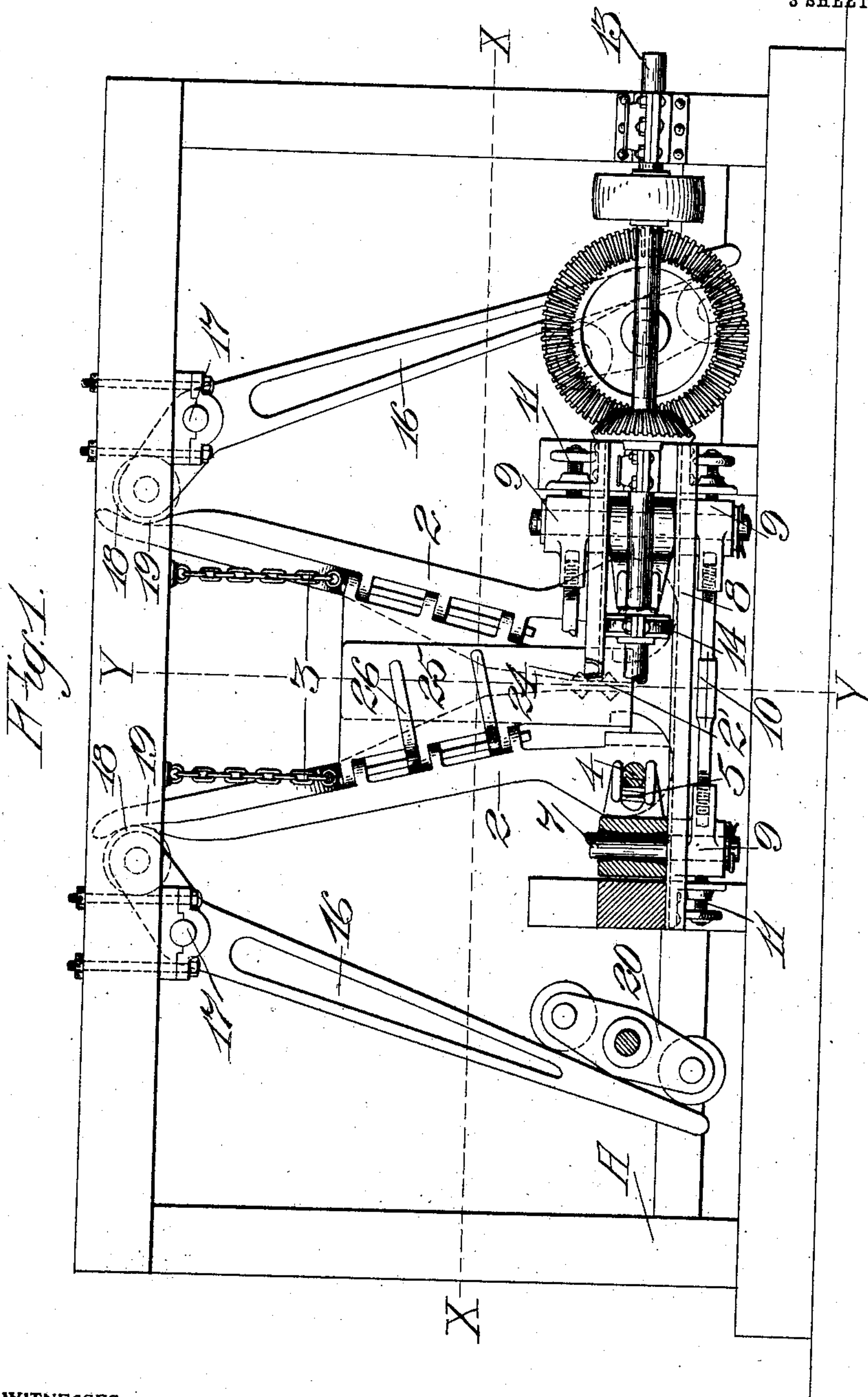


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 ROCK CRUSHER AND PULVERIZER.
 APPLICATION FILED NOV. 5, 1907.

906,790.

Patented Dec. 15, 1908.

