

(No Model.)

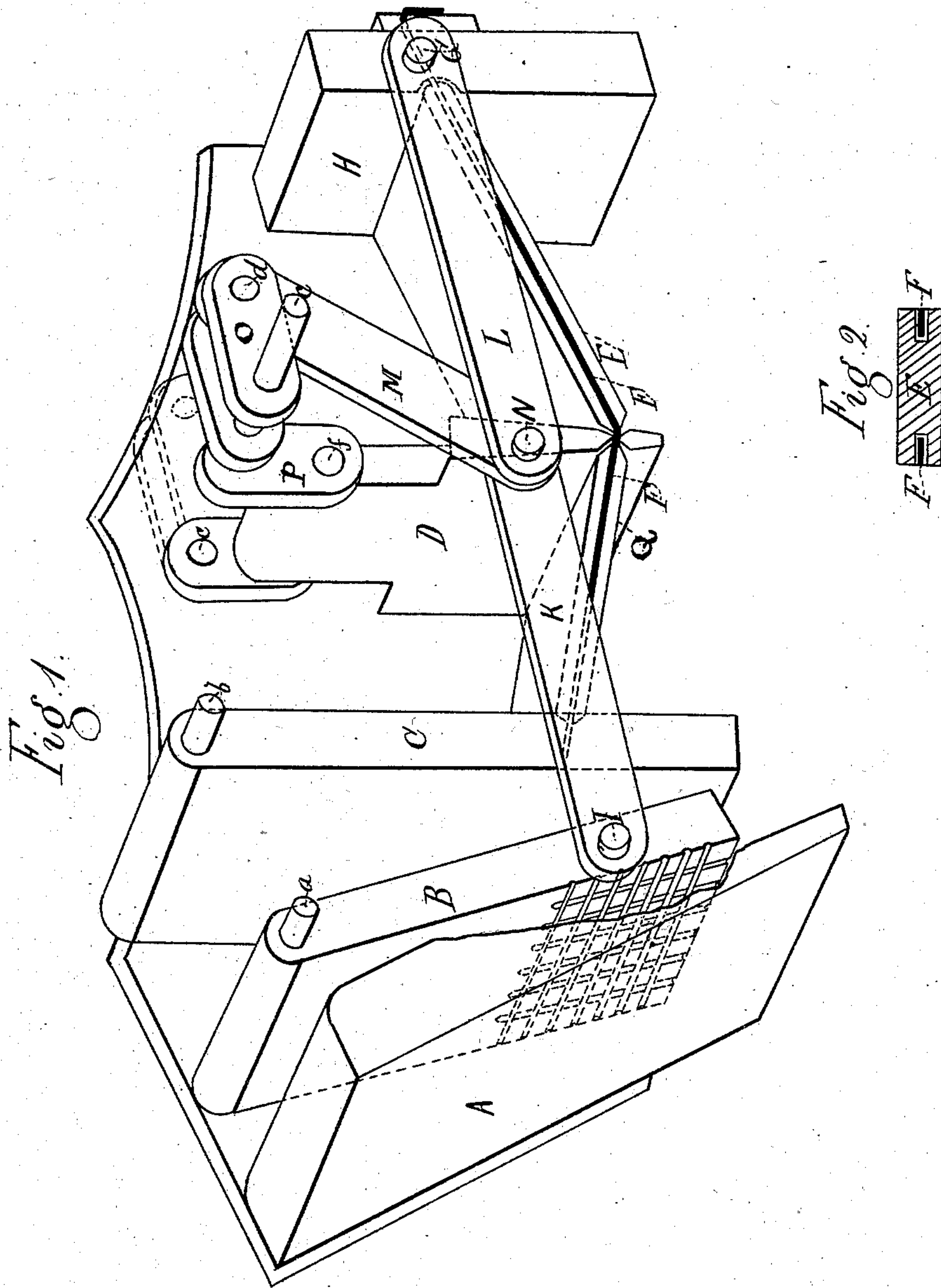
3 Sheets—Sheet 1.

J. DAVID.

MECHANICAL MOVEMENT FOR ORE CRUSHING MACHINES.

No. 257,852.

Patented May 16, 1882.



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Inventor,
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(No Model.)

