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PATENTED JULY 23, 1907.

W. J. BELL.

MACHINE FOR CRUSHING AND PULVERIZING.

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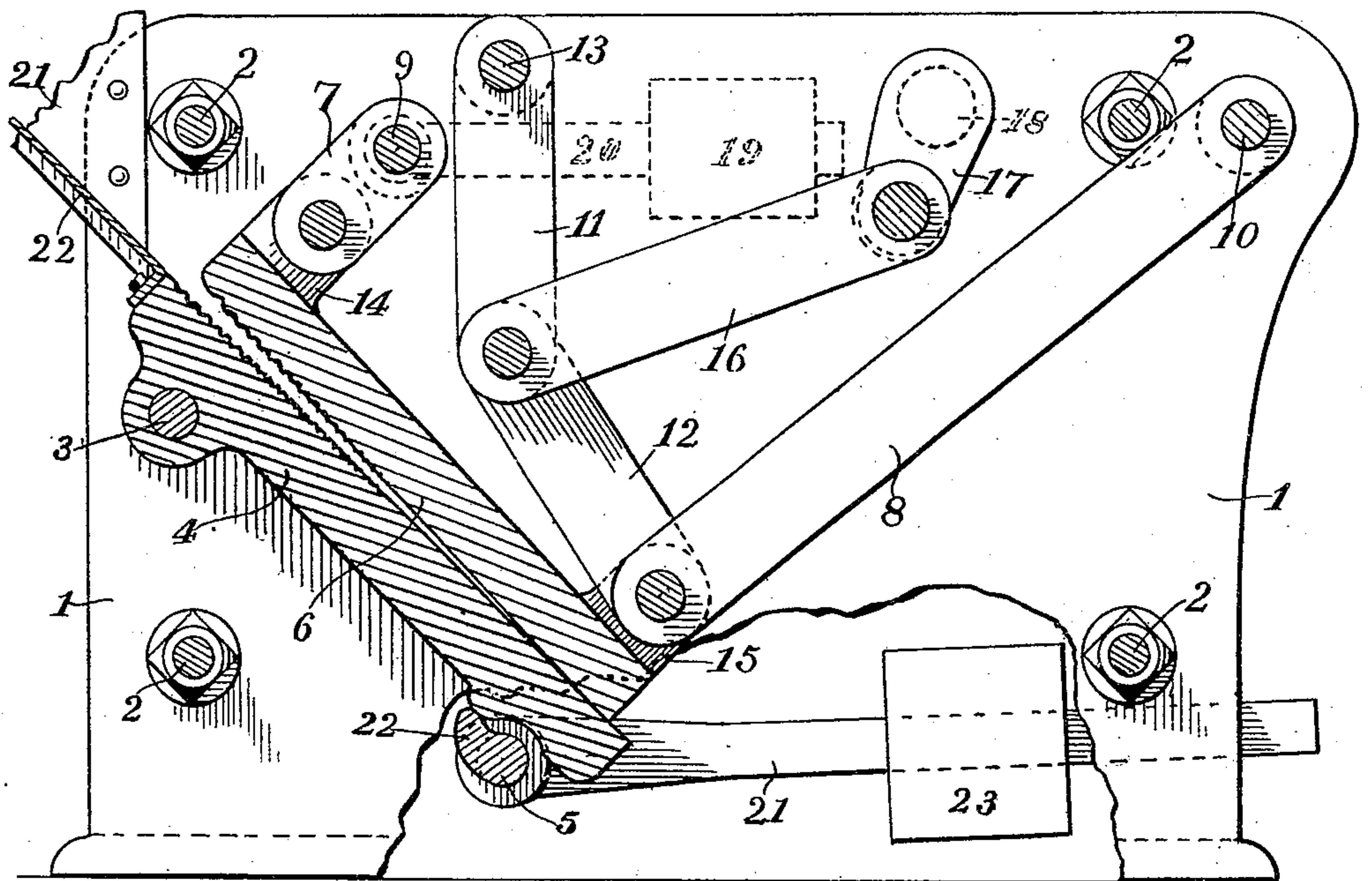


Fig. 1.

