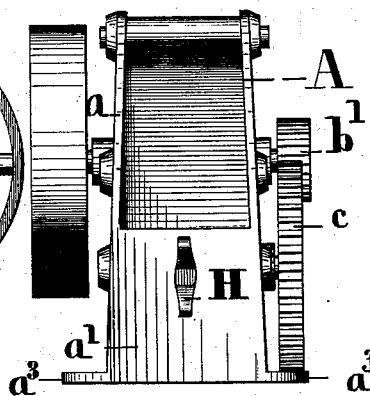


Fig. 3.

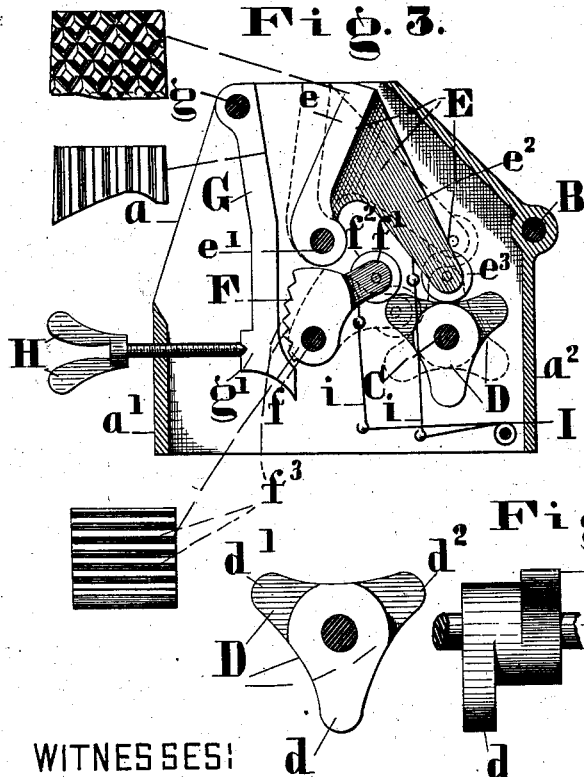


Fig. 4.

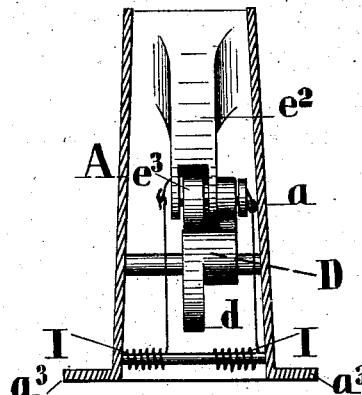
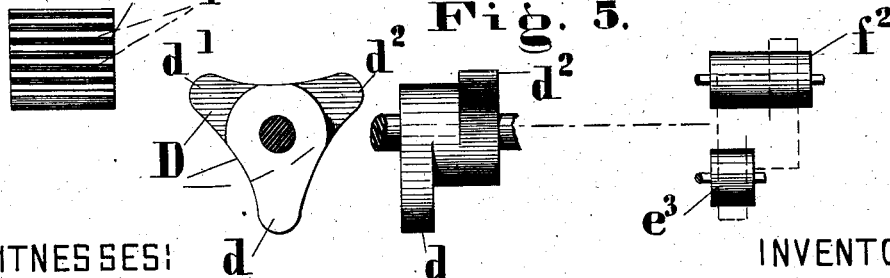


Fig. 5.



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# UNITED STATES PATENT OFFICE.

LEWIS C. SPRINGER, OF WILMINGTON, DELAWARE, ASSIGNOR OF ONE-HALF TO V. C. WALKER AND R. T. ELLIOTT, BOTH OF SAME PLACE.

## ORE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 260,796, dated July 11, 1882.

Application filed April 14, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS C. SPRINGER, of Wilmington, county of New Castle, and State of Delaware, have invented new and useful Improvements in Ore-Crushers; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates to that class of machines which are employed for crushing or breaking stones and similar substances; and it consists mainly in the combination of a fixed jaw with a main crusher-jaw adapted to receive one oscillation in the revolution of the main shaft, and an auxiliary crusher-jaw adapted to receive several oscillations in the same period of time.

It consists, further, in certain details of construction which, in connection with the foregoing, will be fully described hereinafter.

In the drawings, Figure 1 represents a side view of my improved stone-breaking machine; Fig. 2, an end view of the same; Fig. 3, a longitudinal vertical section; Fig. 4, a transverse vertical section, and Fig. 5 detail views of various parts detached.

To enable others skilled in the art to make my improved machine and properly use the same, I will proceed to describe fully its construction and manner of operation.

A  $a$  represent the side plates of the machine, and  $a'$   $a^2$  the end plates of the same.

$a^3$   $a^3$  represent base-flanges upon the side plates, by means of which the machine is properly secured to any suitable foundation. These fixed parts, it will be observed, furnish a proper support for the many parts hereinafter referred to.

B represents the main shaft, held by proper bearings at one corner of the machine, as shown in Figs. 1 and 3, which is provided at one end with the pulley  $b$  for receiving motion from any suitable source of power, and at the other with the pinion  $b'$ , as shown.