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Fig. 3.

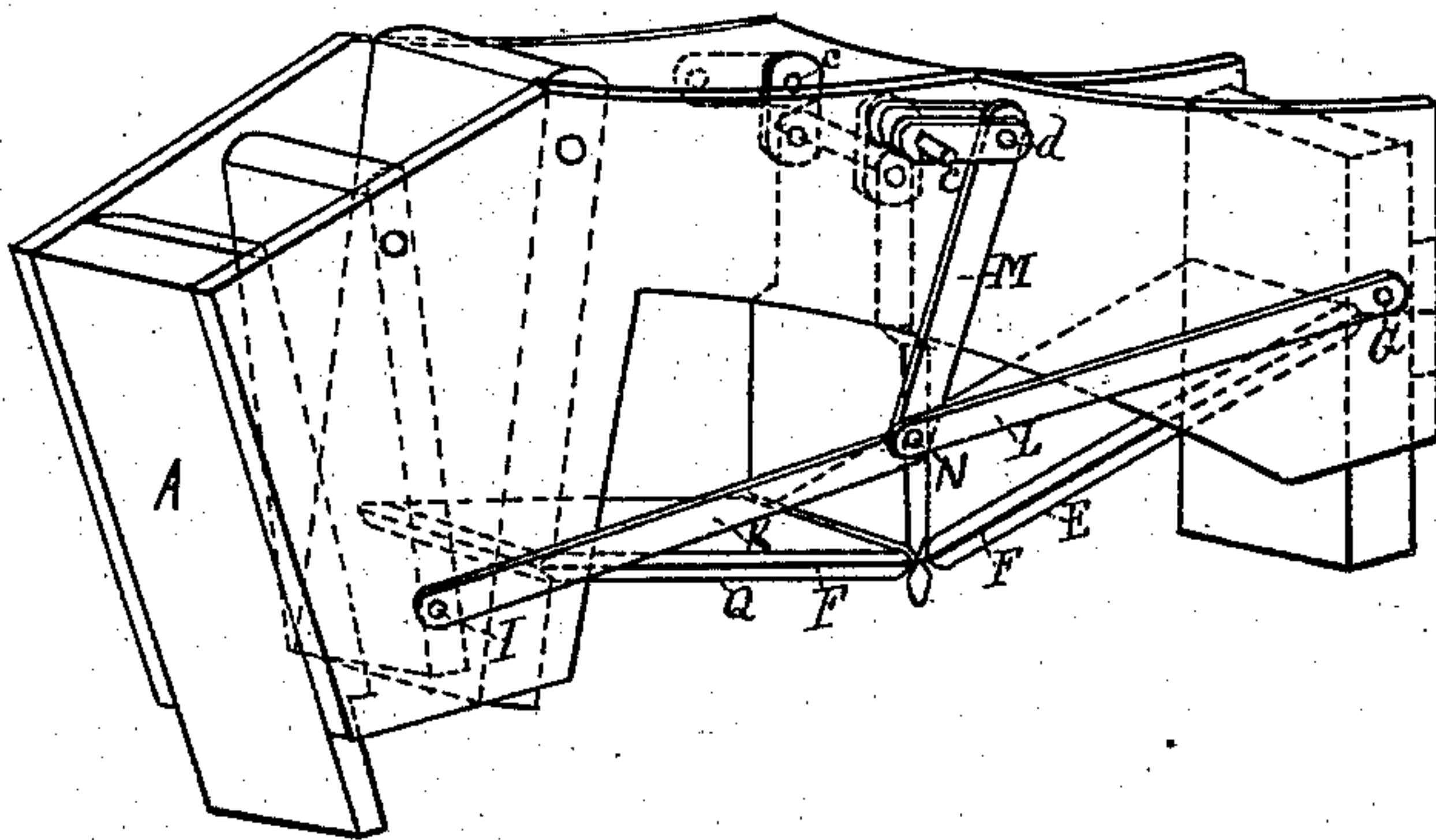


Fig. 4.

