No. 657,958. Patented Sept. 18, 1900.

E. REYNOLDS.

CRUSHING MACHINE.

(Application filed Apr. 6, 1897.)

(No Model.)

Fig. 1.

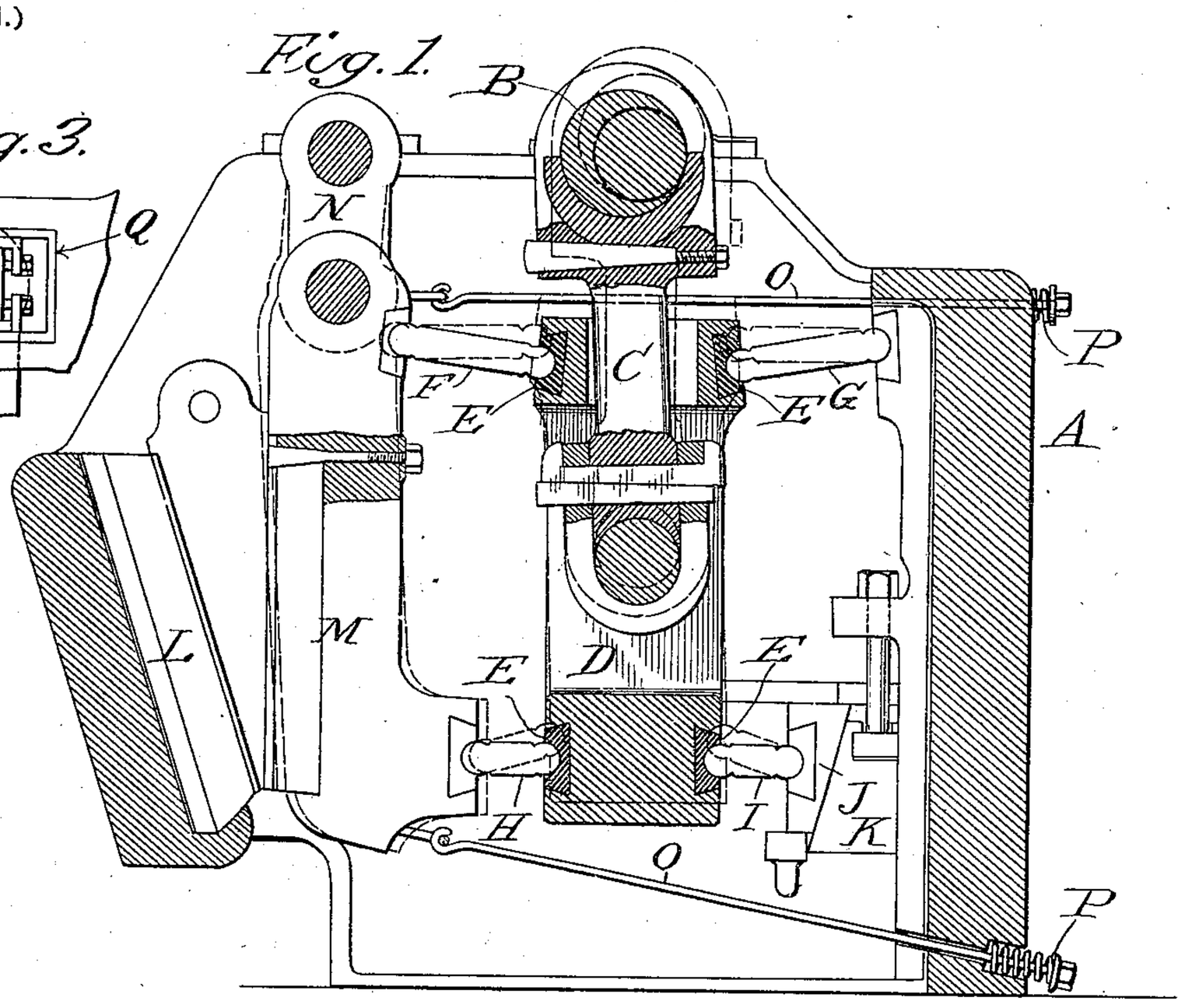


Fig. 3.