3 SHEETS—SHEET 1.



WITNESSES

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J. H. Gause

INVENTOR

William H. Fulcher
 BY *Geo H. Strong*

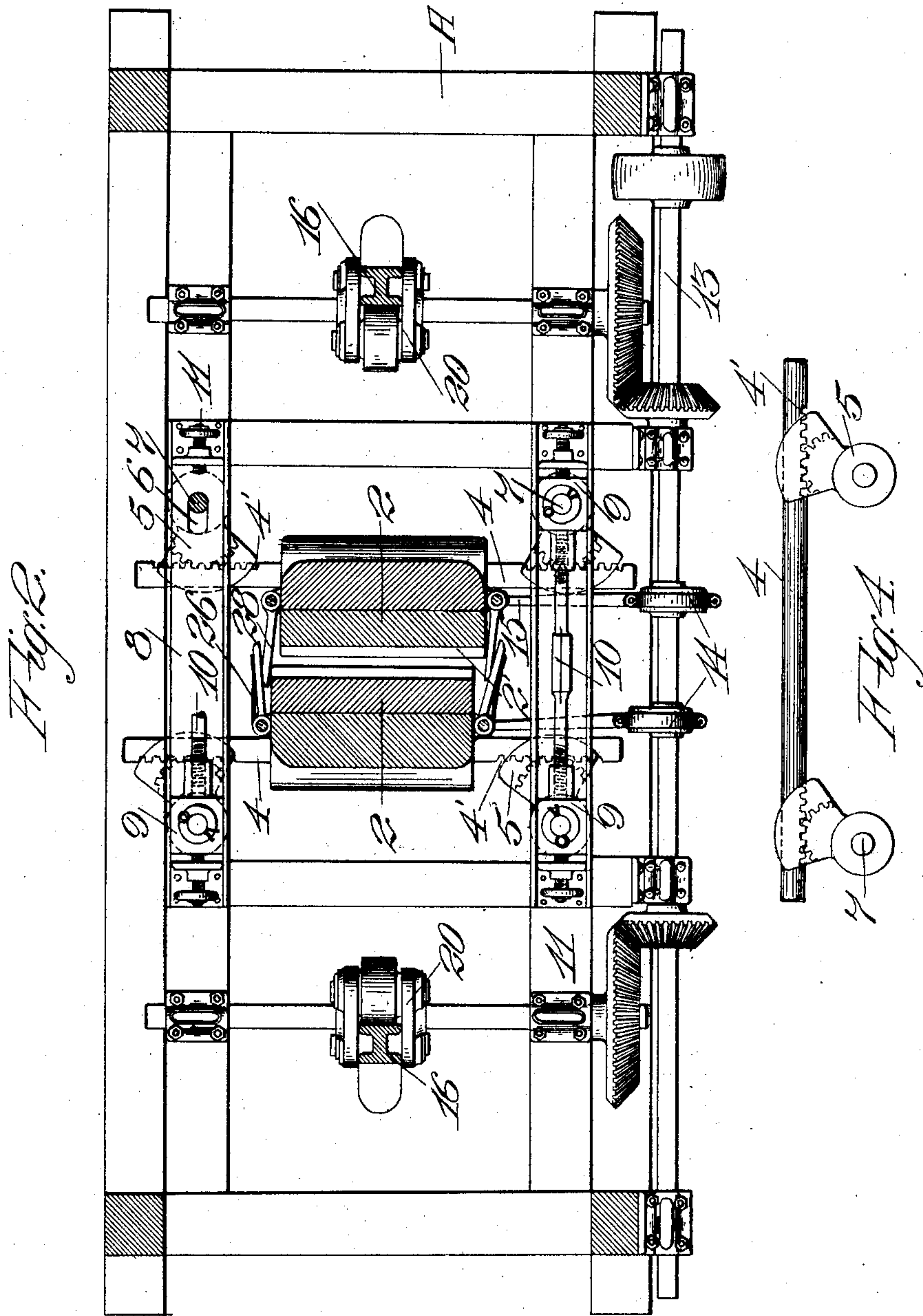
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WITNESSES