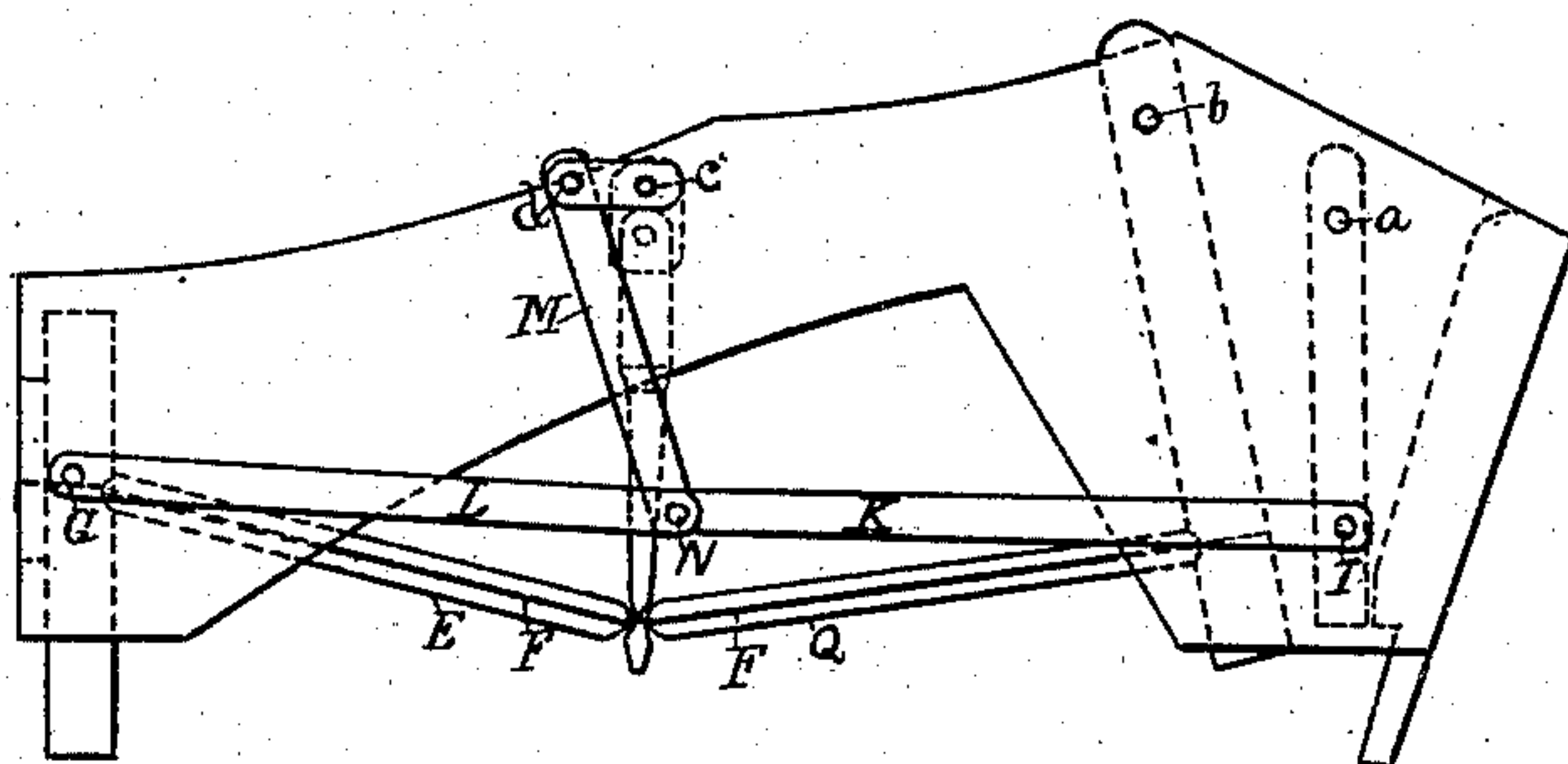
