(No Model.)

G. N. MILLER.

STONE CRUSHER.

No. 543,041. Patented July 23, 1895.

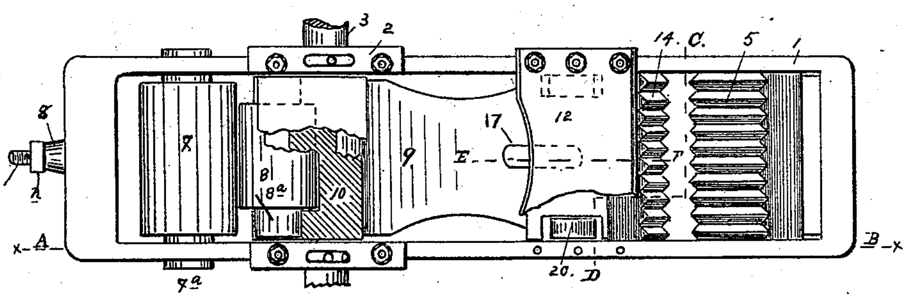

FIG. 2.

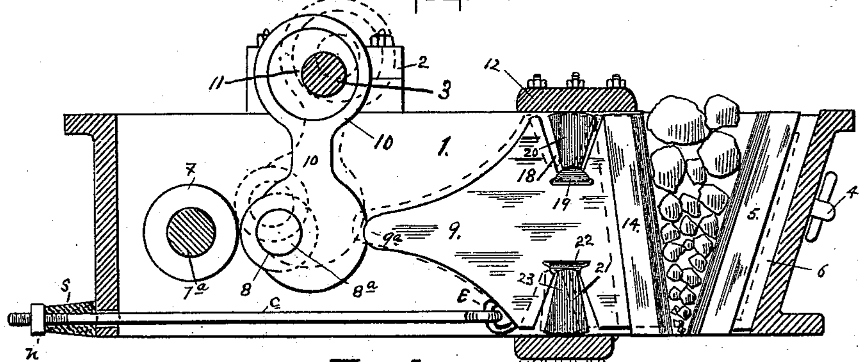

FIG. 1.

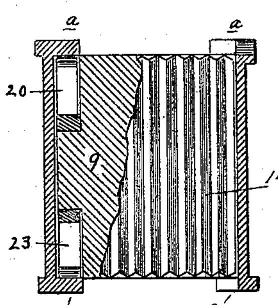

FIG. 6.

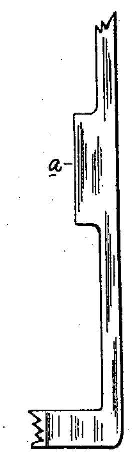

FIG. 7.

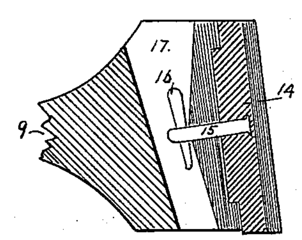

FIG. 3.

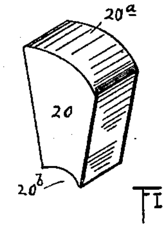

FIG. 4.

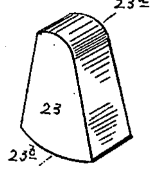

FIG. 5.

WITNESSES:
M. A. Keller.
E. W. Jones

George N. Miller INVENTOR

BY Risley, Robinson & Love
ATTORNEYS.

UNITED STATES PATENT OFFICE.

GEORGE N. MILLER, OF UTICA, NEW YORK, ASSIGNOR TO FREDERICK C. AUSTIN, OF CHICAGO, ILLINOIS.

STONE-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 543,011, dated July 23, 1895.

Application filed September 8, 1894. Serial No. 522,522. (No model.)

To all whom it may concern:

Be it known that I, GEORGE N. MILLER, of Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in Stone-Crushers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification.

My invention relates to an improvement in stone-crushers.

