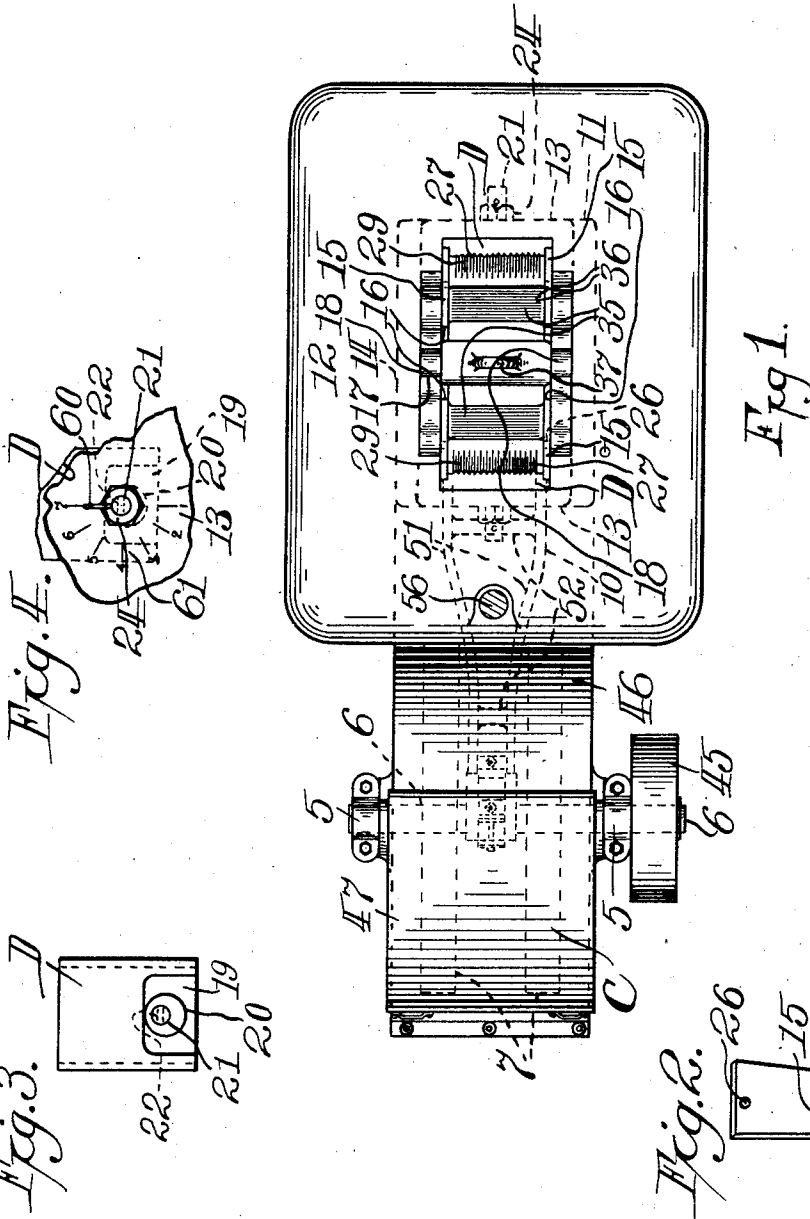


R. M. G. PHILLIPS.  
 ROCK CRUSHER.  
 APPLICATION FILED FEB. 21, 1912.

1,047,835.

Patented Dec. 17, 1912.

2 SHEETS-SHEET 1.



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Fig. 6.

