(No Model.) 2 Sheets—Sheet 1.

J. SPIERS & E. H. BOOTH.

ROCK BREAKER.

No. 419,294. Patented Jan. 14, 1890.

Fig. 1.

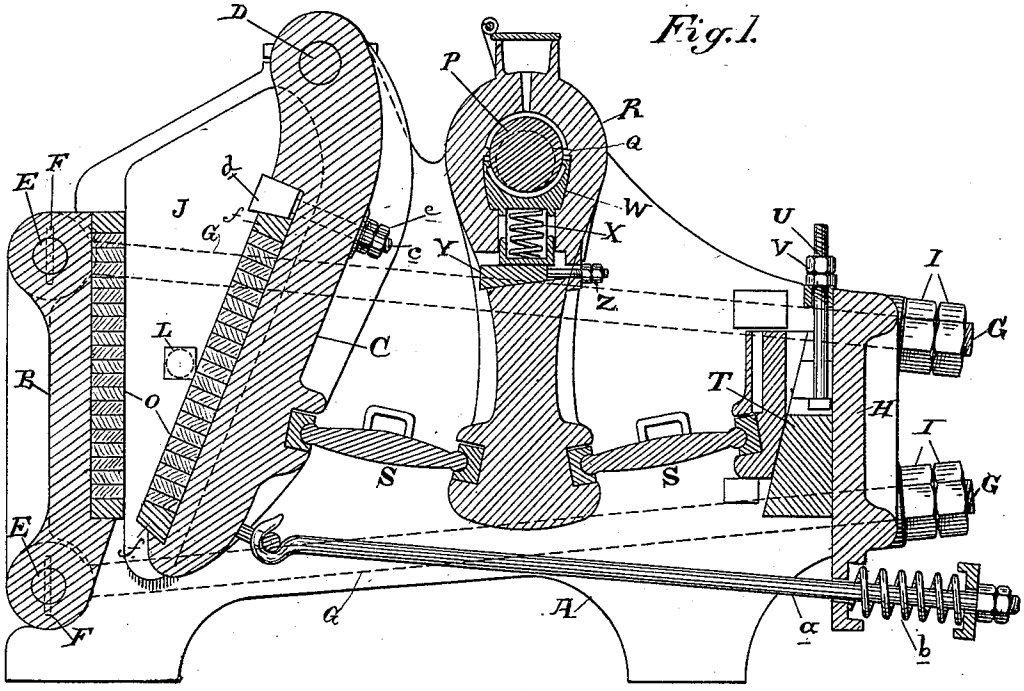
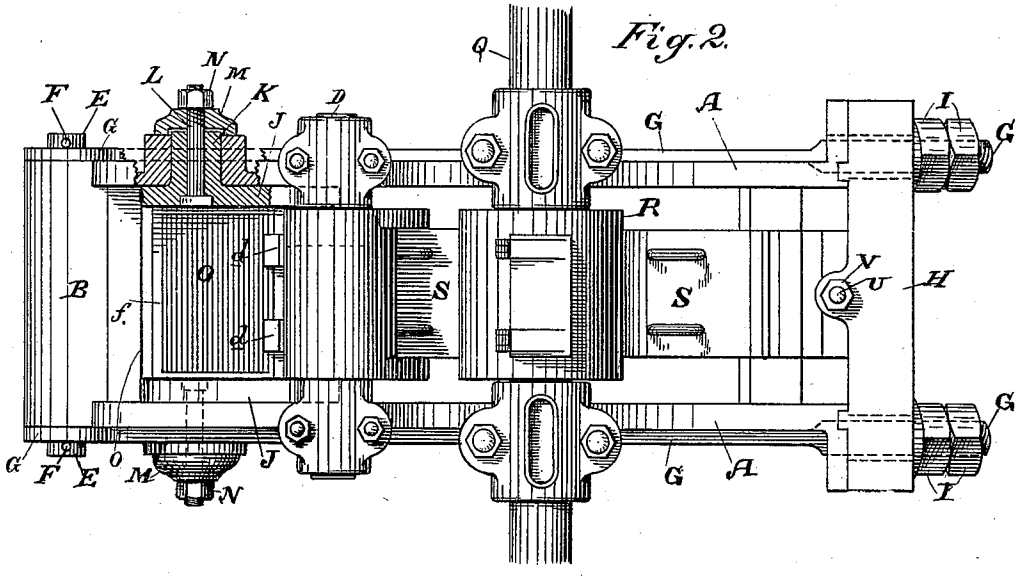


Fig. 2.