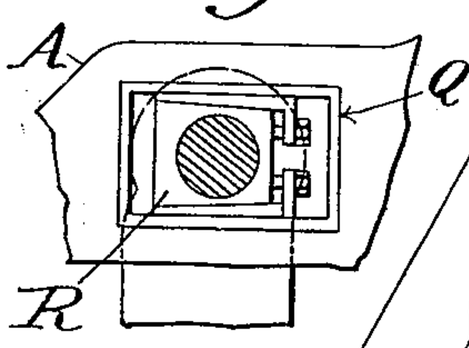
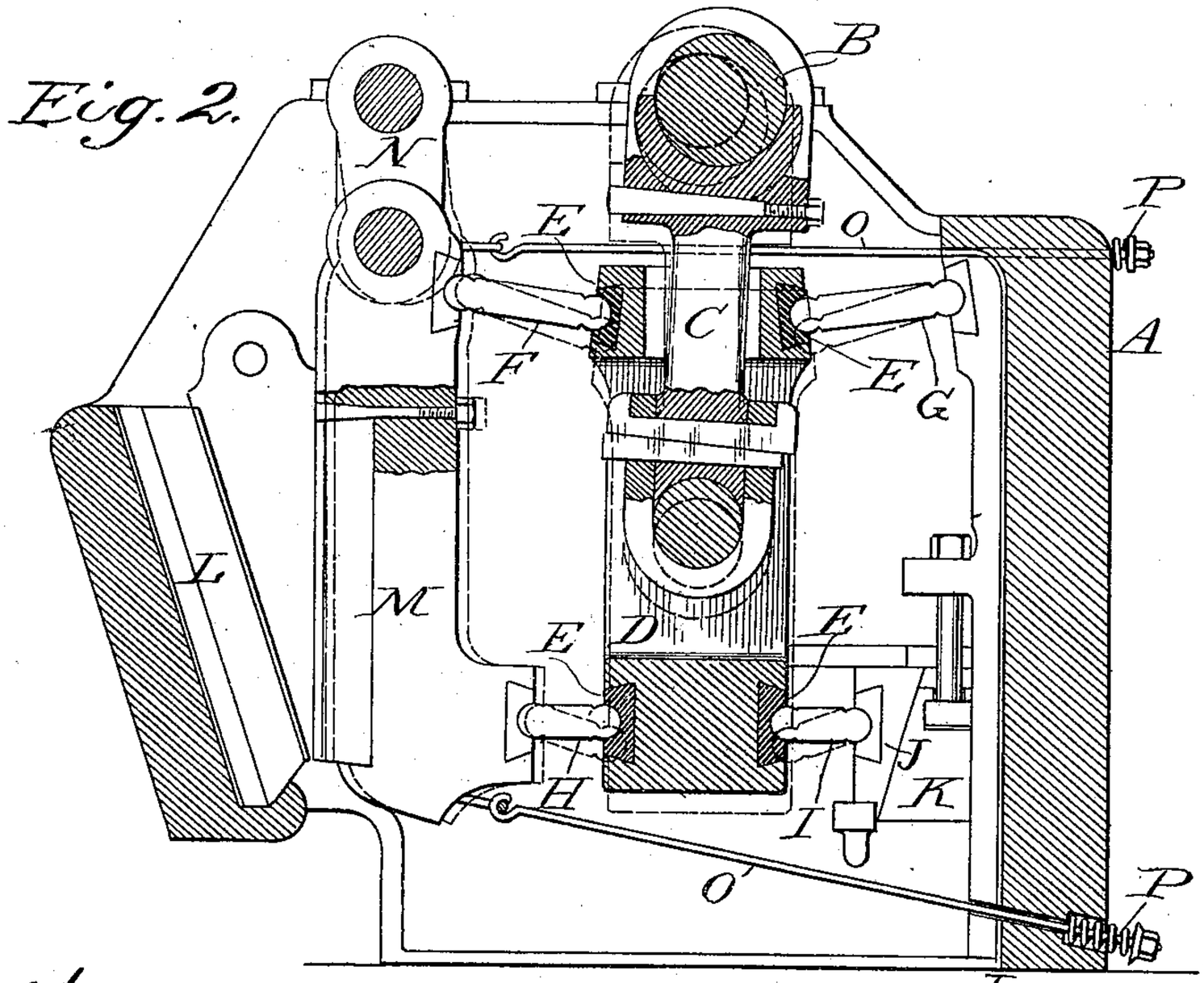


Fig. 2.



