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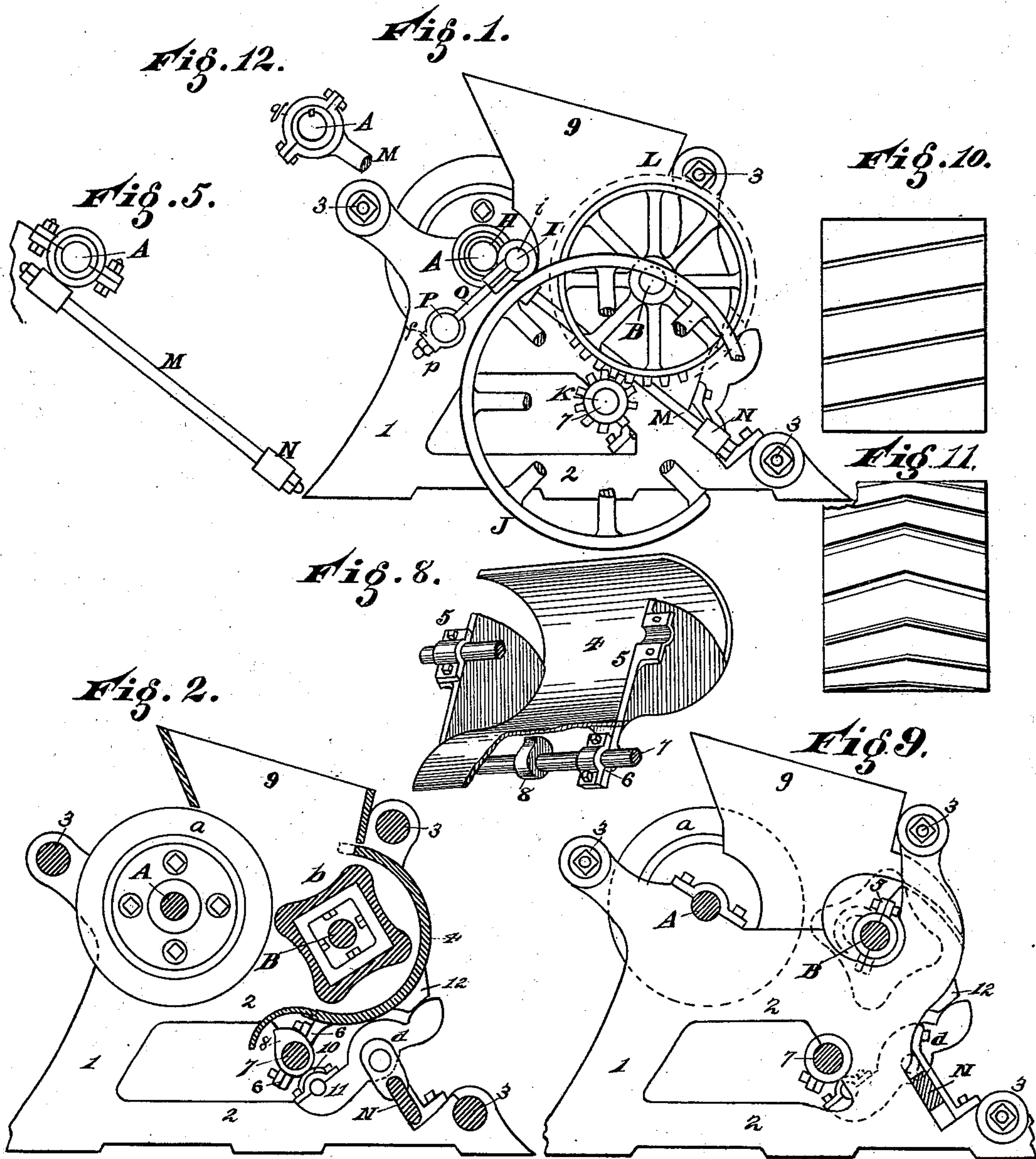