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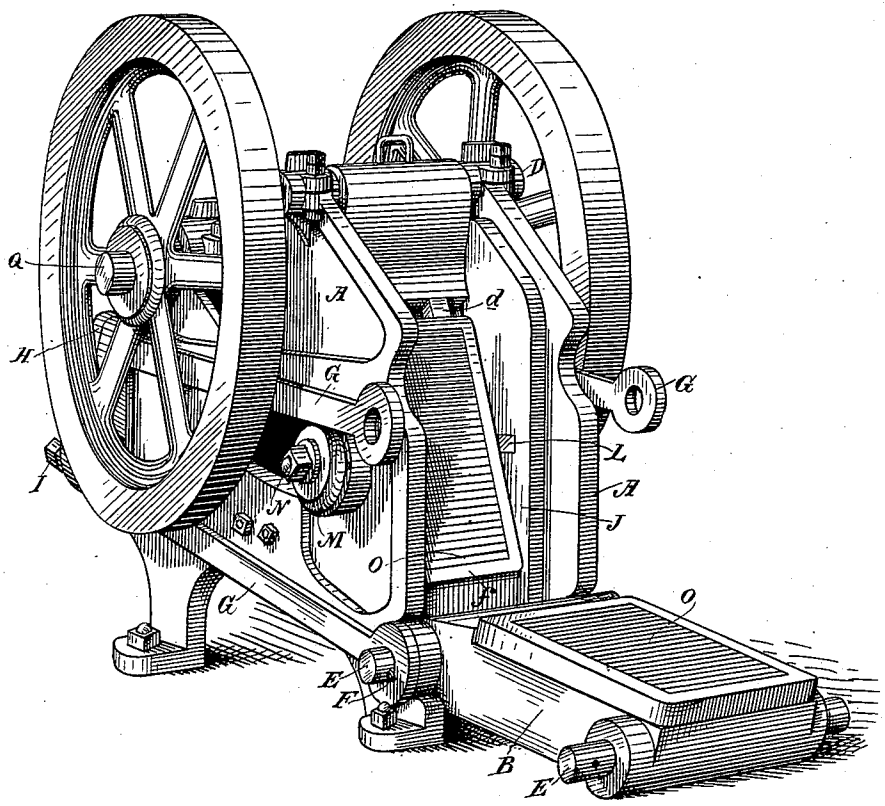
(No Model.) 2 Sheets—Sheet 2.

J. SPIERS & E. H. BOOTH.

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Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES SPIERS AND EDGAR H. BOOTH, OF SAN FRANCISCO, CALIFORNIA.

ROCK-BREAKER.

SPECIFICATION forming part of Letters Patent No. 419,294, dated January 14, 1890.

Application filed September 27, 1889. Serial No. 325,277. (No model.)

To all whom it may concern:

Be it known that we, JAMES SPIERS, a citizen of the United States, residing in the city and county of San Francisco, State of California, and EDGAR H. BOOTH, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Rock-Breakers; and we hereby declare the following to be a full, clear, and exact description of the same.

Our improvement is in that class of apparatus which is employed for crushing rock and other hard mineral substances.

It consists in certain details of construction, which will be more fully pointed out in the claims, and explained by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of the apparatus. Fig. 2 is a plan view, partly in section. Fig. 3 is a perspective view showing the stationary jaw turned down.

A A are the sides of the machine, between which are supported the stationary jaw B and the movable jaw C of the rock-breaker. The movable jaw is fulcrumed in the upper part of the frame by means of a stout pin or shaft D, which extends through from side to side, and is supported by the frames A, the jaw standing at an inclination, as shown. Opposed to this movable jaw is the stationary jaw B, which is shown approximately vertical in position. This jaw is held in place between the sides by pins or shafts E at both top and bottom. These shafts pass through the ends of the stout bars or rods G, which extend along each side of the machine and have holes made through their ends opposite the edges of the jaw B, through which the shafts E pass. The rods G at this end of the machine are held in place by means of the short pins or cotters F, passing through the ends of the shafts E outside of the rods G. At the opposite end or rear of the machine these rods or bars G pass through the end plate H, and are adjusted by nuts I, so as to hold the jaw B in place. Whenever it is necessary to obtain access to the inner face of the jaw, it is done by simply removing the cotters F from the upper shaft and slipping the ends of the rods G off of the shafts, thus allowing the jaw to turn about its lower shaft and lie down flat, with the inner face exposed.

In order to protect the side frames A from wear due to the rock passing through, we have shown the cheek or wearing plates J, having hubs K, which pass through the corresponding bosses or enlargements in the sides A. Short bolts or shafts L pass through these hubs for the purpose of holding the plates J securely in place, and are fastened by washers M and nuts N upon the outer end. These hubs K serve as pivot-points, being set approximately midway between the top and bottom of the jaws, and they allow the plates J a certain amount of movement about them to accommodate the meeting edges of the plates and the die O, which is carried upon the jaw B.