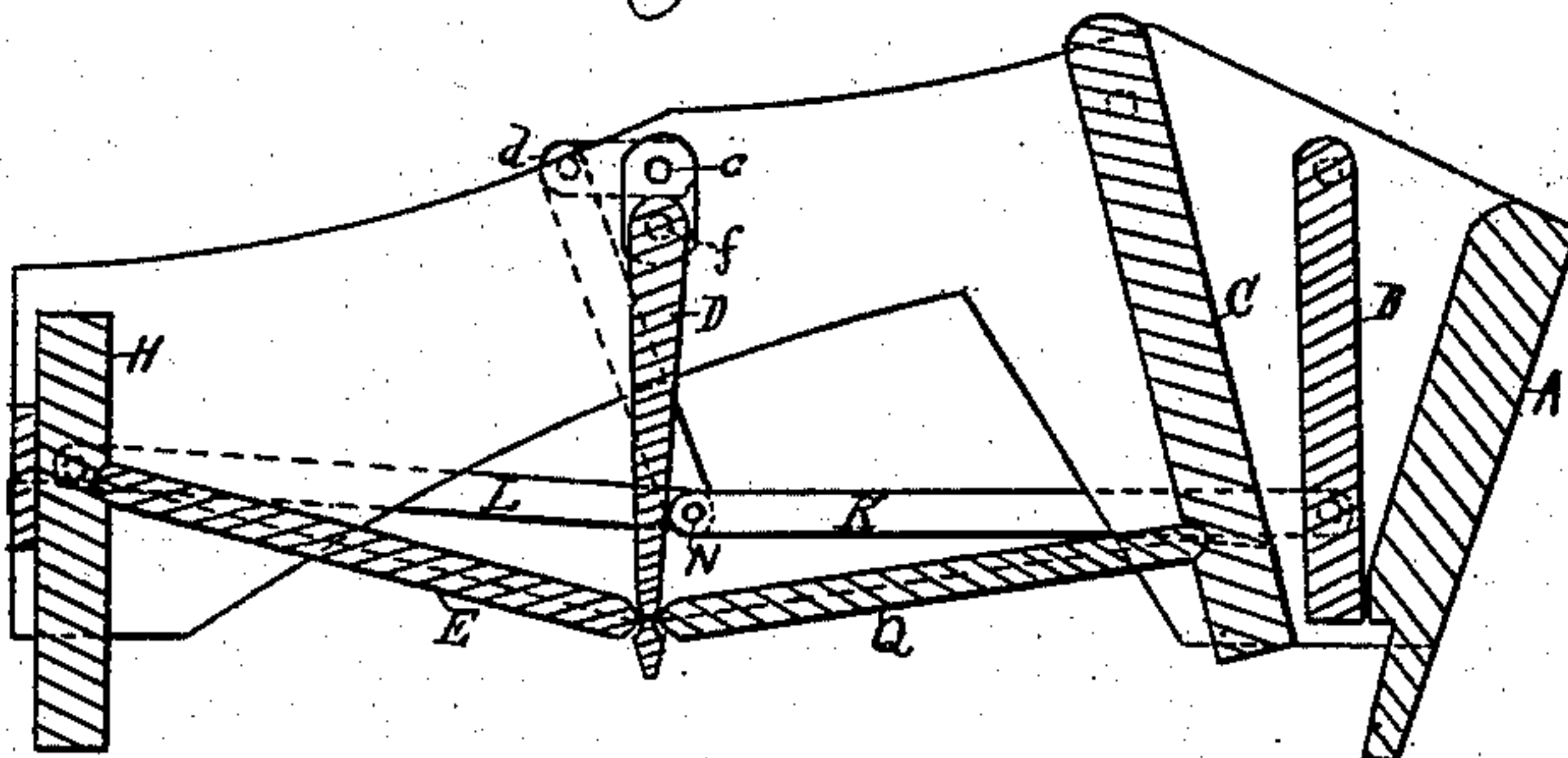