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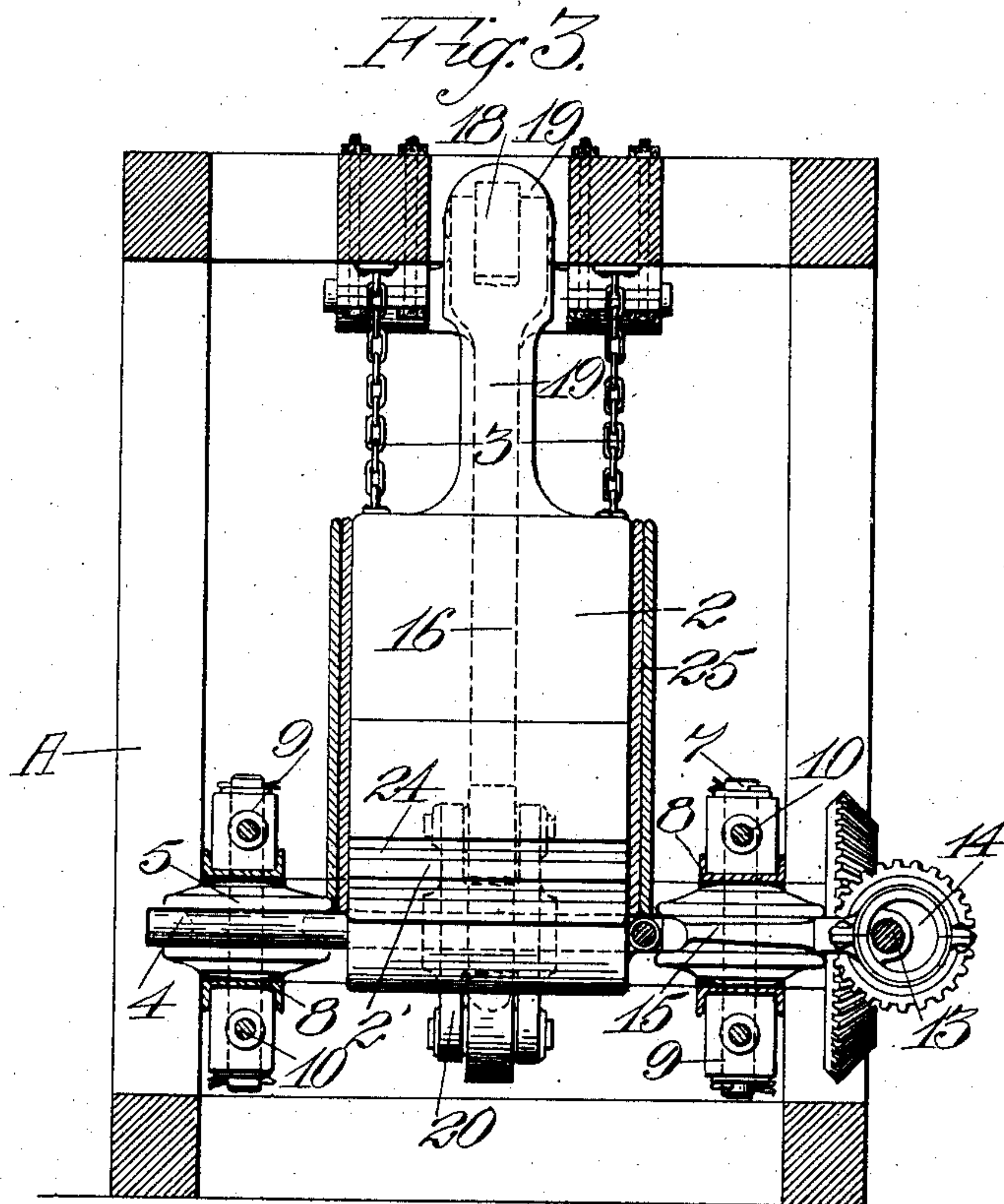
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3 SHEETS—SHEET 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM H. FULCHER, OF OAKLAND, CALIFORNIA, ASSIGNOR TO TEDDY JAW PULVERIZER COMPANY, OF OAKLAND, CALIFORNIA, A CORPORATION OF CALIFORNIA.

ROCK CRUSHER AND PULVERIZER.

No. 906,790.

Specification of Letters Patent.

Patented Dec. 15, 1908.

Application filed November 5, 1907. Serial No. 400,742.

To all whom it may concern:

Be it known that I, WILLIAM H. FULCHER, citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Rock Crushers and Pulverizers, of which the following is a specification.

This invention relates to a mill for crushing and pulverizing ore, rock, and other material.