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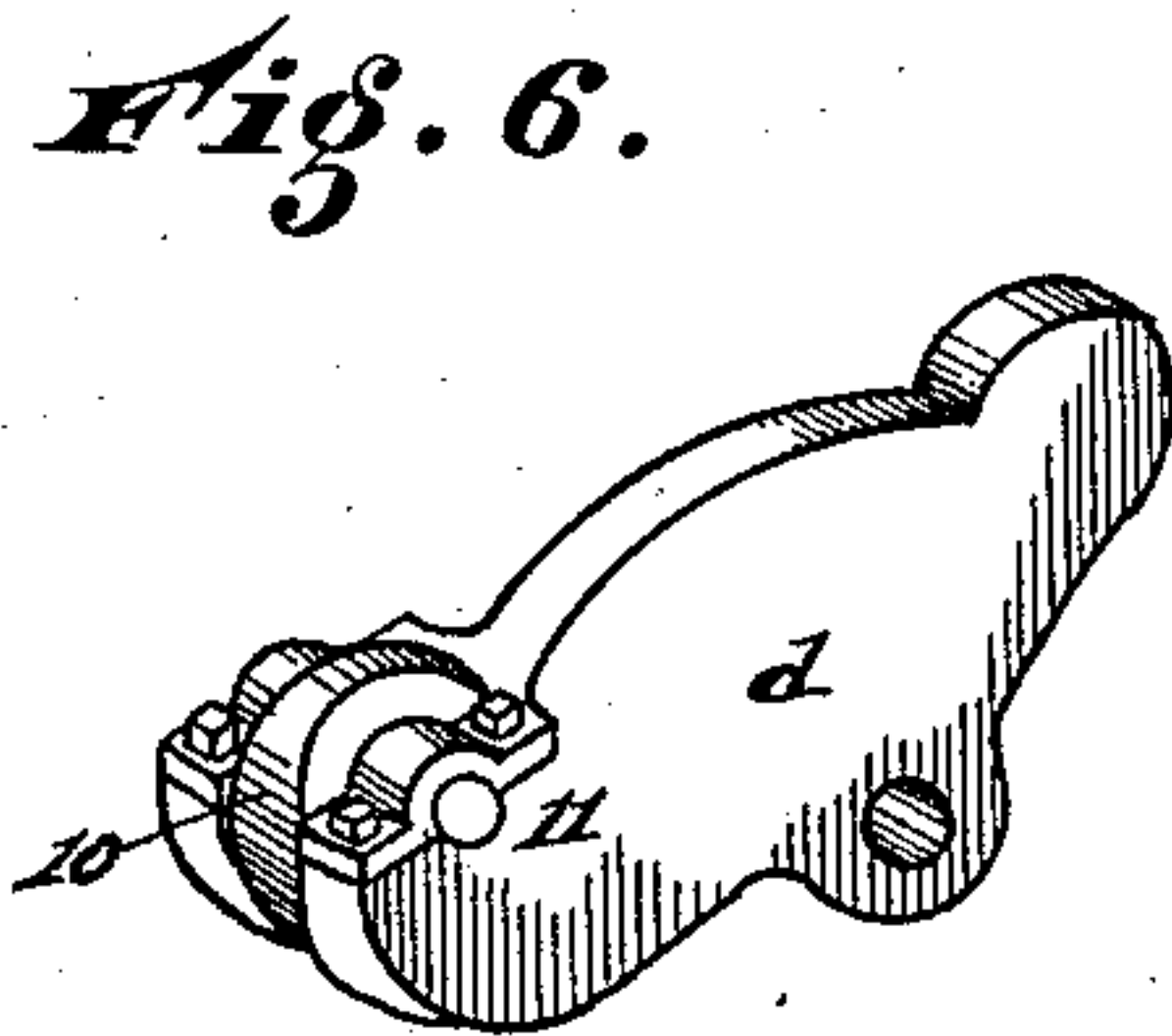
CLAY CRUSHER.

