



# UNITED STATES PATENT OFFICE.

DAVID DICK, OF MEADVILLE, PENNSYLVANIA.

## IMPROVEMENT IN ROCK AND ORE CRUSHERS.

Specification forming part of Letters Patent No. 41,518, dated October 4, 1864.

*To all whom it may concern:*

Be it known that I, DAVID DICK, of Meadville, in the county of Crawford and State of Pennsylvania, have invented a new and Improved Machine for Crushing Ore and Rock; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a view in perspective of my crusher. Fig. 2 is a plan view thereof. Fig. 3 is a vertical central section of the eccentrics, rollers, jaws, springs, and end plates of the frames. Fig. 4 is a vertical section through one pair of eccentrics and one of the rollers used to give the reciprocating movement to the jaws.

My invention has relation to that class of ore-breaking machines in which a vibrating movement is imparted to the crushing-surface; but in those now known the vibrating surface is hinged either at top or bottom, and necessarily moves in the arc of a circle, which is very objectionable; and, besides, these known machines use but one vibrating crusher to crush the ore against a stationary block, which limits its rapidity of operation, and they also employ a power which makes a large waste in friction.

Now, it is the object of my invention to overcome all these defects in the reciprocating ore-crushers; and to this end my invention consists, first, in the employment of two crushers having a rectilinear reciprocating movement to and from each other, so that the pressure shall be at all times the same over their entire crushing-surface; secondly, in the combination of one or two rectilinear reciprocating crushing-surfaces with anti-friction sectors, and eccentric or cam rollers to impart motion to the crushers.

In Fig. 1 of the accompanying drawings I have given a view in perspective of my crusher, in which four rods, A A A A, pass through the corners of two end plates, B B'. The rods A carry screws on each end, with nuts 1 1 1 1 on the inside of the plates B B', and nuts 2 2 2 2 on the outside of these plates. These rods and plates constitute the frame of the crusher, and must be of a strength proportioned to the work required, and it is obvious that by adjusting the nuts on the screws the end plates

can be adjusted to a truly parallel relation, and at a greater or less distance apart, to regulate the degree of fineness to which the ore shall be reduced.

The crushers C and C' are cast or formed onto sleeves D and D', which slide upon the rods, the latter (D') being divided, as they only act as guides, while the former (D) serve as supports for the jaws or crushers, and permit them the desired reciprocation. The crushers work between two side pieces, E and E', also cast or formed on sleeves e and e', by which they are supported upon the rods A A A A, and are rendered stationary in the proper relation to the jaws to form a feeding-hopper, F, Fig. 2, by the set-screws f and f'. The jaws are dovetailed on their face to receive chilled cast-iron or steel face-plates G G, which are shown corrugated in the drawings, and are removable, and of course when worn or broken can be changed without injury to the jaws.

Cone-shaped sectors M M' M'' M''', terminating in a knife-edge at their apices and in the arc of a circle at their bases, are supported in collars on the inside of the end plates and the outside of the jaws within the frame, and rest at their base upon an anti-friction double eccentric roller, K, so that while the jaws are open the sectors M'' and M''' shall always be depressed and the sectors M and M' shall be elevated and rest upon the narrowest part or smallest diameter of the double eccentric roller K, as shown in the drawings; but when the pressure is to be used the positions of these parts are reversed—that is to say, when the jaws are closed the sectors M and M' are elevated and the sectors M'' and M''' depressed, and the rollers K have their largest diameters between them.

As the roller K is constantly changing its horizontal position, it is obvious that it must have some provision to permit it to have this variable movement, and this I have effected by supporting it at both ends in braces L and L', that are cast or formed with sleeves at each end that fit upon the rods A A A A, and are secured in the desired position by the set-screws l and l', and centrally between the rods. These braces L and L' carry slots N and N', horizontally elongated to the distance required by the movements of the journals of the rollers K.

To keep the eccentrics and roller always in contact by a yielding vibration of the jaws C C', rods U U' are fastened centrally to the bottom of the jaws and pass through the end plates and through springs O O' behind them, and against which nuts p p are firmly secured. I have shown india-rubber springs in the drawings; but it is obvious that springs of other material or form may be used, and that as the springs are compressed by the rods they will always hold the jaws, sectors, and rollers in connection by a yielding pressure.

Motion is imparted to the jaws through a lever, R, made fast to the roller K. This lever may be retracted by hand, or by any suitable attachment to a motive power. When vibrated, the lever will impart the required reciprocating rectilinear motion to the jaws through the crank-arms S S' (upon the roller K) and pitman T, by which the cranks are connected.

It is obvious that where less work is required the pitman may be detached, when one of the jaws will remain at rest, and the other will reciprocate singly when the lever is vibrated.

Among the marked advantages of my improvement, it may be proper to mention that the rollers and sectors work wholly without oil or grease, and thus in this kind of work the moving parts will operate with the minimum quantity of friction and almost without wear.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. The employment, in an ore and stone crushing machine, of two rectilinearly-reciprocating crushers vibrating between adjustable side plates, substantially in the manner and for the purpose set forth.

2. The combination of two rectilinearly-reciprocating crushers with cone-shaped sectors and a double eccentric roller, arranged and operating substantially in the manner and for the purpose set forth.

In testimony whereof I have hereunto subscribed my name.

DAVID DICK.

Witnesses:

JOHN S. HOLLINGSHEAD,  
JOHN D. BLOOR.