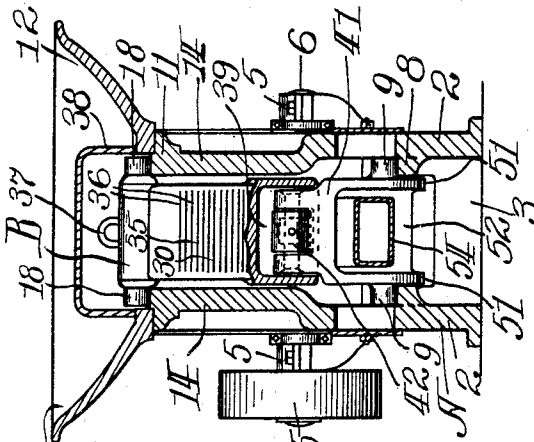
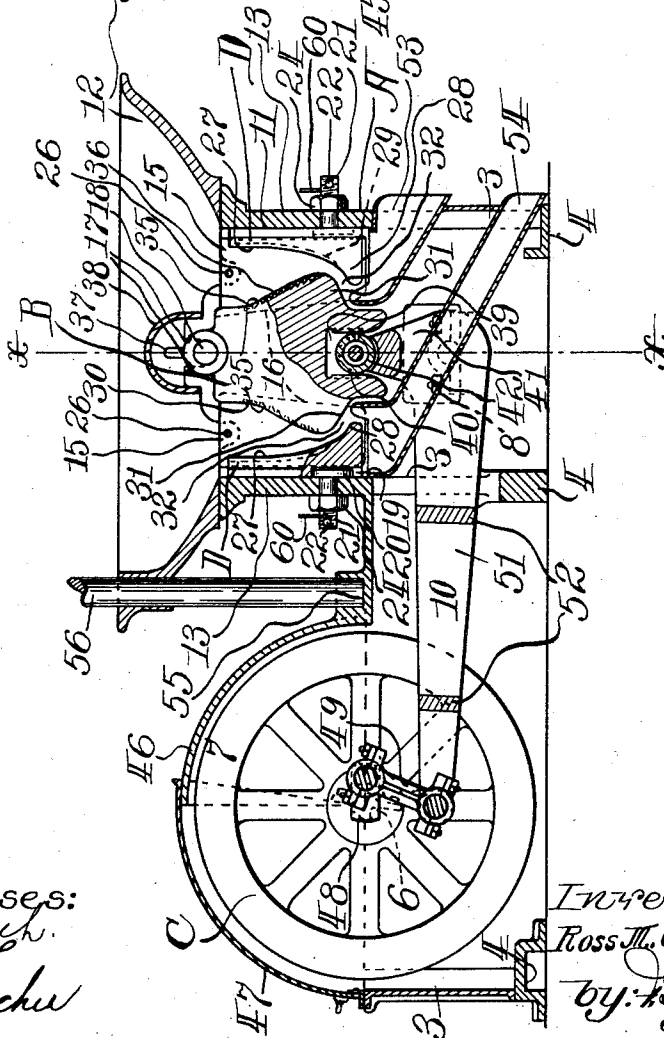


Fig. 5.



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# UNITED STATES PATENT OFFICE.

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## ROCK-CRUSHER.

1,047,835.

Specification of Letters Patent.

Patented Dec. 17, 1912.

Application filed February 21, 1912. Serial No. 679,052.

*To all whom it may concern:*

Be it known that I, ROSS M. G. PHILLIPS, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented a new and useful Improvement in Rock-Crushers, of which the following is a specification.

An object of this invention is to provide a rock crusher of minimum height combined with a most advantageous crushing action and which will permit the use of convenient shapes of crushers.

My invention is particularly directed to the production of a crusher that will crush rock by means of a very slight but powerful movement of the crushing parts, that will permit the ready adjustment of the crushing parts to different sizes of crushed rock and at the same time assure the crusher from breakage when objects having unusual resistance are introduced into the machine.

In the drawings with which I have illustrated my invention and which form a part of this specification, Figure 1 is a plan of my rock crusher, Fig. 2 is a perspective of a cheek plate; Fig. 3 is an elevation of the jaw adjuster and indicator; Fig. 4 is a view of a fixed crusher jaw showing the action of the adjusting mechanism; Fig. 5 is a sectional elevation of the crusher showing the action of the crusher and the power mechanism, and Fig. 6 is a section on the line X—X, Figs. 1 and 4.

In the above drawings I have illustrated a rock crusher having a supporting frame A, a movable crushing part B, a power mechanism C actuating the movable crusher B, and fixed crusher jaws D.

The support A is formed with side walls 2 and cross frames 3 having suitable bearing surfaces 4. The side walls carry the bearing boxes 5 in which the crank shaft 6 carrying fly wheels 7 is journaled and the bearings 8 in which the gudgeons 9 of the operating lever 10 are journaled. The supporting walls are extended upward into a head frame 11 which supports the hopper 12 and the crusher B. The head frame 11 is substantially rectangular in shape having the fixed jaws D resting against opposite walls 13 longitudinally of the machine. Against the opposite walls 14 of the head frame rest cheek plates 15 which lie between shoulders 16 on the walls 14 and the fixed

jaws D holding the latter firmly against the walls 13. At the top of the walls of the head frame 11 are formed open bearings 17 in which are journaled the gudgeons 18 supporting the movable crusher B between the fixed jaws D.