Fig. 5.



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Fig. 6.

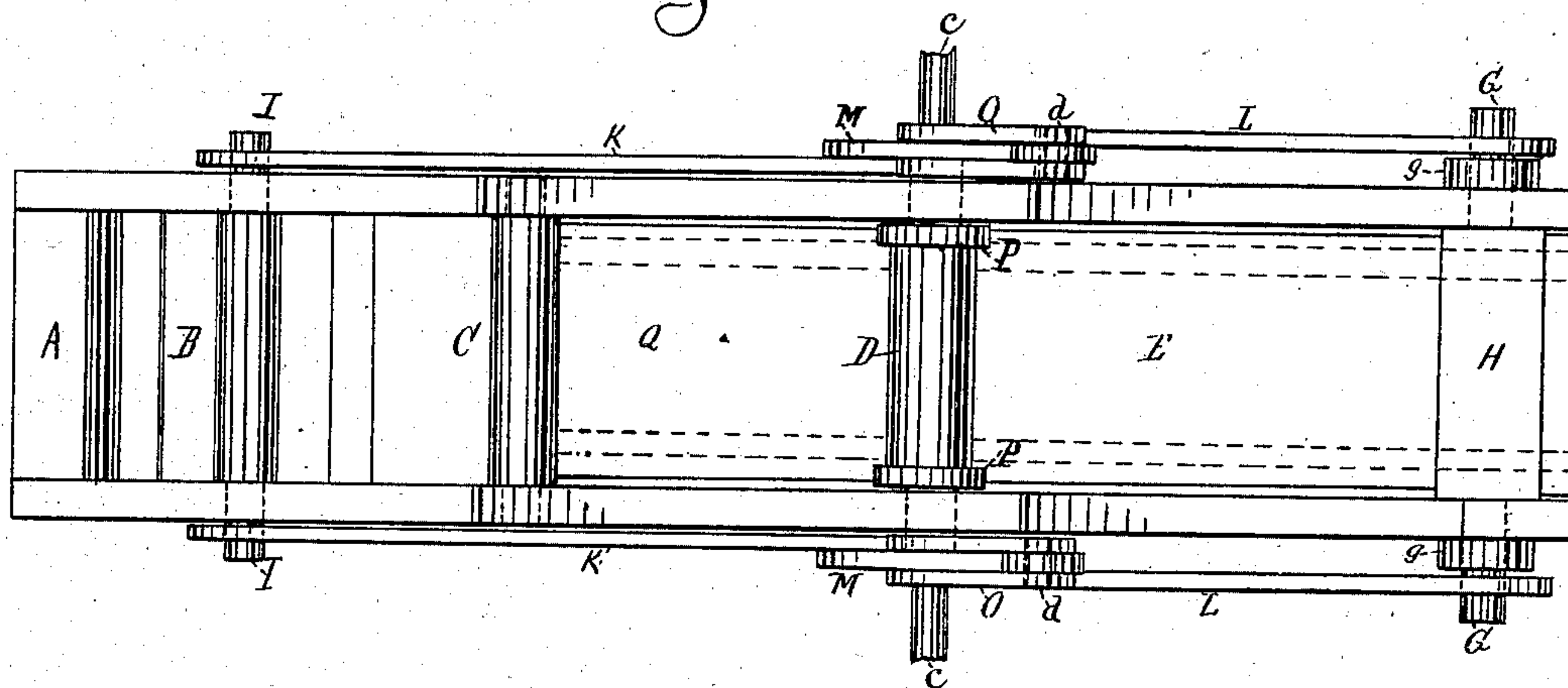


Fig. 7.