C represents a shaft, held by proper bearings in the side plates, which is provided at one end with a gear-wheel,  $c$ , adapted to engage with the pinion  $b'$  of the shaft B, as shown in Fig. 1.

D, Figs. 3, 4, and 5, represents a cam located on this shaft, within the case, which is provided

with the arm  $d$ , located in one vertical plane, and the arms  $d'$   $d^2$ , located in another vertical plane, as shown in Fig. 5. These arms, however, are all of the same length.

E represents the main movable crusher-jaw, consisting of the heavy metal block or plate  $e$ , having the pivot-shaft  $e'$ , held in proper bearings in the side plates, and the triangular arm or projection  $e^2$ , provided with a friction-roller,  $e^3$ , as shown in Figs. 3 and 4. The face of the jaw E is provided with serrations, as shown in Fig. 3, of any proper form and size. The arm  $e^2$  and its friction-roller, it will be observed in Fig. 4, are located in the same vertical plane as the arm  $d$  of the cam D.

F represents an auxiliary movable jaw consisting of a heavy metal block having the pivot-shaft  $f$ , held in proper bearings in the side plates, and the arm or projection  $f'$ , provided with the friction-roller  $f^2$ , as shown. The arm of the jaw, with its friction-roller, equals in breadth the extent of the cam D, with all its arms, and it is located in the same vertical plane. The face of this jaw is provided with transverse ribs  $f^3$ , as shown in Fig. 3.

G represents what may for convenience be termed the "fixed crusher-jaw," consisting of a plate slightly bent near its center, which is united at its upper end to the side plates of the machine by the pivot-shaft  $g$ , and is provided below with a bearing,  $g'$ , adapted to take the end of the set-screw H, by means of which latter it is adjusted and held in any desired position. The face of this jaw also is provided with serrations of any proper form and size.

I I represent springs united by proper rods,  $i$   $i$ , to the movable jaws for the purpose of insuring the positive contact of their friction-rollers with the cam at all times. In a large machine these springs may be dispensed with, as the parts themselves have sufficient weight to insure contact.

If desired, the fixed and movable crusher-jaws may be provided with removable face-plates formed of chilled iron, so that provision may be made for change when these parts become worn. If desired, also, two pulleys, two pinions, and two gear-wheels may be employed instead of one, as shown, for the purpose of adapting the machine for very heavy work.

The operation is substantially as follows:

The fixed crusher-jaw having been adjusted at its lower end, by means of the set-screw H, nearer to or more remote from the movable crusher-jaw F, according as it may be desired to crush the material under treatment more or less fine, and movement having been communicated to the main shaft, the phosphate, rock, plaster, limestone, or other substances to be reduced are introduced in proper quantities into the hopper formed between the fixed and movable jaws. By the reciprocation of the main jaw the substance under treatment is reduced from the size possessed when introduced to a size small enough to pass the opening between the fixed jaw and the lower end of the main movable jaw. After passing this point it is subjected to the action of the auxiliary crusher-jaw, and is further reduced until it escapes from the opening between the fixed jaw and the lower end of the auxiliary jaw. The auxiliary crusher-jaw, owing to its peculiar form and the location of its pivot-point, has an eccentric action, its curved face being caused to swing downward over the curved face of the fixed jaw, and also move at the same time in a lateral direction. It follows from this that the material subjected to its action is both ground and crushed. The auxiliary crusher-jaw also, it will be understood, owing to the breadth of its arm and friction-roller, is acted upon by all the arms of the cam D, while the arm of the main crusher-jaw is acted upon by only one arm of the cam—that is, the arm *d*. From this it follows that it moves three times during the period that the main crusher moves once—that is, during one revolution of the main shaft—and in consequence of this excess of movement it is adapted to dispose of the large volume of material delivered to it by the main crusher without jamming or clogging.

Several important advantages result from the special construction described. The material treated is reduced to any desired degree of fineness with great rapidity without danger of clogging or jamming. By means of the more rapid action of the auxiliary crusher the large volume of material received from the main crusher is properly taken care of, and by means of the eccentric action of the auxiliary crusher the material acted upon is both crushed and ground.

The construction described is very simple for the purpose contemplated.

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

1. The combination, with a fixed jaw, a main movable crusher-jaw, and mechanism, substantially as described, for giving it one oscillation in the revolution of the main shaft, of an auxiliary movable crusher-jaw, and mechanism, substantially as described, for giving it several oscillations in the same period of time.

2. The combination, with the fixed jaw G and the movable jaws E and F, of the cam D, substantially as described, adapted to give to one of the movable jaws a more rapid movement than the other.

3. The machine described, consisting essentially of the fixed jaw G, means for adjustment, H, the movable jaws E and F, and the oscillating cam D, common to both said jaws, all constructed and arranged substantially as described.

This specification signed and witnessed this 29th day of March, 1882.

LEWIS C. SPRINGER.

Witnesses:

V. C. WALKER,  
R. T. ELLIOTT.