The fixed jaws D are formed with straight rear faces in which are recesses 19 on the middle line of the jaws fitted to receive an eccentric 20 on a stud shaft 21 journaled in each wall 13 of the head frame. Revolution of the eccentric forces the jaw up or permits it to be lowered. The shaft 21 has a hole 22 in its outer end to receive a bar (not shown) to turn the shaft and eccentric. An indicator 60 is connected with the shaft 21 and operates in connection with a dial 61 on the adjacent wall 13 to indicate the position of the adjustable fixed jaw and the size of material being crushed. A nut 24 is threaded on the shaft and adapted to be screwed against the wall 13 to fix the shaft 21 and jaw D in adjusted position. The cheek pieces 15 are formed with an aperture 26 to receive a bar or other suitable instrument to raise the cheek pieces when it is desirable to adjust the position of the fixed jaws.

Each fixed jaw D is formed with a crushing face 27 substantially vertical at its upper end and curving inward toward the opposite fixed jaw to an extremity 28 having an angle of substantially forty five degrees with the horizontal. The crushing face 27 is formed with grooved teeth 29 extending vertically on the jaw and the entire face may be case hardened or otherwise prepared for rock crushing.

The movable crusher B supported by the gudgeons 18 in the open bearing 17 depends between the fixed crusher jaws D and is formed with opposite crushing faces 30 which are opposed to the crushing faces 27 of the fixed jaws D. The crusher B is narrow near its upper end providing relatively wide spaces between the faces 27 and 30 at their ends which communicate with the hopper 12 through its bottom. Toward its lower end the crusher B widens longitudinally of the machine and the faces 30 approach the faces 27 to a point above the extremity of the face 27 where crushed stone of normal size may pass between the faces. From this point the face 30 curves toward

the axis of the crusher sharply forming a final crushing extremity 31 on the face opposed to the extremity 28 of the face 27. The space 32 between the faces 27 and 30 and especially between the extremities 28 and 31 of these faces, determines the maximum size of the crushed rock passing through. The material is crushed between the faces by the oscillation of the crusher B on the gudgeons 18. The space 32 may be adjusted to produce any size of crushed stone desired within the limits of the machine by the vertical adjustment of the fixed jaw D by means of the eccentric 20 and the shaft 21.

Transverse teeth 35 are formed on the crusher B between the sides of the crusher and these teeth have downwardly extending apices 36 which engage the rock material during crushing and assist in the lifting action produced between the fixed and movable crushing faces upon the introduction of a hard substance between them which the jaws are unable to crush and which would cause injury to the machine if both faces were fixed.

The crusher B extends across the space between the walls 14, holding the cheek plates 15 against the walls 14 and dividing the mass of material to be crushed into two parts which descend between the crushing faces upon each side of the crusher B. A loop or handle 37 is formed on the upper side of the crusher B, for convenience in raising the mass of the crusher out of the machine. A cover 38 fits over the open bearings 17 to keep out dirt. The crusher B extends below the fixed jaws D and is formed with a recess 39 on its bottom side and upon its central axis, having bearing surfaces 40 between which operates the operating arm of the operating lever 10. An anti-friction wheel 42 is journaled on the arm 41 and travels on the faces 40 during the operation of the lever.

The axis of the gudgeon 9 of the lever 10, the axis of the wheel 42 and the axis of rotation of the crusher B are on the same line and the oscillating movement of the arm 41 of the lever 10 produces an equal oscillating movement of the crusher to the two sides of this line and an equal crushing operation on the fixed crushing jaws D.

The operating mechanism C consists of the shaft 6 journaled in the bearings 5 on the supporting frame as previously described, a drive pulley 45 or other suitable power attachment mounted on the shaft 6 and fly wheels 7 mounted on the shaft 6 within the supporting frame. The fly wheels 7 are a pair of large heavy wheels adapted to take up heavy strains in the crusher without stopping the operation of the machine. A cover 46 which may be formed integral with the supporting frame

serves to protect the fly wheels and has a removable portion 47 giving access to the wheels and their connected mechanism.