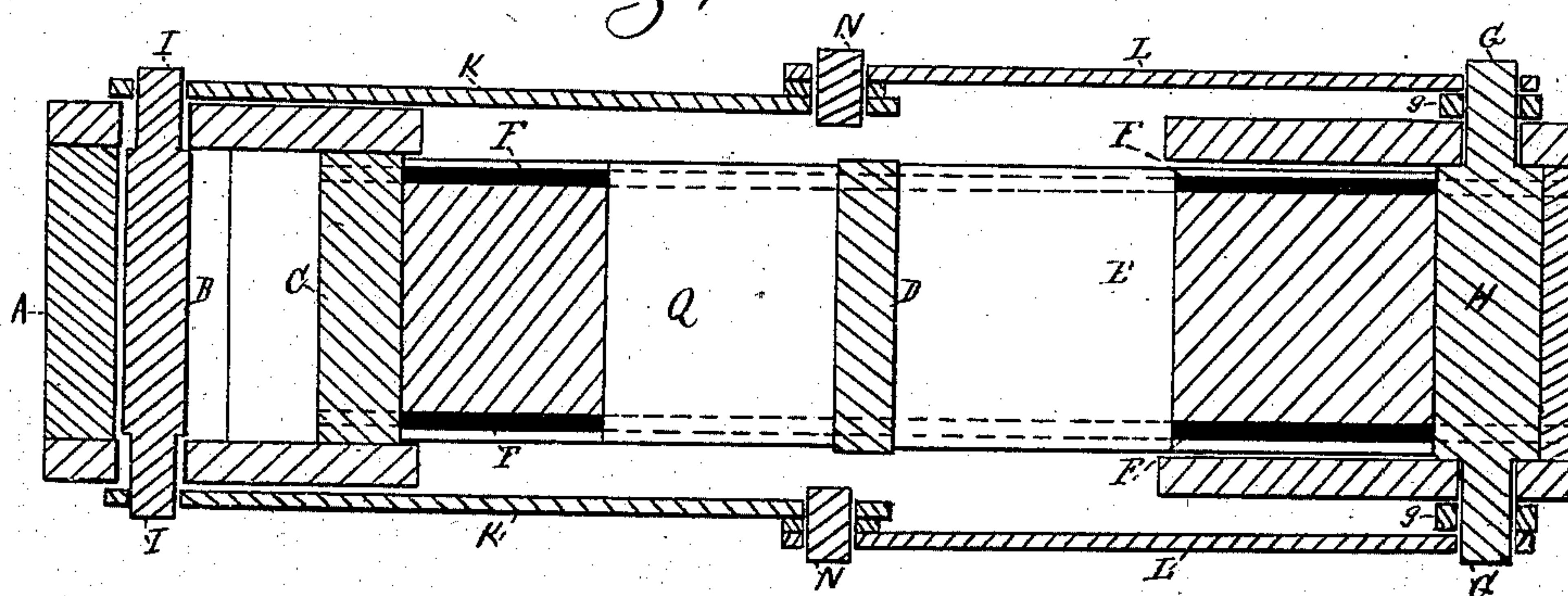
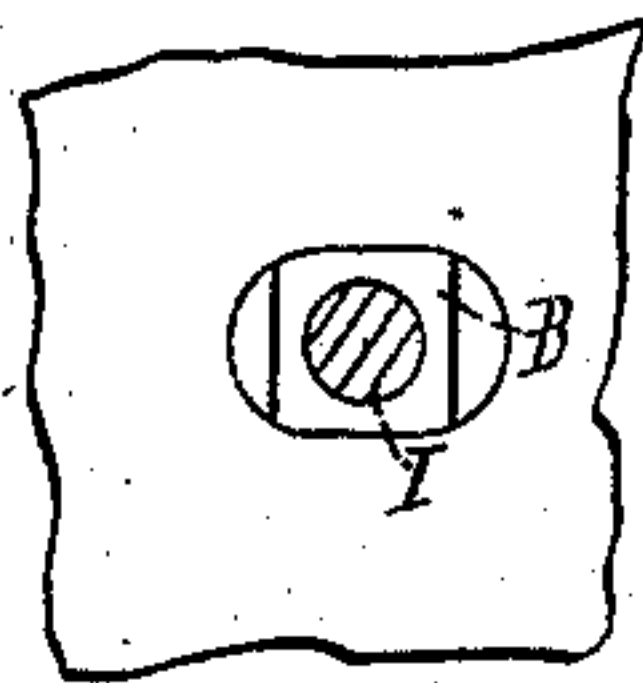


Fig. 8.



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UNITED STATES PATENT OFFICE.

JACOB DAVID, OF BROOKLYN, NEW YORK.

MECHANICAL MOVEMENT FOR ORE-CRUSHING MACHINES.

SPECIFICATION forming part of Letters Patent No. 257,852, dated May 16, 1882.

Application filed July 27, 1881. (No model.)

To all whom it may concern:

Be it known that I, JACOB DAVID, a citizen of the United States, residing at Brooklyn, in the county of Kings, State of New York, have
5 invented a new and useful Improvement in Mechanical Movements for Ore-Crushing Machines, of which the following is a specification.

My invention relates to mechanism for converting a rotary motion into a reciprocating motion by the use of cranks and toggle-levers, as hereinafter fully set forth.