No. 369,086.

Patented Aug. 30, 1887.



Attest  
*J. Watson Sims*  
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Inventor  
*William H. Wallace*  
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his Attorneys &c

(No Model.)

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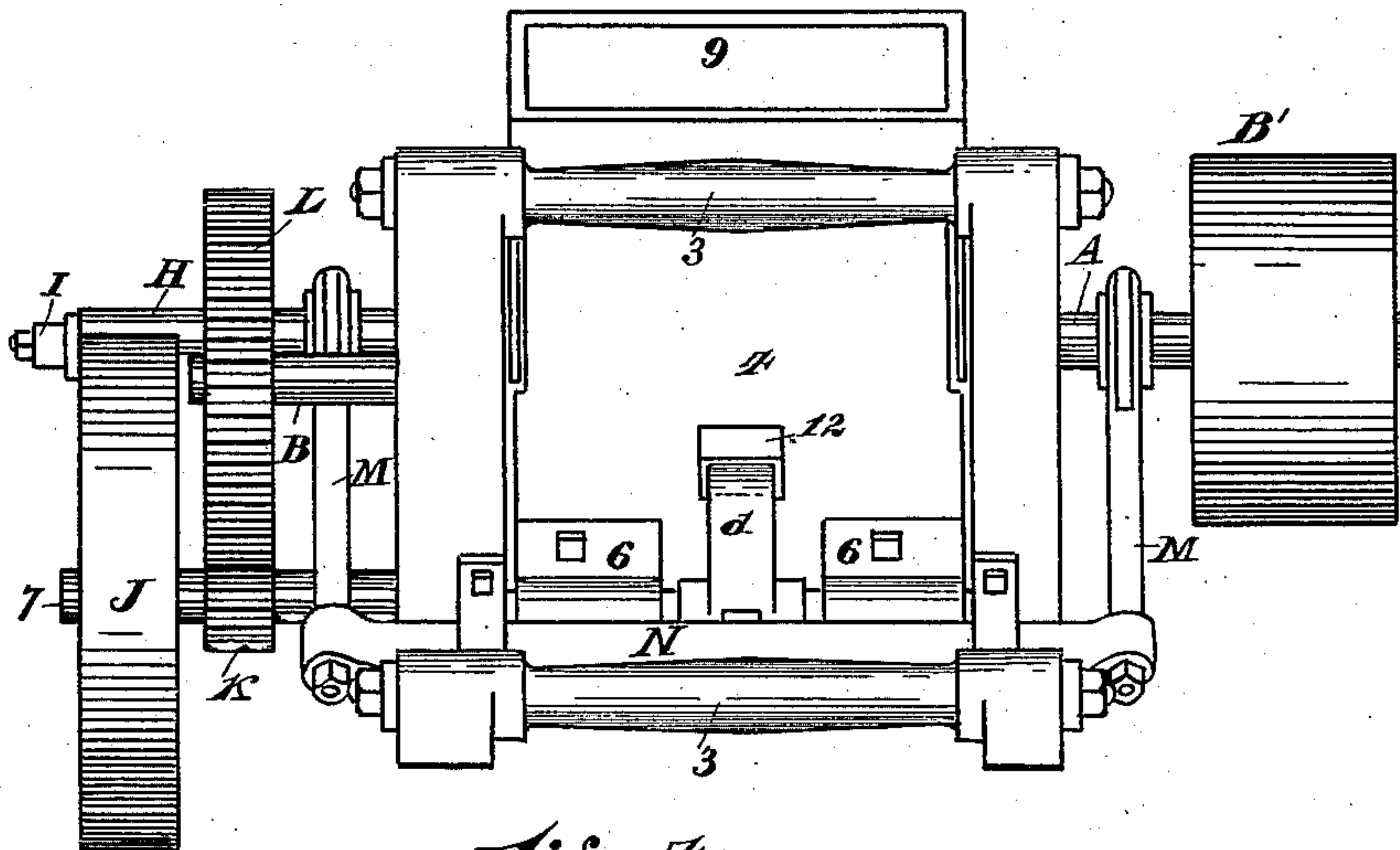
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CLAY CRUSHER.