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UNITED STATES PATENT OFFICE.

EDWIN REYNOLDS, OF MILWAUKEE, WISCONSIN.

CRUSHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 657,958, dated September 18, 1900.

Application filed April 6, 1897. Serial No. 631,041. (No model.)

To all whom it may concern:

Be it known that I, EDWIN REYNOLDS, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Crushing-Machines, of which the following is a specification.

My invention pertains to crushing-machines, and particularly to that class in which the material to be crushed is subjected to lateral pressure between two jaws.

In the accompanying drawings, Figure 1 is a vertical sectional view of my improved crusher; Fig. 2, a similar view showing the parts in a different relation, and Fig. 3 a detail view showing a modified construction of a part of the device.

The objects of my invention are to provide a construction wherein the crushing force is properly distributed; to provide a construction wherein the material is acted upon in accordance with its state of reduction to produce a more uniform product; to provide a simple mechanism that gives varied movements to different parts of the crushing-jaw, giving a double effect or action when wanted; to provide an automatic opening of the lower ends of the jaws after each double-crushing effect, thereby allowing the easy discharge of material already crushed, and, finally, to produce a more efficient mechanism than those now generally used for this purpose. These various objects are attained by the construction shown in the annexed drawings, wherein—

A designates the body or frame of the crusher, upon which is journaled a shaft provided with an eccentric B. Journaled upon and depending from said eccentric is a link C, to the lower end of which is pivoted a block or shoe-piece D, provided with shoes or seats E for the reception of the ends of toggles F, G, H, and I. The opposite end of toggle G bears against a shoe or seat provided in the rear wall of the frame, while the outer end of toggle I has its bearing in a block J, which may be thrown forward or receded by means of a wedge K, as is usual in this class of machines.

L indicates the fixed crushing-jaw, and M the movable one. Said movable jaw M is pivotally connected at its upper end to link N, which in turn is journaled upon the frame, the link forming the sole means of suspending the jaw. Shoes or seats are provided in the rear face of the said jaw, against which the toggles F and H bear.

Connected to the upper and lower ends of the jaw M are rods O, which extend out through the rear wall of the frame, where they are provided with springs P, which acting against the nuts upon the ends of said rods tend to draw jaw M backward, thus exerting a slight pressure upon the toggles and the intermediate block or casting D, keeping the parts in their proper relation and position.

The eccentric in the position shown in full lines, Fig. 1, is intermediate of its highest and lowest position, in which position the toggles H and I lie in the same horizontal plane, while the toggles F and G stand at an angle to each other below the horizontal. When in this position, the front face of the movable jaw stands in a vertical plane, its lower end bearing against or occupying a position close to the lower end of the fixed jaw, according to the adjustment, or being at that point of its movement in which it most nearly approaches said fixed jaw at its lower end. A quarter-revolution of the eccentric or to its highest position, as shown by dotted lines, Fig. 1, draws the toggles F and G into horizontal alinement, throwing the upper end of jaw M toward the fixed jaw and exerting the greatest amount of compression upon the material at that point which is given during the revolution of the shaft. At the same time toggles H and I are brought above the horizontal, and the lower end of the movable jaw will be drawn away from the fixed jaw, the material of the desired fineness being discharged. A further quarter-revolution brings the parts back into the position indicated in full lines, Fig. 2, the toggles assuming the relation shown in said figure and also in Fig. 1. A still further quarter-revolution brings the eccentric to its lowermost position, the toggles H and I again passing from the horizontal to an angular relation below the horizontal. The toggles F and G at the same time

fall to the lowest position below their horizontal and the upper ends of the jaws assume their greatest distance apart. It will thus be seen that for each complete revolution of the shaft the lower toggles H and I are twice brought into alinement, and thus twice exert their greatest force against the lower end of the movable jaw. The toggles F and G come into alinement but once during the revolution of the shaft. Consequently but one crushing impulse is given to the upper end of the jaw. Jaw M being pivotally suspended from the journaled link is free to move in accordance with the position which the toggles assume, the rods O and springs P serving to keep the jaw in its proper relation to the toggles. The upper end of jaw M will of course be farthest away from the fixed jaw when the eccentric is in its lowest position and will gradually approach the fixed jaw as the toggles straighten, the jaw turning on its pivot and the link moving on its shaft or journal. Meanwhile the lower end of the jaw will be drawn back by reason of the lower toggles H and I passing above the horizontal, and as they are again brought down to the horizontal a forward thrust upon the lower end will be exerted. As the upper end of the jaw begins its reverse movement the lower end is also withdrawn; but when the upper end has half completed its reverse movement the lower end again begins its forward movement, which is completed when the upper end of the jaw is drawn back as far as possible.