The shaft 6 is formed with a crank 48 between the fly wheels 7 on which is journaled a link 49 connecting with the operating lever 10 on its power arm 50. The lever 10 is designed for great strength and lightness and to deliver heavy pressure through a short distance. To this end the power arm 50 of the lever is formed with two side parts 51 connected by transoms 52 and increases in depth from its connection with the link 49 to the point where the gudgeons 9 formed integral with the lever are journaled in the bearings 8. The operating arm 41 of the lever 10 is relatively short in comparison with the power arm 50 and is thus adapted to operate the movable crusher B with immense power through a very short oscillation.

Immediately below the opening 32 between the crushing faces 27 and 30 conveying spouts 53 and 54 are provided to receive the crushed material and convey it to a point outside of the machine. The spout 54 as shown in Fig. 5 passes between the sides 51 of the lever 10, a construction permitted by the short movement of the lever parts. A socket 55 is formed at the top of the supporting frame A to receive the mast 56 of a hoist or crane provided in connection with the machine for the convenient raising of the crusher B and other heavy parts thereof and if desired, the raising of loads of rock.

In the operation of my device the different parts are placed in position as described and illustrated, suitable power is supplied to the shaft 6 and rock of suitable dimensions is supplied to the hopper 12 whence it passes downward on either side of the crusher B between the fixed and movable crushing faces 27 and 30 and through the aperture 32 to the spouts 53 and 54 leading from the machine. The operation of the shaft 6 through the crank 48 oscillates the power arm 50 of the lever 10 and the connected arm 41 operating within the recess 39 of the crusher B to produce a short powerful crushing movement thereof. The oscillation of the crusher B alternately opens a space between the crushing faces 27 and 30 permitting the descent of the partly crushed rock between them and closes this space, exerting an immense crushing force upon the rock which is engaged by the teeth 35 and forcing it against the face 27 of the fixed jaw D. The process is continued until the rock particles are sufficiently small to pass through the opening 32 and thence from the machine. In case a chunk of iron or similar substance enters between the jaws and is too large to pass through the opening 32, the engagement of the teeth 35 on the iron will raise the crusher

B out of its bearings 17 and permit the passage of the iron or will call attention to its presence and allow the lifting of the crusher by means of the crane and the removal of the obstruction.

In accordance with the patent statutes I have described the principles of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof but I desire to have it understood that the construction shown is only illustrative and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:—

1. In a stone crusher, a supporting frame, a pair of cooperating concave and convex crusher jaws, one being vertically slidable in said frame and the other hung and its lower portion adapted to oscillate, an adjusting cam journaled in said frame having its cam surface supporting said stationary jaw in vertically adjusted position, means for securing said cam in adjusted position and means for reciprocating said convex jaw.

2. In a stone crusher, a supporting frame, a pair of cooperating concave and convex crusher jaws, one being vertically slidable in said frame and the other hung and its lower portion adapted to oscillate, an adjusting cam journaled in said frame having its cam surface supporting said stationary jaw in vertically adjusted position, means for securing said cam in adjusted position, a dial on the side of said frame adjacent said cam, a pointer on said cam member movable over said dial to indicate the adjusted position of said slidable jaw member and means for reciprocating said convex jaw.

3. In a stone crusher, a pair of cooperating crusher jaws, one being stationary and adjustable and the other journaled and movable to cooperate with said stationary jaw for crushing purposes, a supporting frame for said parts, means for oscillating said movable jaw, said stationary jaw being attached to said frame by a sliding joint and having a cam shoulder, and means for adjusting said stationary jaw to said movable jaw, comprising a cam cooperating with said cam shoulder to move said stationary jaw, a shaft on said cam journaled in said frame and means for locking said shaft to prevent it from turning.

4. A rock crusher, comprising, in combination, a supporting frame having a journal bearing open on top, a movable crusher journaled in and suspended from said bearing having a recess into its lower end and opposite crushing faces formed with teeth the apices of which extend downwardly, a pair of stationary jaws carried by said supporting frame on opposite sides of said crusher and having inwardly projecting lower portions adapted to cooperate with the teeth of said crusher and break stone between them and to assist in lifting said movable jaw out of its bearing upon the introduction of an uncrushable object between said crusher and stationary jaws and means cooperating with said crusher in said recess to reciprocate said crusher and permit the free movement of said crusher upwardly.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

ROSS M. G. PHILLIPS.

Witnesses:

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H. L. FISCHER.