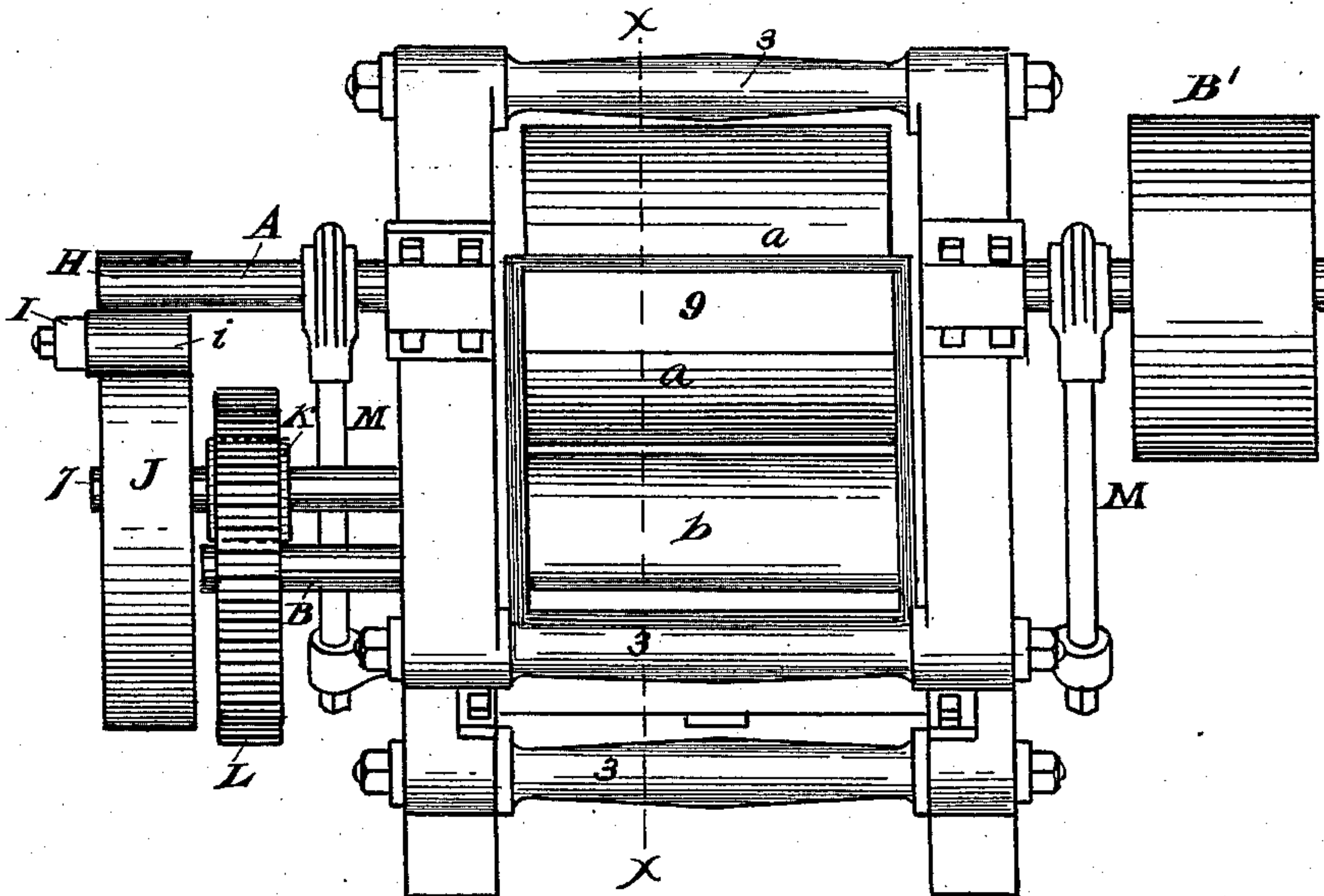
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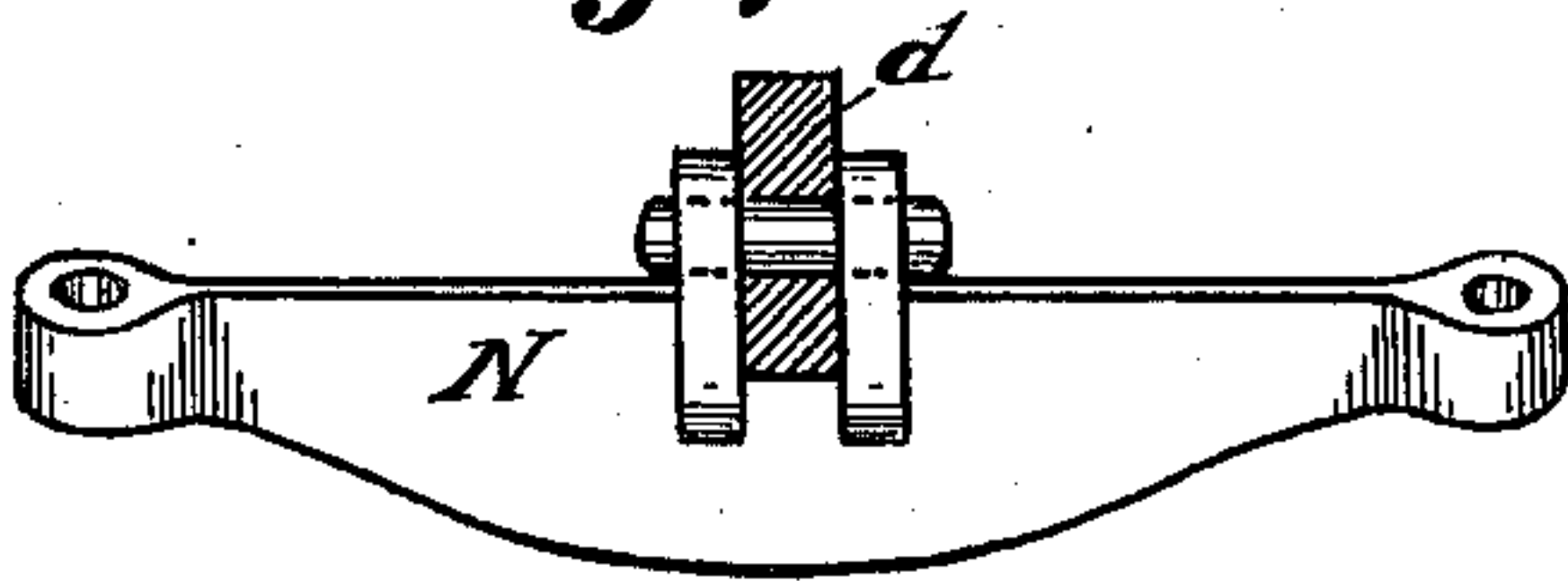
*Fig. 3.*