The object of the invention is to provide an apparatus of this character which shall be simple in construction, powerful, with a maximum capacity, and capable of ready adjustment as wear takes place; which shall combine with the ordinary crushing, oscillating movement of a rock crusher, an additional sidewise grinding motion of the jaws in opposite directions, for the purpose of pulverizing and grinding the ore or rock.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a side elevation and partial section of the invention. Fig. 2 is a horizontal plan view and section on line X—X, Fig. 1. Fig. 3 is an end elevation and section on line Y—Y, Fig. 1. Fig. 4 shows the fulcrum shaft and the cam segments.

A represents a frame-work of suitable description. On this frame-work is hung the crushing jaws 2 by suitable means, as the chains 3. The lower ends of these jaws each fulcrum on a transverse pivot shaft 4, and the ends of each fulcrum shaft are suitably journaled in the grooves of the segmental blocks 5. There is one of these segments 5 for each end of each fulcrum shaft 4, and each segment has a hub portion 6 through which passes a vertical pivot pin 7. The bearings for the segments 5 are sufficiently loose to provide for the necessary vertical motion to which the jaws may be subjected during their reciprocation. The pivot pins 7 pass through slots in the top and bottom guide channels 8, suitably fixed in the frame. A box or dolly-block 9 fits over each end of each pivot pin 7, and the opposed pairs of these dolly-blocks on each side of the jaws are connected by the right and left threaded tension rods or bolts 10. Thus, by turning all the ends of the jaws 2 are brought closer to-

gether, to compensate for the wear on the crushing faces 2' of the jaws, or to adjust the jaws to crush different sized material. Correspondingly, by turning the rods 10 in the opposite direction, the wearing faces of the jaws are separated. In order to prevent endwise movement or displacement of the bearings and accompanying parts for the lower ends of the jaws, suitable means, as the locking screws 11, may be employed; these screws 11 being appropriately journaled in a fixed part of the frame and adapted to bear against the rear sides of the dolly-blocks 9.

The grooved segments 5 supporting each jaw, have suitable rack and gear connections 4', through rods 4, whereby the rocking movements of the segments of each pair are made uniform. The bottoms of the grooves in the segments 5 are preferably made eccentric to the pivots 7, as shown, for the purpose of alternately bringing the lower ends of the jaws closer together and slightly opening them more, at each sidewise movement of the jaws, so that there is a compound crunching and rubbing action on the material proximate to the point of discharge. The movement of the jaws towards and from each other by the eccentric segments need not exceed a quarter of an inch.

By flexibly supporting the jaws from overhead, as by the chains 3, and fulcruming the lower ends of the jaws on the rockable members 5, a lateral oscillation is easily imparted to the jaws by suitably connecting the latter with the line shaft 13. Thus, in Fig. 2, this line shaft extends along one side of the mill, and carries two eccentrics 14 which are suitably connected by the links 15 with the jaws, these connections and eccentrics being so arranged that the jaws will be laterally oscillated simultaneously in opposite directions, whereby a perfect grinding movement of the working faces of the jaws will be secured.

The rocking of the jaws on the pivots 4 to secure the crushing action is accomplished by suitable means, as the bent levers 16, which are fulcrumed at 17; each lever carrying a roller 18 at one end operating on a suitable cam surface of a rigid arm extension 19 of a jaw 2. The opposite end of each lever 16 is arranged in the path of a roller-bearing cam 20 mounted on the cross shaft 21, these cross shafts 21 carrying miter gears 22 engaging corresponding gears 23 of the line shaft 13. The movements of the cams 20 and the ec-

centrics 14 are so timed that as the jaws are closed to crush the material, the lower ends of the jaws at the same time are shifted side-wise in opposite directions, to produce the pulverizing and rubbing action desired in some forms of work for which this mill is particularly adapted.

It will be observed that the working faces 2' of the jaws are provided with V-shaped pockets or recesses 24. These pockets are so arranged with respect to one another that they will hold a certain amount of the crushed ore, so that in the grinding action produced by the lateral movement of the jaws, the ore in one pocket will form an opposed or grinding and bearing surface for the ore in the other pocket; and thus relieve, to a certain extent, the wear on the jaws themselves.

The sides 25 of the mill, between which the jaws operate, are so constructed as to adapt the jaws to their compound crushing and lateral grinding movements, and yet retain uncrushed material between the jaws. As here shown, the sides 25 are made in coacting, hinged, overlapping sections; a section being hinged to each side of each jaw; and the sections yieldingly pressed in always against the jaws to form a hopper space, by suitable means, as the springs 26.

