

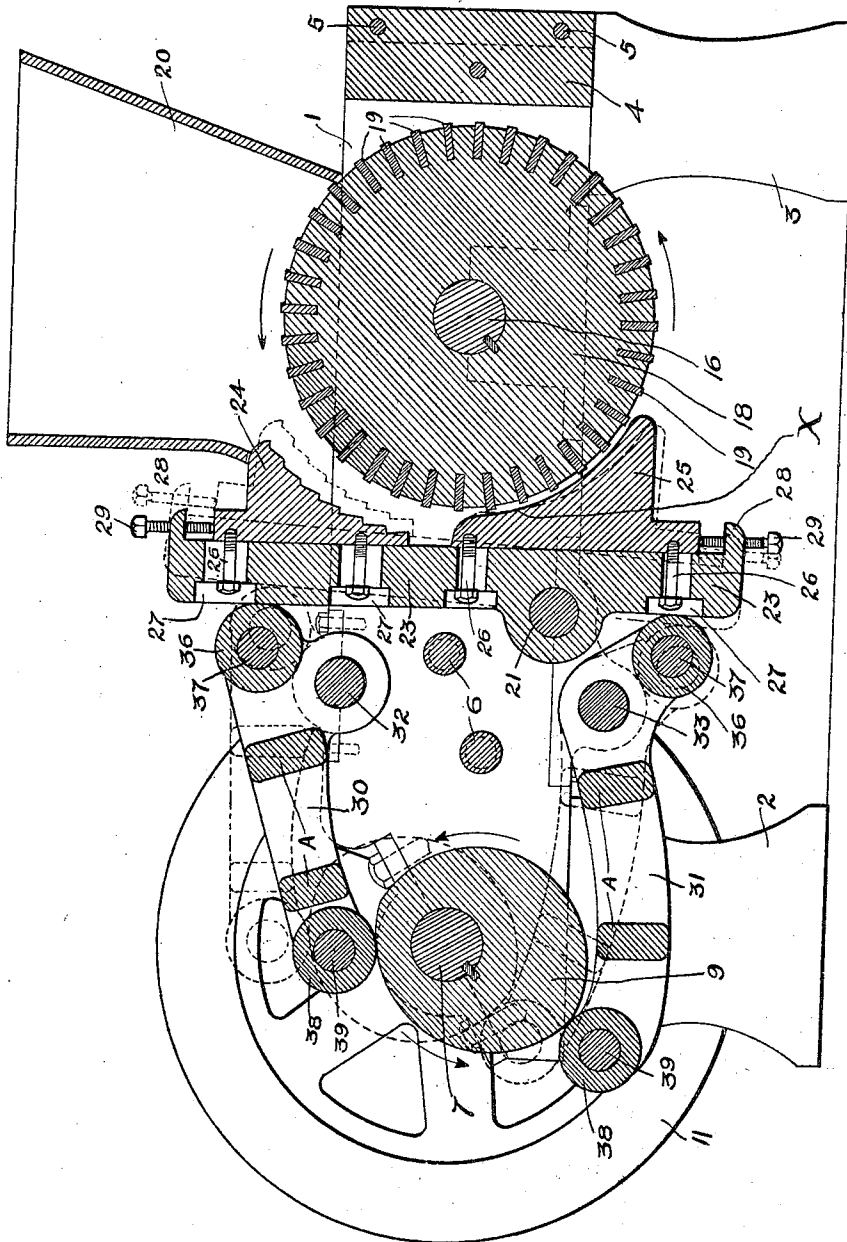
No. 887,003.

PATENTED MAY 5, 1908.

C. O. MICHAELSEN.
ORE CRUSHER.

APPLICATION FILED AUG. 19, 1907.

4 SHEETS—SHEET 1.



Charles O. Michaelsen, Inventor,

Witnesses:

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Warren Siboll

By David O. Barnell,

Attorney.