In the drawings which accompany and form a part of this specification, and in which similar letters and figures of reference refer to corresponding parts in the several views, Figure 1 shows a side elevation of the working parts of the crusher, the frame being shown in section on a line with A B of Fig. 2. Fig. 2 shows a plan view of the machine, parts being broken out to better exhibit the construction. Fig. 3 shows section of the movable crusher-jaw on line E F of Fig. 2. Fig. 4 shows one of the rocking bearing-pieces used in the construction. Fig. 5 shows another form of rocking bearing used in the construction. Fig. 6 shows a broken section of the crusher, taken on a line substantially with C D of Fig. 2, of a slightly-modified form of construction. Fig. 7 shows in plan view a portion of the frame as modified for use with the form of construction shown in Fig. 6.

Referring to the reference letters and numerals in a more specific description of the devices, 1 indicates the frame, which is preferably of a rectangular box form and has mounted on its upper side the bearing-boxes 2, in which the driving-shaft 3 has bearing.

In one end of the frame is secured by means of a key and pin 4 the stationary crusher-jaw 5. There may be interposed between the jaw 5 and the end of the frame a backing-piece 6 of soft metal or other suitable material to form a firm and even bearing for the jaw. In the opposite end of the frame is mounted a roller 7 on the fixed shaft 7^a. The roller 7 is adapted to be engaged by the roller 8, mounted on journals 8^a in the head of pitman 10. The pitman 10 is mounted on and operated by eccentric 11 secured on the shaft 3, the pitman being provided with a strap surrounding the eccentric in the usual manner of such constructions. Engaging substantially on the opposite side of the pitman-head 10 from the roller 8 at 9^a is the rear end of the movable jaw 9. The forward or working end of the jaw 9 is enlarged to substantially fill the opening between the cross-bar 12, firmly secured on the upper side of the frame, and the cross-bar 13, firmly secured on the under side of the frame, and the opposite sides of the frame.

On the enlarged end of the movable jaw 9 is secured the removable face 14, secured by means of the eyebolt 15 and a key 16, there being provided in the jaw an opening 17 to allow the key 16 to be placed as well as removed and a hole for the bolt 15 to pass through from the face end of the jaw into the opening 17. In the upper corners of the movable jaw 9 there are provided substantially V-shaped recesses 18, in the apex portion of which are fitted convex-faced hardened bearings 19. The recesses 18 are adapted to receive the wedge-shaped bearing-pieces 20, which extend between the face of the bearing 19 and the under side of the cross-piece 12 and are provided with convexed bearing-faces 20^a on one end and a concaved bearing-face 20^b on the other end, adapted to engage the cross-bar 12 and the bearing-piece 19, respectively. The V-shaped opening 18 is of the size to permit a lateral or rocking movement of the wedge-shaped bearing-piece 20 and yet retain the piece in position. In the lower corners of the movable jaw 9 there are also provided substantially V-shaped recesses 21 similar to 18, at the smaller or apex end of which is provided the hardened concave-faced bearing-piece 22.

The recess 21 is adapted to receive the rocking bearing-piece 23, provided with the convexed bearing-face 23^a of a small radius on one end and a convexed bearing-face 23^b of a large radius on the other end, the two bearing-faces being adapted to engage the bearing-block 22 and the cross-piece 13, respectively. The wedge shape of the bearing pieces or blocks 20 and 23 provides a greater length of bearing-surface on the outer edge, thereby allowing for the movement of the jaw. Recess 21 is adapted to allow the block 23 to rock when the jaw is moved or reciprocated, but still retain it in position and not allow it to become displaced.

The jaws of the crusher are preferably both located at an angle, substantially as shown, with their upper edges removed from each other to allow the introduction of quite a large stone or piece of rock, while the lower edges converge so as to come quite close together in the manner usual in this class of crushers, and the faces of the jaws are preferably grooved or corrugated, as shown, the corrugations running up and down the face of the jaws. For retracting the jaw 9 there is provided an eye on the lower portion of the jaw, to which is attached one end of the connecting-rod *c*, which passes through an opening in the rear end of the frame and is provided with a spring *s*, of rubber or other suitable material, acting between the side of the frame and the nut *n* on the end of the rod to withdraw or retract the jaw.

