

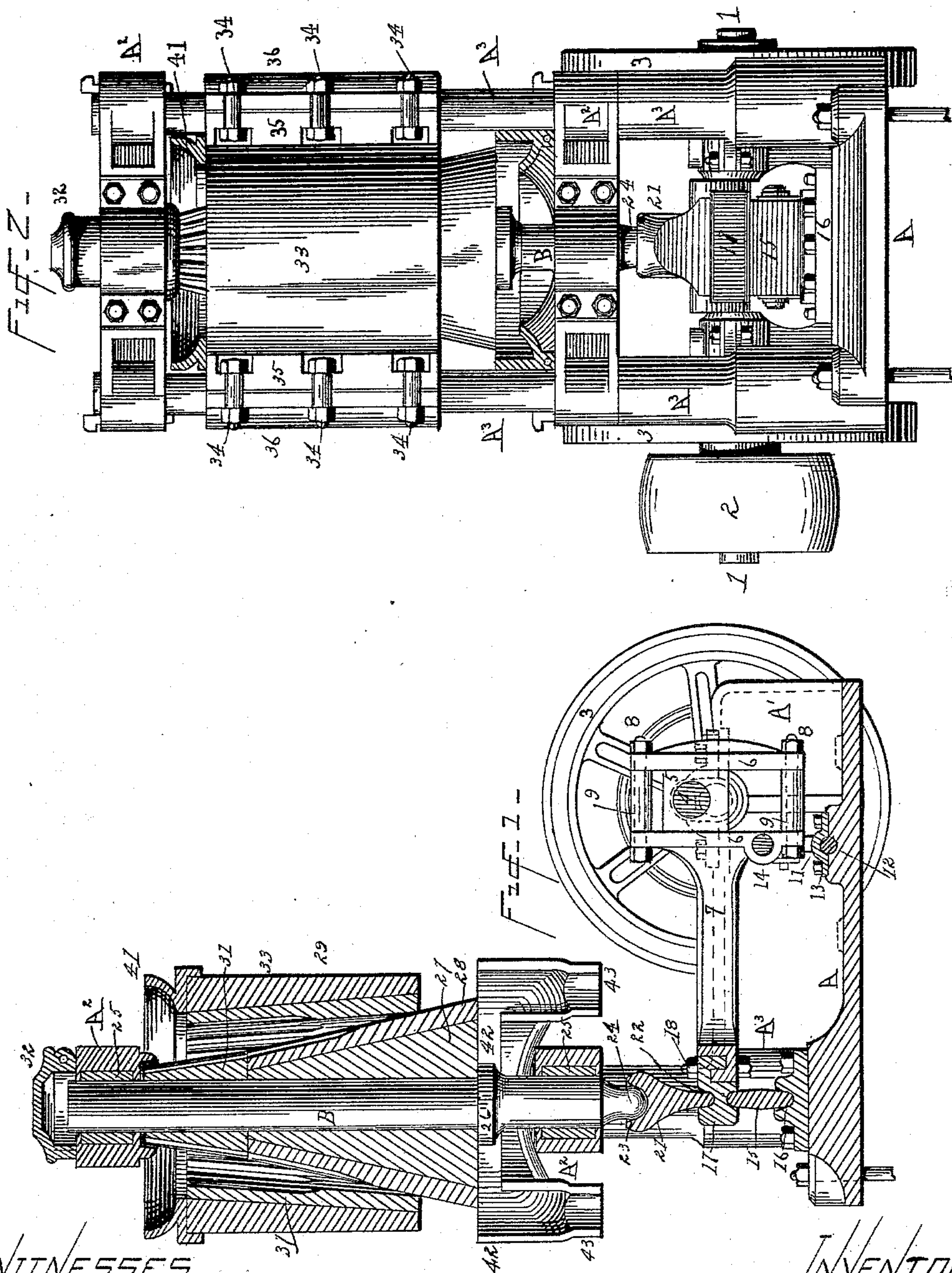
(No Model.)

2 Sheets—Sheet 1.

D. H. ANDERSON.
CRUSHER.

No. 411,881.

Patented Oct. 1, 1889.



WITNESSES.

Norris A. Clark.
L. M. Bartlett.

INVENTOR.

David H. Anderson
By W. A. Bartlett
att'y.