In Fig. 3 I have shown a construction designed to afford a sliding and pivotal support for the moving jaw to be used in place of the link connection. In said figure, A indicates the frame of the machine, and M the movable jaw. In the frame there is formed an opening Q, in which is mounted a block or box R, free to move back and forth therein as required. Extending through said block is a shaft upon which the jaw is journaled and sustained. This mode of suspension permits all the movements necessary and is the equivalent of the link construction.

The material to be subjected to pressure is fed into the angular space between the jaws and as it is reduced works down between them and gradually nears a point corresponding to the center line of the toggles H and I, where it comes more and more under the influence of the double thrust from said toggles. It is finally discharged from between said jaws when it becomes sufficiently fine, which degree of fineness may be determined by setting the wedge K up or down.

While I have shown and described the toggles F and G as being so arranged that they do not pass above the horizontal, still they may be so placed that they may move a slight distance above that point, in which case, of course, the upper end of jaw M would have a double thrust. This, however, is not desirable.

Having thus described my invention, what I claim is—

1. In a crushing-machine, the combination of a fixed jaw; a pivotally-suspended crushing-jaw movable toward and from the fixed jaw in a substantially-horizontal line; toggles arranged to act on said movable jaw at or near its extremities with a differential throw and to impart a greater number of impulses to one end than to the other; and means for actuating said toggles.

2. In a crushing-machine, the combination of a fixed jaw; a pivoted jaw bodily movable in a horizontal line toward the fixed jaw; and means for imparting a differential movement to the opposite ends of said pivoted jaw and a greater number of impulses to the lower end than to the upper end thereof, substantially as described.

3. In a crushing-machine, the combination of a fixed jaw; a movable jaw pivotally suspended from its upper end; toggles to act upon opposite ends of said movable jaw one of said toggles occupying a substantially-horizontal position, and the other arranged at an angle thereto and designed to give a differential movement to the opposite ends of said jaw, and to impart a greater number of impulses to the lower end than to the upper end thereof, substantially as described; and means for moving said toggles.

4. In a crusher, the combination of a movable jaw; a swinging pivot therefor; toggles arranged to act upon said jaw at or near its extremities, one of said toggles being so arranged that it will swing to both sides of its position of greatest thrust; and means for operating said toggles.

5. In a crusher, the combination of a frame; a movable jaw; a swinging pivot therefor; an eccentric; a block suspended from said eccentric; and two sets of toggles arranged upon opposite sides of the block and designed to bear against the frame and the jaw; one set of toggles being arranged to swing to both sides of its position of greatest thrust, substantially as described.

6. In a crushing-machine, the combination of a frame; a movable jaw; a swinging pivot therefor; toggles arranged to act upon said jaw at or near each end thereof, one of said toggles being arranged to swing to both sides of its position of greatest thrust; means for operating said toggles; and means for adjusting the same.

7 In a crushing-machine, the combination of a frame; a fixed jaw; a movable jaw; a link journaled upon the frame and pivotally connected to the upper end of the movable jaw; a block; toggles bearing against said block and the movable jaw and frame; one of said toggles being arranged to swing to both sides of its position of greatest thrust; and means for adjusting said toggle.

8. In a crushing-machine, the combination of a frame; a fixed jaw; a movable jaw; a

link N journaled upon the frame and pivotally connected to the upper end of the movable jaw; a block, as D; an eccentric; a link C pivotally connected to the block and actuated by the eccentric; toggles F, G, H and I arranged upon opposite sides of the block and bearing respectively against the upper and lower ends of the movable jaw and the frame; and tension-rods O, substantially as described.

In witness whereof I hereunto set my hand in the presence of two witnesses.

EDWIN REYNOLDS.

Witnesses:

E. W. TUCKER,

IRVING H. REYNOLDS.