Figure 1 is a view in perspective of the working parts of the machine with the frame or casing of one side removed. Fig. 2 is a cross-section of the toggle-lever Q or E, showing part of my improvement. Fig. 3 is a view in perspective of the machine, showing one side and the front end. (Working inside parts shown
15 by the dotted lines.) Fig. 4 is a side view of the opposite or reversed side of the machine shown in Fig. 3. Fig. 5 is a longitudinal sectional view through the center. Fig. 6 is a top plan view. Fig. 7 is a horizontal section on a line drawn through the pivot I to the pivot G.
20 Fig. 8 is a section of the casing or frame of the machine, showing the slot in the casing through which the pivot I connects the jaw B and the levers K.

30 Similar letters refer to similar parts throughout the several views.

The part marked A is a part of the framework of the machine, and at the same time forms an immovable face or jaw, against which
35 the material is crushed finer after being passed between the other jaws.

The part marked B is a movable jaw, hung by suitable pivots, which pivots or journals enter suitable journal boxes or holes made in the
40 frame-work of the machine. The jaw B obtains a reciprocating motion from the toggle-levers K L and the connecting-rods M, which rods M connect to the cranks O on the shaft c. Both sides of the machine have toggle-levers
45 K L and connecting-rods M, as shown in the several views.

The toggle-lever L is connected at one end to a fixed support by a pivot at G and the other end is connected by a pivot to one end
50 of the toggle-lever K and to one end of the connecting-rod M. The other end of the toggle-

gle-lever K is connected to the movable jaw B by a pivot at I.

The pivots (marked I) on each side of the jaw B pass through the casing or frame of the
55 crusher and connect to the toggle-levers K on the outside of the machine, said pivots (marked I) moving in suitable slots on each side of the machine, said openings or slots being of such a shape as to allow the movable jaw B to move
60 forward and backward.

The cranks O are fixed on the revolving shaft c, and the connecting-rods M engage the cranks O at one end and at the other end engage the toggle-levers K L by pivots at N.
65

The cranks, (marked O,) the toggle-levers K and L, with the connecting-rods M, are all on the outside of the casing of the crusher, one set of levers and one crank O being on each side of the machine, as shown at Figs. 1, 3, 70 and 4.

The part marked C is also a movable jaw, hung on suitable pivots or journals in suitable journal-boxes or holes in the frame at b. The journal-boxes are attached to the frame in a
75 suitable manner. The jaw C receives a reciprocating motion from the toggle-levers E Q, the pitman D, and the crank P. One end of the toggle-lever E is set in a notch in an immovable support at H. The other end of the
80 toggle-lever E is set in a notch in the end of the pitman D. The pitman D is connected to the crank P at f. One end of the toggle-lever Q is connected to the pitman D at a point exactly opposite the notch that receives the toggle-lever E. The other end of the toggle-lever
85 Q is connected by a notch on the back and lower part of the movable jaw C.

The toggle-levers E and Q are held in position in the notch in the immovable support H,
90 in the notches on the pitman D, and in the notch on the movable jaw C by the steel rods or bars marked F F, which bars or springs are fastened in a suitable manner to the immovable support H, passing from thence through a
95 groove in the toggle-levers E Q, and terminating at a suitable fastening on the movable jaw C.

If the bars or springs F F are fastened in a suitable manner—one end to the immovable
100 support and the other end to the movable support—when the pitman D is raised to its high-

est point or depressed to its lowest point by the revolution of the crank P the jaw or movable support C will be brought back and away from the jaw B. By each half-turn of the rotary shaft *c* the toggle-levers E and Q straighten, or become parallel, and press against the immovable support H and push the movable support or jaw C forward and against the other movable support or jaw B.

10 The crank P, pitman D, and toggle-levers Q E are all inside the casing of the machine. The interior parts are shown by the dotted lines in the several views.

When the cranks O and P are placed at right angles to each other, as shown at Figs. 1, 3, 4, 5, and the crank P is at its highest point, it will raise the pitman D, which in its turn will raise the toggle-levers E and Q at the ends connected to the pitman D. By so doing the toggle-levers are shortened and the jaw C drawn back. At the same time, the crank P being at a right angle and horizontal to the cranks O, the outside toggle-levers, L K, will then be in a straight line, or at their longest, which will cause the jaw B to be pushed away from the other movable jaw, C, and against the immovable jaw A. By one-quarter of a revolution of the shaft *c* the crank P is horizontal and the cranks O perpendicular, and exactly the reverse of the foregoing operation takes place, as by this latter motion the movable jaws B and C approach each other, and the jaw B recedes, and is drawn from the immovable jaw A. By turning the shaft *c* one-quarter of a revolution farther, making a total of one-half of a revolution, the same result follows in the operation of the jaws as described in the first instance, while by moving one-quarter of one revolution more, making three-quarters of one revolution of the shaft *c*, the same result follows in the operation of the jaws as described above in the second instance.