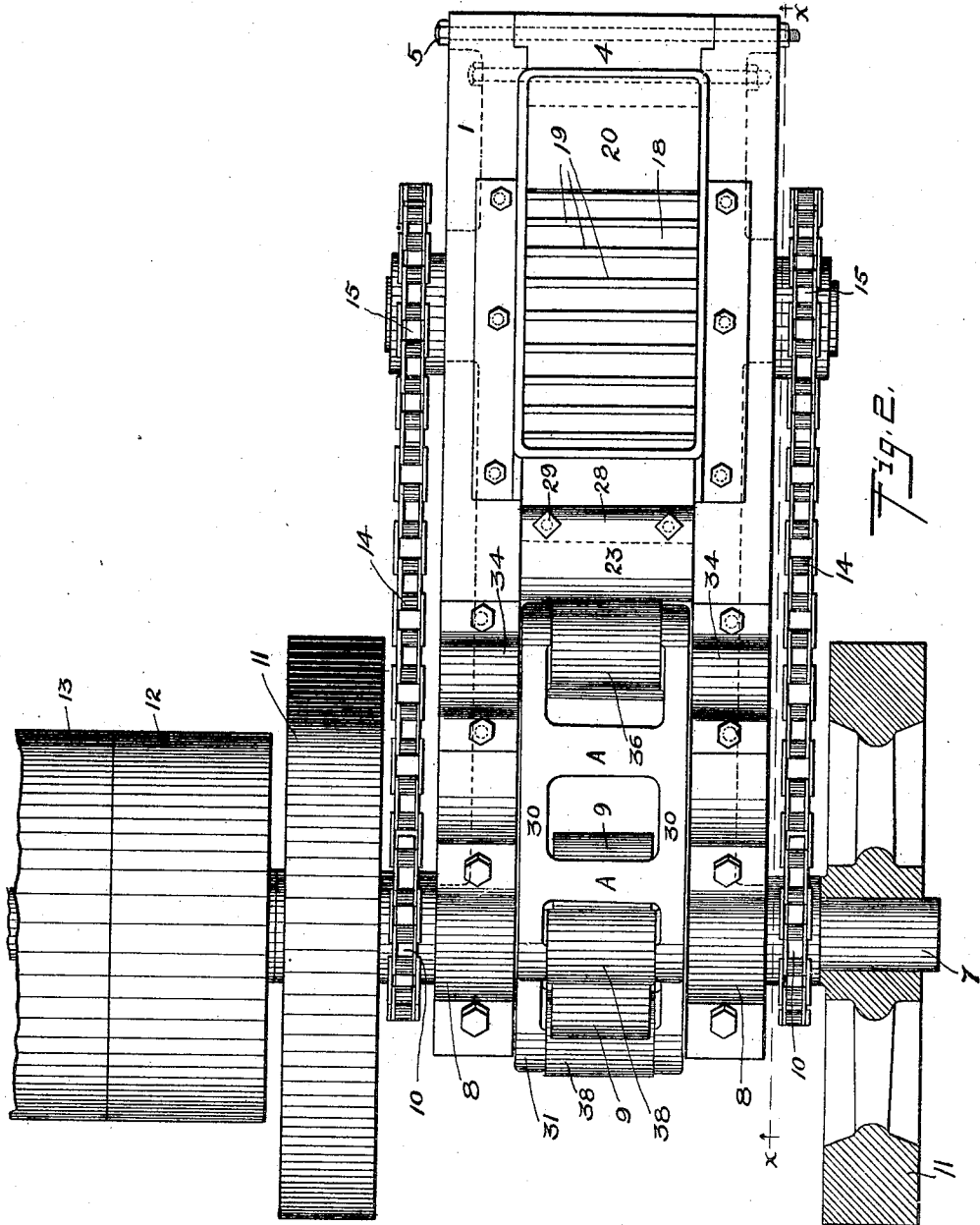
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