The nuts I when tightened bring the edges of the die O and the plates J firmly together, thus securing the die firmly in place upon the jaw B, as well as binding the entire machine strongly together and causing the wrought-iron rods or bars G to take the entire tensile strain due to the introduction of rock or other substance between the dies O.

The movable jaw C is actuated by means of an eccentric P, fixed upon the driving-shaft Q and rotating within the head of the driver R. This driver extends vertically downward between the crushing-jaw C and the rear end plate H of the machine, and the toggle or thrust plates S extend beneath its lower head and the lower part of the jaw C on one side and between the same head and the adjusting-wedges T, which abut against the end plate H, upon the opposite side. The jaw C is moved to and from the jaw B to regulate the size of the discharge-opening between the lower ends of the jaws by means of the adjusting-screw U, connected with the wedge T, and the nuts V, by which it is moved.

Within the head R is the gib W, against which the eccentric P acts, and which forms the oscillating bearing for it. As this becomes worn there will be a tendency of the moving parts to pound and make a disagreeable noise, as well as become worn very rapidly. In order to hold the gib in contact with the eccentric as it revolves, we have shown a spring X, fixed in a chamber below the gib W, and a

key or wedge Y, with its screw and the nut Z, by which to move it. This key acts against the containing-case of the spring and presses it up, so as to increase the tension of the spring and its pressure against the gib W. The lower part of the swinging jaw C is drawn back after each thrust by means of the rods *a* upon each side and the springs *b*, which act upon the rod *a*, and as the latter is connected with the lower part of the jaw C it is retracted after each impulse of the thrust, which forces it forward in the usual manner of this class of machines.

Upon the faces of the jaws B and C are placed the dies O, which are fitted upon these jaws so as to come opposite to each other. The die O carried upon the face of the jaw B is secured and held in place by bars G and plates J, as has been described. The die O upon the movable jaw C is held in place by means of two bolts *c*, having wedge-shaped heads *d*, forcing the die O down and holding it firmly into a recess at bottom of jaw C, made to receive it. These dies O are formed of wrought-iron bands *f*, inclosing alternate horizontal layers of wrought-iron and steel bars placed edgewise. These alternate layers of wrought-iron and steel bars are firmly held in place by the band *f* being heated and shrunk around them, or by wedges driven between the bars or between the bars and band or by being forced into the band by hydraulic pressure. The steel bars are hardened, and the wear being greater upon the wrought-iron bars than upon the steel bars the latter will be slightly elevated above the surface of the wrought-iron, forming a corrugated surface and producing a better crushing effect. The wrought-iron and steel bars, being set upon edge, present the grain of the metal to the substance to be crushed in a manner calculated to insure long wear.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a rock-breaker having the stationary and movable jaws, the plates pivoted midway between the top and bottom of said jaws upon the inner side of the main frame and having their front edges abutting against the stationary jaw, substantially as herein described.

2. In a rock-breaker having stationary and movable jaws, the plates J, pivoted within the sides A of the machine, and the pins or shafts about which they adjust themselves, one edge of said plates abutting against the edges of the die or stationary jaw and the other extending upon each side of the movable jaw, substantially as herein described.

3. In a rock-breaker, the movable oscillating jaw and the stationary jaw having the horizontal projecting pins at the top and bottom of each of its sides, in combination with the rods G, having their ends perforated to receive the pins of the stationary jaw and the opposite ends passing through the opposite end plate of the machine, the nuts I, and the pins F, by which the rods are removably held on the pins, substantially as herein described.

4. In a rock-breaker, the stationary and movable jaws, the eccentric mounted upon the main shaft, and the vertically-movable pitman actuated by said eccentric and having the knee-levers or thrust-plates by which motion is transmitted from the pitman of the movable jaw, in combination with the gib fitting within the head of the pitman and receiving the thrust of the eccentric, the spring X, and the adjusting-key Y, substantially as herein described.

5. In a rock-breaker, the stationary and movable jaws having the removable crushing-dies composed of alternate bars or ribs of wrought-iron and steel extending horizontally across the face of said dies, and a wrought-iron or steel band inclosing said bars or ribs, substantially as herein described.

6. In a rock-breaker, the stationary jaw having its upper and lower ends supported by pivot-pins extending horizontally through the ends of the side rods G, which extend through the rear end plate of the machine, nuts by which the length of said rods is regulated, and removable pins or cotters, whereby the opposite ends of said rods are retained upon the projecting pins of the stationary jaw, substantially as herein described.

In witness whereof we have hereunto set our hands.

JAMES SPIERS.
EDGAR H. BOOTH.

Witnesses:
S. H. NOURSE,
H. C. LEE.