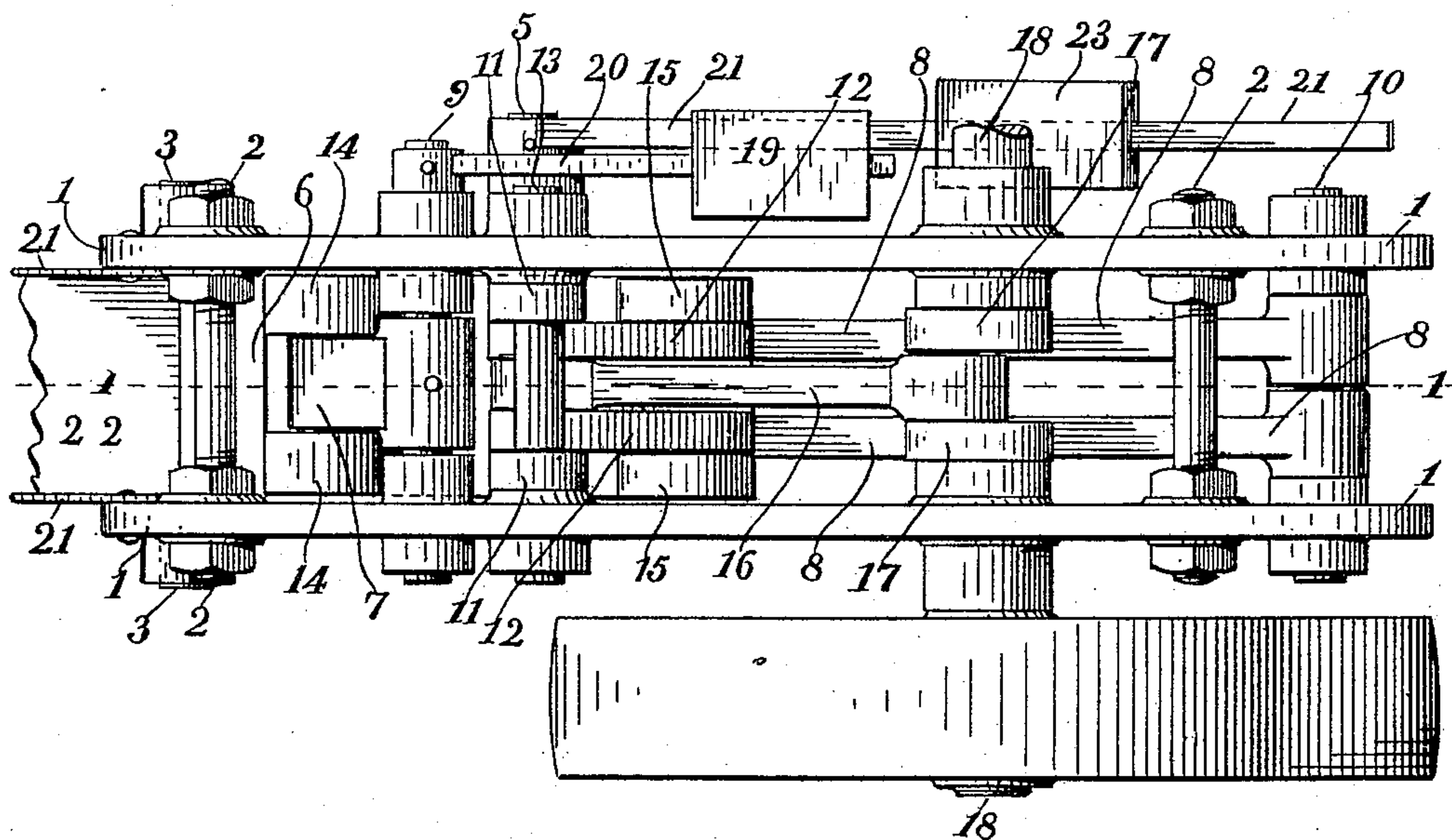


Fig. 2.

Witnesses

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MACHINE FOR CRUSHING AND PULVERIZING.

No. 860,783.

Specification of Letters Patent.

Patented July 23, 1907.

Application filed October 31, 1905. Serial No. 285,281.

To all whom it may concern:

Be it known that I, WILLARD J. BELL, a citizen of the United States, residing at Newaygo, in the county of Newaygo and State of Michigan, have invented certain
5 new and useful Improvements in Machines for Crushing and Pulverizing; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

10 My invention relates to improvements in machines for crushing and pulverizing, and more particularly to machines for pulverizing or grinding materials for making cement in the process of its manufacture; and its object is to provide the device with various new and
15 useful features hereinafter more fully described and particularly pointed out in the claims.

My invention consists essentially of the combination and arrangement of a machine comprising an adjustable stationary jaw, a movable jaw opposing the same, and
20 means for moving the movable jaw in the arc of a circle at its respective ends, said arcs having different radii, whereby the movable jaw reciprocates longitudinally of the stationary jaw, and also moves toward and from the same, and whereby a combined sliding and crush-
25 ing movement of the jaw is produced, as will more fully appear by reference to the accompanying drawings, in which:

Figure 1. is a vertical section of a device embodying my invention taken on the line 1—1 of Fig. 2.; and, Fig.
30 2. a plan view of the same.

Like numbers refer to like parts in both of the figures. The case or frame consists of plates 1, 1 arranged in parallel vertical planes connected and spaced apart by means of tie bolts 2.

35 3 is a pivot pin supporting the upper end of the lower jaw 4, the other end of which jaw is yieldingly supported upon a pivoted lever comprising a short arm 22 engaging and supporting the jaw, and projecting from a rock shaft 5 journaled in the plates 1—1 and having attached
40 an arm 21 forming the long arm of the lever on which is adjustably mounted a weight 23.