*Fig. 4.*



*Fig. 7.*



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# UNITED STATES PATENT OFFICE.

WILLIAM W. WALLACE, OF FRANKFORT, INDIANA.

## CLAY-CRUSHER.

SPECIFICATION forming part of Letters Patent No. 369,086, dated August 30, 1887.

Application filed March 29, 1886. Serial No. 197,054. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM W. WALLACE, a resident of Frankfort, in the county of Clinton and State of Indiana, have invented certain new and useful Improvements in Clay-Crushers, of which the following is a specification.

My invention relates to an improved clay-crushing machine in which one of the rollers is journaled in oscillating bearings and provided with irregular or cam faces, and operated so as to slide or draw across the face of a coacting crushing-roller revolving on a fixed axis. The faces of the coacting cam-roller, owing to its oscillations, draw or slide across the face of the opposite roller to pulverize stones or other hard substances which are often mixed with the clay.

Other objects of my invention relate to improved means for operating the parts, and will be fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side elevation of my improvement, partly in section. Fig. 2 is a section on line *x x*, Fig. 4. Fig. 3 is a modification of the adjustable brace-arms. Fig. 4 is a top plan view. Fig. 5 is a modification of the method of transmitting power from the main driving-shaft. Fig. 6 is a detail view of the vibrating arm for moving the oscillating roller. Fig. 7 is a detail view of the support of the vibrating arms shown in Fig. 6. Fig. 8 is a perspective view of the oscillating frame. Fig. 9 is a sectional elevation showing the movements of the oscillating roller and frame. Figs. 10 and 11 are modifications of the faces of the roller revolving on a fixed axis. Fig. 12 represents a modification of the adjustable arms shown in Figs. 3 and 4.