In the modified form of construction shown in Figs. 6 and 7 the cross-bars 12 and 13 are dispensed with, and a projection *a* is provided on the frame, adapted to furnish a bearing for the outer end of the bearing-piece or rockers 20 and 23 on the upper and lower sides of the frame, respectively.

In operation the crusher is put in motion by power applied to shaft 3, and as the shaft rotates the eccentric 11 operates to give the roller 8 an upward-and-downward movement on the face of roller 7, the same being held in contact by action of the spring *s*. At the same time the rear end of the jaw 9 is given a vertical rocking movement, and it is withdrawn or forced toward the stationary jaw 5, depending on the direction in which the parts are moving. Jaw 9 is held in engagement with the head of pitman 10 by the action of the spring *s* and is retracted by the same spring when the movement of the pitman-head will permit. One of the positions of movement of the parts is shown in dotted outline in Fig. 1, and the arrangement of parts may be such that the rear end of the jaw 9 will be passed below a horizontal line as well as above, as shown in dotted outline, with each revolution of the shaft 3. As the movable jaw is rocked and reciprocated the bearing-pieces 20 and 23, at the upper and lower sides of the jaw, respectively, rock substantially from the position shown in full lines in Fig. 1 to the position shown in dotted lines. By the arrangement of bearing here shown the jaw is held very firmly to its work, while the amount of friction is reduced to the minimum. The jaw being mounted on bearing immediately back of its working-face in, connection with the peculiar rocking and operated movement given by the operating mechanism heretofore described, gives a rolling and reciprocating motion to the face of the jaw, which is very effective in crushing stones or rock.

By the arrangement of the convexed bearing 19 on the upper portion of the movable jaw and the concaved bearing 22 on the lower portion both bearings keep themselves free from dirt and grit, the convexity and concavity, as the case may be in reference to either, tending to work the grit out of the bearings and discharging it by the side of the jaw as the jaw is operated.

It is evident that an ordinary toggle-joint might be substituted for the mechanism herein shown and described for operating the movable jaw, in which event the jaw 9 would become one of the members of the toggle-joint, and it is also evident that other modifications and changes than those herein shown and suggested may be made without departing from the equivalents of my construction.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a stone crusher of a frame and fixed roller mounted in one end of the frame, a fixed jaw in the opposite end of the frame, a reciprocating jaw between the roller and fixed jaw and the reciprocating mechanism adapted to move substantially at right angles to the axial line between the roller and fixed jaw and engaging the roller and rear end of the jaw respectively.

2. The combination in a stone crusher of a frame and fixed roller in one end of the frame, a fixed jaw in the opposite end of the frame a movable jaw between the roller and fixed jaw a reciprocating pitman 10 having a friction roller 8 mounted therein and engaging with the rear end of the movable jaw, combined substantially as set forth.

3. The combination in a stone crusher of a frame, a reciprocating jaw mounted on rocking bearing pieces 20 and 23 projecting from the upper and lower sides of the jaw adjacent to the face of the jaw and engaging with the frame, and means for reciprocating the jaw, substantially as set forth.

4. In a stone crusher, a frame, a fixed jaw in one end of the frame, a reciprocating jaw having V-shaped recesses in its corners adjacent to its face, wedge-shaped rocking bearing pieces located in the recesses and supporting the face end of the jaw by engagment with the frame, and jaw reciprocating mechanism connecting with the rear end of the jaw, substantially as set forth.

In witness whereof I have affixed my signature in presence of two witnesses.

GEORGE N. MILLER.

Witnesses:

GEORGE C. CARTER,
GEO. A. GAYMONDS.