Opposite the lower jaw is a jaw 6 arranged with its lower end contacting the jaw 4 for finely pulverizing the material and with its upper end spaced apart therefrom
45 to receive the material therebetween when in its coarser condition. This jaw 6 is carried at its upper end by a short arm or link 7 mounted on a rock-shaft 9 journaled in the frame, and at its lower end is carried on the ends of long arms 8 mounted on a rock shaft 10 also journaled
50 in the frame, these arms being pivotally connected to the lugs 14 and 15 on the ends of the jaw 6. Fixed on the rock-shaft 9 is a lever 20 provided with a weight 19 to counterbalance the jaw 6 and parts attached thereto.

To operate the jaw 6, I provide toggle levers consisting
55 of the members 11 and 12 pivoted to each other at their

adjacent ends and at their outer ends pivoted to the frame by a shaft 13 and to the lugs 15 on the movable jaw. The middle joint of this lever is oscillated by means of a connecting rod 16 pivoted to the middle joint at one end and connected to a crank 17 in a driving
60 shaft 18 journaled in the frame and rotated by any suitable means. These toggle levers oscillate both ways from a right line position, whereby two complete movements of the jaw 6 are effected by one revolution of the driving shaft.

21 represents the sides and 22 the bottom of the hopper for feeding the material to the machine.

In operation the short arm 7 will move in the arc of a smaller circle than the long arm 8 so that the jaw 6 will at its upper end approach and recede to and from the
70 jaw 4 to a greater extent than at its lower end and thus will both crush and roll the material between the upper ends of the jaws. As the material passes downward, the jaws approach more closely to each other and the lower end of the jaw 6 being mounted on an arm of longer ra-
75 dius, moves more nearly parallel with the surface of the stationary jaw 4, and the movement is rendered wholly so by the yielding pressure of the lever supporting the lower end of the jaw 4. Furthermore should any very hard substance such as a piece of iron get between the
80 jaws, this support will yield and allow said substance to pass through without breaking or stopping the machine. The material is thus subjected to a different movement of the jaws as it is made finer, the general result being that this compound crushing and sliding movement
85 will first break or crush the material to a granular condition and then grind the same to a very fine powder all at one continuous operation. The machine is thus eminently adapted for use in the manufacture of ce-
90 ment and like uses, where the material is to be reduced from a granular condition of considerable size known as "cinder" to a very fine powder.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent is;

1. In a machine for crushing and pulverizing, in combi-
95 nation with a longitudinally movable jaw adapted to move in an arc of comparatively short radius at the upper end and moving in an arc of comparatively long radius at the lower end, means for moving said jaw, and a comparatively stationary jaw opposite the movable jaw and arranged in
100 contact therewith at the lower end, and also spaced apart therefrom at the upper end.

2. In a machine for crushing and pulverizing, the combination of a substantially stationary jaw, a movable jaw opposite the same, a pivoted arm of comparatively short
105 radius supporting the upper end of the movable jaw, pivoted arms of comparatively long radius supporting the lower end of the same, and means for oscillating the arms and movable jaw about the pivots of the arms.

3. In a machine for crushing and pulverizing, the combi-
110 nation of a substantially stationary jaw, a pivotal support for the upper end of the same, a yielding support for the lower end of the same, a movable jaw slidably engaging

the lower end of the stationary jaw, pivoted arms of comparatively long radius supporting the lower end of the movable jaw, an arm of comparatively short radius supporting the upper end of the same, and means for oscillating the arms and movable jaw.

4. In a machine for crushing and pulverizing, a yieldingly supported jaw, a movable jaw opposite the same, a short pivoted arm supporting one end of the movable jaw, a longer pivoted arm supporting the other end of the same. toggle levers connected to the movable jaw, and means for oscillating the middle joint of said lever.

5. In a machine for crushing and pulverizing, an inclined jaw pivoted at the upper end and yieldingly supported at the lower end, a movable jaw opposite thereto, a short pivoted arm supporting the upper end of the movable jaw, a longer pivoted arm supporting the lower end of the movable jaw, toggle levers attached to the jaw and oscillating oppositely from a right line position, a crank shaft, and a rod connecting the crank shaft and the lever.

6. The combination of plates arranged in parallel, vertical planes and spaced apart, a pivot pin and a lever supported by the plates, a weight on the lever, a yielding jaw supported by the pin and lever, a movable jaw, a short arm

pivoted to the plates at one end and to one end of the movable jaw at the other end, a long arm pivoted to said plates at one end and to said jaw at the other end, toggle levers pivoted to the plates at the one end and to said jaw at the other end, a crank shaft, and a rod connecting the crank shaft and middle joint of the lever.

7. The combination of an inclined and yieldable jaw, a movable jaw above the same, a short arm pivoted to the upper end of the movable jaw, a rock shaft on which said arm is mounted, a counter balance weight attached to said shaft, a longer arm pivoted to the lower end of the movable jaw at one end and to a rock shaft at the other end, toggle levers connected to the movable jaw and oscillating oppositely from a right line position, a crank shaft, means for rotating the shaft, and a rod connecting the crank shaft and the middle joint of the lever.

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

WILLARD J. BELL.

Witnesses:

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L. F. ECKARD.