1 represents posts of the frame.

2 represents the cross-pieces of the frame.

3 represents transverse tie-rods for rigidly uniting the sides of the frame together.

A represents the main driving-shaft, which is suitably journaled to the frame 1 of the machine.

B' represents the main driving-pulley, mounted on shaft A.

a represents a crushing-roller keyed to the main shaft A.

b represents a crushing-roller having several irregular or cam faces, preferably of the form shown in Figs. 2 and 9. It is preferably desirable to have the crushing-faces of this many-sided roller work in nearly uniform proximity to the face of the cylindrical or fixed axial roller, so as to give a drawing motion and a biting action, due to the rapid approach of portions of the faces to the opposite roller. This is accomplished by the following instrumentalities: 4 represents a frame-piece, to which the shaft of the roller b is journaled by means of boxes 5. The lower end of this frame is provided with bearings 6, in which journals a transverse shaft, 7, which is likewise journaled to the frame of the machine.

8 represents a cam keyed upon the shaft 7 centrally between the two sides of the frame. The upper portion of the shell 4 projects under the hopper 9, as shown in dotted lines, Fig. 2, the dotted lines showing the limit of its inward movement. Shaft 7 serves as a center for the frame-piece 4 to vibrate upon, in order that roller b may be moved to and from the roller a, so as to preserve approximately a uniform distance between the crushing-faces. This oscillating movement is obtained by means of the cam 8, working against the friction-roller 10, journaled at 11 on the oscillating arm d, which arm is pivotally supported and connected to the frame of the machine by means of the adjustable arms M, as shown in Figs. 1 and 5.

Cam 8 is speeded so as to revolve four times as fast as roller b, and the cam is of such shape as to move the arm d in the frame 4 forward and backward to maintain the uniform proximity of the crushing-surfaces of the roller b to roller a, which gives the drawing and biting action and crushes the stones and clay fed in between the faces of the crushing-rollers.

12 represents a lug projecting centrally from the frame-piece 4, against which the free end of arm d rests. It is of sufficient size and strength to furnish the proper working-surfaces.

In order to prevent the breaking of the parts of the machine when too large stones are introduced, and to provide a gradually-slowing motion, I have designed the following instru-



mentalties for transmitting motion from the main shaft A to the cam and roller *b* and their operative parts.

H represents a friction-wheel on shaft A.

5 I represents a transmitter-shaft journaled on adjustable arms O, and carrying a friction-wheel, *i*, which is in contact with and driven by friction-wheel 8.

10 J represents a friction-wheel on shaft 7. This friction-wheel is in contact with and receives its motion from friction-wheel *i*.

15 K represents a spur-wheel keyed upon shaft 7 and driving gear-wheel L, keyed upon shaft B of roller *b*. As the oscillating frame 4, in which the shaft B is journaled, oscillates upon shaft 7, the gear-wheels K and L have the same center, and their mesh is preserved during the oscillating movements.

20 In order to regulate the frictional strain of transmitter *i*, I mount the same upon an adjustable arm, O, upon the upper end of which the friction-wheel *i* is properly journaled.

25 P represents a lug or stud rigidly secured to the frame 1, and it is pierced with an orifice to receive the shaft O.

*p* represents a nut tapping on the screw-threaded end of shaft O.

30 *f* represents a segmental washer the segment of which bears against the lug P, and the nut *p* bears against the plane face of said washer. As the nut *p* is turned up or down, the frictional contact of transmitter *i* is increased or diminished at will; hence by this means any desired amount of tension can be brought upon the friction-transmitter *i*.

35 In order to adjust the relation of the arm *d* to the lug 12, I have provided the following instrumentalities:

40 M represents supporting-arms upon each side of the machine, which I have shown connected to the shaft A in two ways. In Figs. 1 and 12 the cross-bar is provided with an eye-bearing, through which shaft A passes, and forms a journal-bearing for the arms M. The cross-piece *n* is provided with ears through which the arms M pass, and the parts are secured by nuts upon the ends of the arms M. These nuts may be turned up or down, so as to adjust the relation of arm *d*, which is journaled thereto in the slot N.