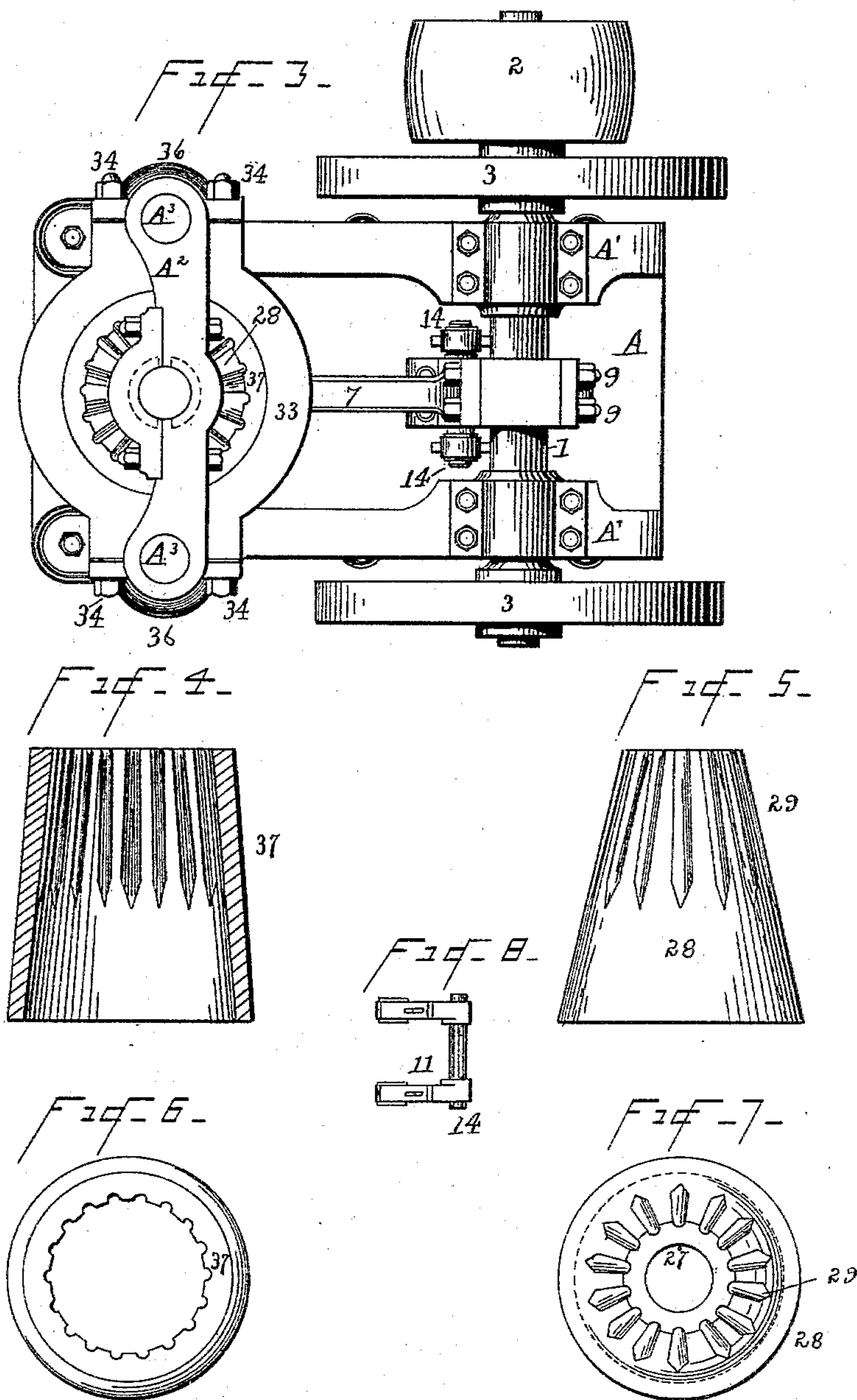
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Louis A. Clark
L. M. Bartlett.

INVENTOR.

David H. Anderson
Ray W. A. Bartlett
atty

UNITED STATES PATENT OFFICE.

DAVID H. ANDERSON, OF GRANITE, MONTANA TERRITORY.

CRUSHER.

SPECIFICATION forming part of Letters Patent No. 411,881, dated October 1, 1889.

Application filed September 17, 1888. Serial No. 285,567. (No model.)

To all whom it may concern:

Be it known that I, DAVID H. ANDERSON, residing at Granite, in the county of Deer Lodge, Montana Territory, have invented certain new and useful Improvements in Crushers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to rock or quartz crushers, which may also be used in breaking coal or similar substances.

The invention consists in the mechanisms and combinations hereinafter set forth.

The object of the invention is to simplify and make certain the operation of a rock-crusher.

Figure 1 is a vertical longitudinal section of the machine, some parts being shown in elevation. Fig. 2 is an end elevation, the hoppers being shown in section. Fig. 3 is a top plan of the machine. Fig. 4 is a vertical section of a crushing-shell detached, and Fig. 6 is a top plan of the same. Fig. 5 is a side elevation of the main cone, and Fig. 7 a top plan of the same. Fig. 8 is a detail of the swinging link.