The throat portion of the crusher is so constructed that there will always be a slight opening for the discharge of the crushed material from the pockets and from between the jaws, so that there will be no danger of the mill choking.

This invention is not limited in its uses simply to crushing and breaking rock, like most rock crushers and breakers, but it is designed for use as a grinding mill for pulverizing auriferous and other value-bearing ores. By reason of the construction, and of the various motions of the jaws, I produce a grinding, pulverizing, jaw mill with a vertical underneath discharge.

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

1. In an apparatus of the character described, a pair of jaws flexibly suspended at their upper ends and pivotally supported at their lower ends, means for rocking the jaws toward and from each other on the said pivots, and means for coördinately shifting the jaws sidewise in opposite directions during said pivotal movement.

2. In an apparatus of the character described, a pair of coacting crushing jaws pivotally supported at one end, means for rocking the jaws on the pivots towards and from each other, and means for giving the jaws a sidewise grinding movement in opposite directions coördinately with the oscillating and crushing movement of the jaws.

3. In a rock crushing apparatus, a pair of

crushing jaws, means for rocking the jaws towards and from each other, and means for simultaneously imparting a sidewise grinding motion to the jaws.

4. In a rock crushing mill, a pair of pivoted crushing jaws, the pivots of the jaws mounted in rockable bearings whereby the jaws may have a lateral motion with respect to their plane of oscillation towards and from each other, means for effecting said lateral motion, and means for oscillating the jaws towards and from each other.

5. In a rock crushing mill, a pair of flexibly suspended jaws, pivots for the jaws, rockable bearings for the pivots, said rockable bearings turning on vertical axes, means for rocking the jaws on said bearings, and means for imparting an oscillating motion to the jaws towards and from each other.

6. In a crushing mill, a pair of crushing jaws, turnable on horizontal pivot shafts towards and from each other, means for effecting said pivotal movement, grooved segments turnable on vertical axes and supporting said pivot shafts for the jaws, adjustable connections between the opposed segments whereby the jaws are adjustable towards and from each other, and means for giving the jaws a sidewise grinding motion on said segments.

7. A grinding mill comprising a pair of crushing jaws, flexible supporting means for the top of the jaws, horizontal pivots for the lower ends of the jaws, rockable bearings for said pivots, means for giving the pivoted ends of the jaws a sidewise grinding motion, means for operating the jaws towards and from each other, and adjustable connections between the bearings for said pivots, whereby the jaws are adjustable towards and from each other.

8. In a rock crushing mill, a pair of crushing jaws, means for giving the jaws a crushing motion towards and from each other, means for simultaneously imparting a sidewise grinding motion to the jaws, and means for adjusting the jaws towards and from each other.

9. In an apparatus of the character described, a pair of coacting crushing jaws pivotally supported at one end, means for rocking the jaws on the pivots towards and from each other, means for giving the jaws a sidewise grinding movement in opposite directions coördinately with the oscillating and crushing movement of the jaws, and yielding sides between which the jaws operate.

10. In a rock crushing apparatus, a pair of crushing jaws, means for rocking the jaws towards and from each other, means for simultaneously imparting a sidewise grinding motion to the jaws, and side members coacting with the jaws to inclose a hopper space.

11. In a crushing mill, a pair of crushing

jaws, turnable on horizontal pivot shafts towards and from each other, means for effecting said turnable movement of the jaws, eccentrically grooved segments turn-
5 able on vertical axes and supporting said pivot shafts for the jaws, adjustable connections between the opposed segments whereby the jaws are adjustable towards and from each other, and means for giving the
10 jaws a sidewise grinding motion on said segments.

12. In a crushing mill, a pair of crushing jaws, turnable on horizontal pivot shafts towards and from each other, means for
15 effecting said turnable movement of the jaws, eccentrically grooved segments turnable on vertical axes and supporting said pivot shafts for the jaws, adjustable connections between the opposed segments whereby the jaws are

adjustable towards and from each other, 20 and means for giving the jaws a sidewise grinding motion on said segments, said eccentric grooves being provided with teeth meshing corresponding rack teeth on said pivot shafts. 25

13. In a rock crusher, a pair of jaws, pivots on which said jaws are rockable, means for rocking the jaws on the pivots, and means for synchronously moving the pivots towards and from each other during
30 the rocking movements of the jaws.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM H. FULCHER.

Witnesses:

S. H. NOURSE,
C. A. PENFIELD.