50 It is sometimes desirable to give a slight vibratory motion to roller *b* in addition to the oscillating motion imparted through the medium of the cam 8, arm *d*, and lug 12. This is accomplished by means of the eccentric *q* (shown in Fig. 12) on shaft A, on which journals the eye-bearing of the arm M. This eccentric gives a slight vibratory motion to the cross-arm *n* to more effectually crush or reduce hard substances.

60 In order to prevent the faces of the rollers A B from coming together, the customary coiled springs used in roller-mills may be employed, if desired.

65 I do not wish to limit myself to the cylindrical form of the roller A, as it may be pro-

vided with varying forms of irregular faces, instead of being cylindrical, and still accomplish the same results, one of which forms is shown in Figs. 10 and 11.

The operation of my machine is as follows:

70 Clay is introduced into the hopper 9, and from thence is passed between the rollers A B. Power is transmitted to the rollers from pulley B', which drives the shaft A, and roller *a* 75 and the friction-wheels H i J transmit power to the shaft 7, which drives gears K L and shaft of roller *b*. The cam 8, keyed on shaft 7, comes in contact with roller 10 in arm *d*, vibrating said arm and oscillating the frame 80 4, so as to move the crushing-roller journaled in it to and from the roller *a*, to maintain the crushing-faces of the two rollers uniformly and give the drawing and biting motion to the approaching faces of roller *b*, crushing the 85 stones and foreign substances found in the clay. The shaft of cam 8 is speeded four times as fast as the shaft of roller *b*. The cam being properly adjusted, makes the roller *b* approach uniformly to and from the roller *a*, so as to 90 keep the faces of the two rollers very nearly in the same proximity, yet producing the irregular drawing and biting motion between the rollers which more effectually crushes stones and foreign substances.

95 Should large stones or other substances be introduced between the rolls, which cannot be crushed by them, the friction-gear allows the parts to slip under the increased heavy strains and prevents the breaking of the machine, 100 when it is stopped and the obstacles removed, or sometimes they are crushed by the increased strain by turning up the nuts *p*.

105 If the vibratory motion by means of the eccentric *q* is employed, supposing the eccentric to have one-eighth of an inch throw, a slight hammering motion is produced, which increases the tendency to crush the stones without materially injuring the uniform crushing of the clay.

110 Having described my invention, what I claim is—

1. In a clay-crushing machine, the combination, with a cylindrical roller, of a roller having alternating projecting or convex and retreating or concave portions or faces upon its periphery, an oscillating support for the shaft-bearings of said roller, and means, substantially as described, for actuating said support, substantially as described.

115 2. In combination with the cylindrical crushing-roller *a*, the roller *b*, having upon its face alternating projecting and retreating portions, a frame, 4, mounted pivotally and carrying said roller, and means, substantially as described, for oscillating said frame, as set forth.

120 3. The combination, with a cylindrical roller revolving on fixed bearings, of a coacting roller provided upon its face with alternately receding and projecting portions, a frame in which 125 said roller has bearing, a pivotal support for one end of said frame, a cam-lever oscillating



the frame on its support, and a cam driven by gearing actuated from the main shaft to cause said roller to rock or oscillate toward and from the cylindrical roller, substantially as described. 5

4. The combination, with the cylindrical roller *a*, of the roller *b*, shaped as set forth, the frame 4, having a pivotal support upon the shaft 7, the gear *L* on the shaft of roller 10 *b*, the spur-gear *K* on shaft 7, meshing with gear *L*, and the cam and cam-lever 8 and *d*, substantially as described.

5. In combination with the oscillating roller *b*, the frame 4, centered upon shaft 7, the cam, and vibratory arm arranged to intermittently 15 oscillate said frame 4, substantially as specified.

In testimony whereof I have hereunto set my hand.

W. W. WALLACE.

Witnesses:

W. H. RUSSELL,

A. S. KIRKPATRICK.