The parts F F are two flat bars or springs, made of steel, that are placed in a groove formed one on each side of the toggle-levers Q and E. The springs or bars F F are fastened at one end to the immovable support H and the other end to the movable support or jaw C. By having the bars or springs attached to the movable support C and the immovable support H and passed through the toggle-levers in a groove, as shown, the toggle levers will not slip out of the notches when the machine is in motion, and when the pitman D is at the highest or the lowest point allowed by the revolution of the cranks and shaft the toggle-levers will be retained in the notches and the movable support or jaw C both be brought back and away from the other movable support or jaw, B. Nearly the same result can be accomplished by having one spring or bar, F, passed from end to end through the center of the toggle-levers Q and E and pitman D and fastened to the movable and immovable supports, as described above.

When the parts are constructed and put to-

gether in the manner shown and described, to operate the machine power is applied, in the usual manner by a pulley or cog-wheel, or otherwise, to cause the shaft *c* and the cranks O P to revolve. The revolving of the shaft *c* causes the movable jaws B and C to approach to and recede from each other at the same time twice to each revolution of the shaft. At the time the jaw B is receding from the jaw C the jaw B is approaching to and antagonizing with the immovable jaw A.

When the machine is in motion the material to be crushed is fed between the movable jaws B and C, which are set a certain distance apart, and by their operation reduce the material to a certain size. After the material has passed between the jaws B and C and been crushed to the proper size it is then taken up and passed between the jaws A and B. The jaws A and B being closer together than the jaws C and B, the material is reduced to a much finer state than by the first operation. After a sufficient part of the material has been reduced by passing the same between the jaws C and B it is then fed between the jaws A and B. At the same time more of the material is passed between the jaws B and C, thus making the two operations simultaneous, crushing the coarse material between one set of jaws and the finer material between the other set of jaws during one revolution of the shaft, thus crushing the coarse material by one movement, and crushing the finer material by the reverse movement of the parts. By placing the two cranks O on the outer ends of the shaft *c*, with the crank-levers M and M and toggle-levers K K and L L, one set of each on each side of the machine, outside the frame, the jaw B will be pressed against the immovable jaw A in a much firmer and more solid manner than where only one set of cranks and toggle-levers is used and affixed to the center of the jaw, as shown and described in Letters Patent of the United States, No. 222,872, granted to me on the 23d day of December, 1879.

What I claim is—

1. In ore-crushing machines, a mechanical movement consisting of the movable support C, the toggle-levers Q E, the pitman D, provided with notches, the crank P, and shaft *c*, in combination with the mechanical movement consisting of the movable support B, the toggle-levers K L, the immovable support H, crank-levers M, and cranks O, for the purpose as shown and described.

2. The toggle-levers Q E, the pitman D, crank P, jaw C, support H, and the toggle-levers K L, crank-levers M, cranks O, shaft *c*, and jaw B, whereby the movable jaws B C will approach to and recede from each other twice at each revolution of the shaft, as shown and described.

3. A mechanical movement for ore-crushing machines, consisting of the shaft *c*, cranks O O, crank-levers M M, toggle-levers K K and L L, one set of each on each side of the machine, a

fixed support, and a movable support or crushing-jaw, B, for the purpose as shown and described.

4. The combination of the steel bars F F
5 with toggle-levers having a longitudinal groove on each side, and the notched pitman D, as shown and described.

5. In ore-crushing machines, in combination with toggle-levers having a longitudinal groove

or orifice and a pitman having a corresponding orifice, the steel springs or bars F F, an immovable support, and a movable object, for the purpose as shown and described.

JACOB DAVID.

Witnesses:

GEORGE S. ELCOCK,
GEORGE L. BENTON.