The letter A indicates the frame of the machine. The frame has standards A', in which the crank-shaft 1 is mounted. This crank-shaft is driven by a belt or running pulley 2 and carries suitable fly-wheels 3 3. The crank or wrist pin 4 passes through a brass or box forming a bearing 5, which bearing slides in guideways 6 6, forming a bearing-head to the connecting-bar 7. The rotation of the crank will reciprocate the bearing 5 in its ways in a vertical direction and at the same time reciprocate rod 7 in horizontal direction. The ways 6 6 are held parallel by bolts 8 8 and spreaders or sleeves 9 9. The end of bar 7 next the crank is supported by a swinging link 11, which is sustained at its lower end 12 in a box 13 on the frame, and at its upper end forms a loop which enters a socket in bar 7. The link 11 is of the same length as the lower member 15 of a toggle-lever. The toggle member 15 is supported in a cup 16 on the base piece of frame A. The end 17 of bar 7 farthest from the crank may have a hook attached thereto by bolt 18 or otherwise, or the hook may be integral with the bar without

departing from the invention. The upper member 21 of the toggle-lever has one end resting in the cup 22 of the connecting-bar. The upper end of this toggle member forms a socket 23, which supports the ball 24 on the main shaft B of the machine. The shaft B slides vertically in bearings 25, which are preferably babbitted and sustained in the cross-girts A², which are by preference keyed to the upright columns A³ of the frame. The shaft B may be of steel or of iron with steel or chilled ball and collar. The collar 26 is preferably integral with the shaft and supports a cone or frustum 27, which has a hardened casing 28. The upper end of the cone or its cover may be fluted in any usual form, as indicated at 29. A second frustum 31 may be applied to the shaft B above the frustum 27, although it will be understood that these frustums may be made integral. The construction in sections is for convenience in large machines and to replace worn parts. A cap or cover 32 may extend over the top of shaft B. A strong shell 33 is attached to standards A³ by bolts 34, resting in notches in the flanges 35 of the shell and passing through similar notches in the edges of caps 36. Of course other usual forms of attachment may be employed to hold shell 33 in place. The shell 33 has a hardened lining 37, which is fluted in manner to correspond with the work to be done. This lining 37 can be replaced when worn. The shell 33 and its lining have a frusto-conical opening, largest at the bottom, but of less degree of taper than the cone 28. Consequently the space between the cone and shell will always be wider at the top than at the bottom. The shell 33 may be adjusted vertically on the columns A³ by loosening bolts 34 and tightening the same in a new position, thus determining the space between cone 28 and the shell at the bottom, which space will determine the fineness to which the rock will be crushed in operating the machine. An annular hopper 41 is attached to the upper portion of shell 33 and directs the coarsely-broken stone or quartz into the space between the cone and shell. An annular trough 42 is attached to the frame just below the cone and receives the broken stone from the machine. This trough has delivery-spouts 43

in convenient locations to deliver the broken material.

The operation of the machine is as follows: When the crank-shaft is rotated, the bar 7 is
5 caused to reciprocate, thus flexing and straightening the toggle-joint and alternately raising and lowering the main shaft and its cone attachments. The broken material in hopper 41 is allowed to fall into the shell as
10 the cone falls, and is then crushed between the shell and cone as the cone rises, the gradual narrowing of the annular space between the cone and shell as the material descends causing a constantly finer comminution of
15 the pieces, which finally drop into the trough 42 and escape by spouts 43. The cup at top of toggle-lever 21 permits a lubrication of the bearing-ball of the main shaft at that point.

While the rocking link 11 is a great help
20 to the ease and uniformity of operation of the larger machine, small machines may be made with pitman-connection in any usual form without departing from the spirit of my invention so far as the crushing mechanism is
25 concerned.

What I claim is—

1. The combination, in a crusher, of the crank-shaft, a bearing-box therefor, a connecting-bar provided with vertical slideways
30 embracing the bearing-box, and a toggle-lever for actuating the cone and coupled to the connecting-bar, substantially as described.

2. In a crusher, a toggle-lever actuating the cone, a connecting-bar coupled to said toggle-lever and having a slideway at its other
35 end, a crank and a bearing in the slideway, and a swinging link connected to the bar and to the frame, all combined substantially as described.

40 3. In a crusher, a vertically-reciprocating shaft, a toggle-lever supporting the same,

and a connecting-bar interposed and forming the sockets for the adjacent ends of the toggle-levers, said bar connected to the driving mechanism, all combined substantially as
45 described.

4. The combination, in a crusher of the character described, of a vertically-reciprocating conical plunger and a surrounding shell having a conical chamber therein, substan-
50 tially as described.

5. The combination, in a crusher of the character described, of a vertically-reciprocating conical plunger and a surrounding shell having a chamber of less taper than the
55 taper of the cone, substantially as described.

6. In a crusher, the combination of a vertically-reciprocating conical plunger having a fluted surface and a surrounding shell having a less taper than the plunger.
60

7. In a crusher, the combination of a vertically-reciprocating conical plunger and a surrounding shell fluted on its interior surface, substantially as described.

8. The combination, in a crusher, with a
65 vertically-reciprocating conical plunger, of a surrounding shell having conical chamber, said shell being vertically adjustable on its supports, as set forth.

9. The combination, in a crusher, of a ver-
70 tically-reciprocating conical plunger having its base downward and a shell having a hardened interior lining with a surface of less taper than the taper of the plunger, substantially as described.
75

In testimony whereof I affix my signature in presence of two witnesses.

DAVID H. ANDERSON.

Witnesses:

W. E. EVANS,
F. H. BIRD.