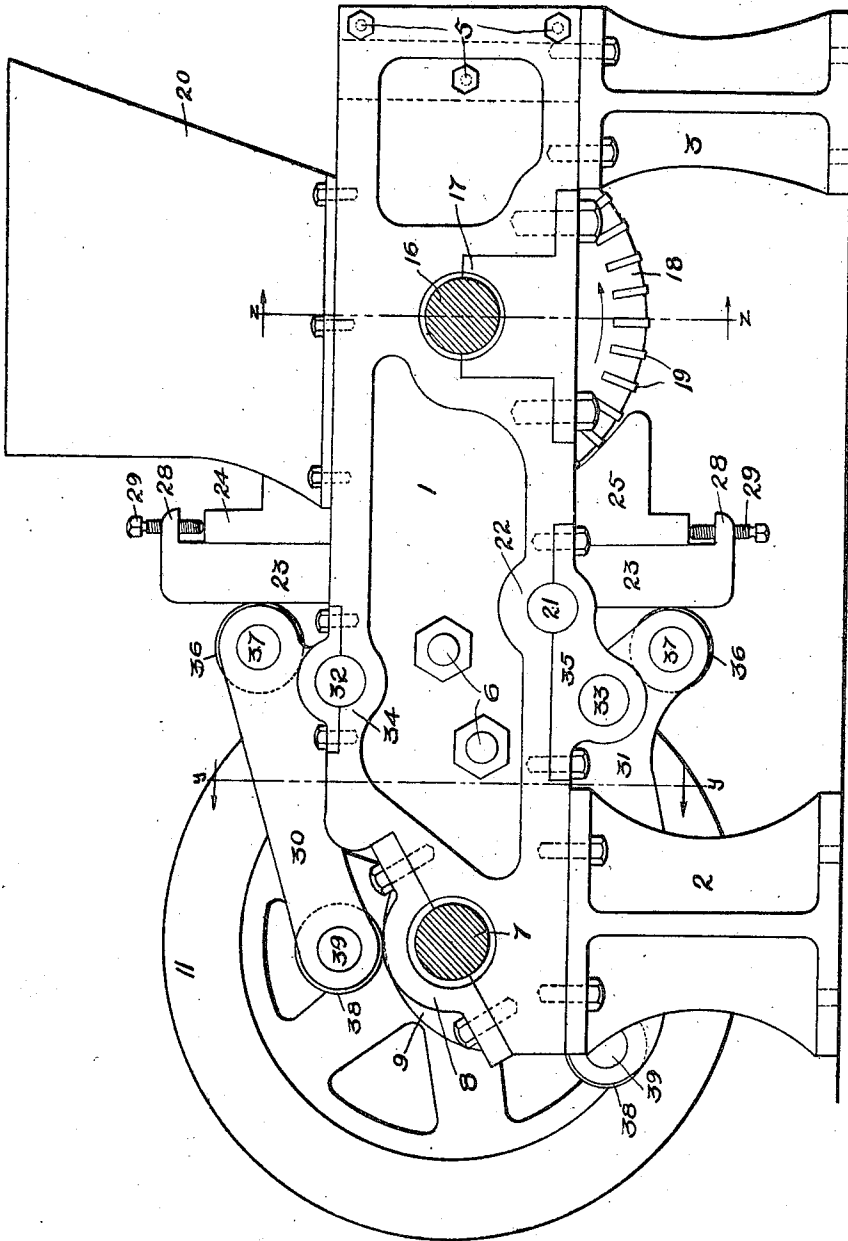
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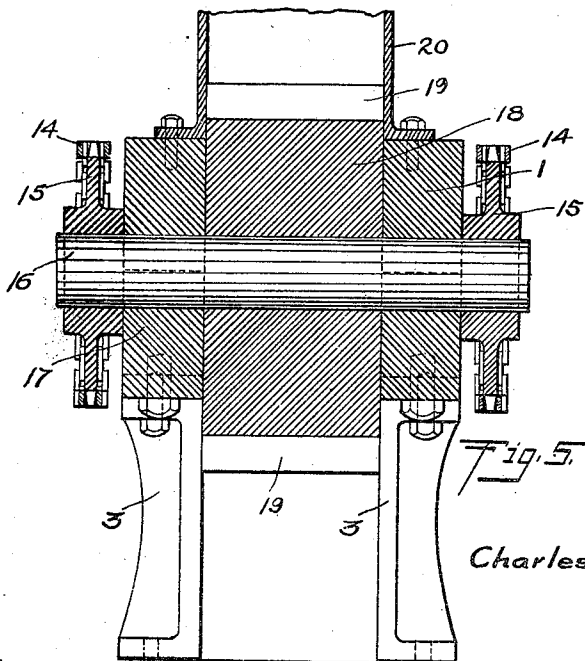
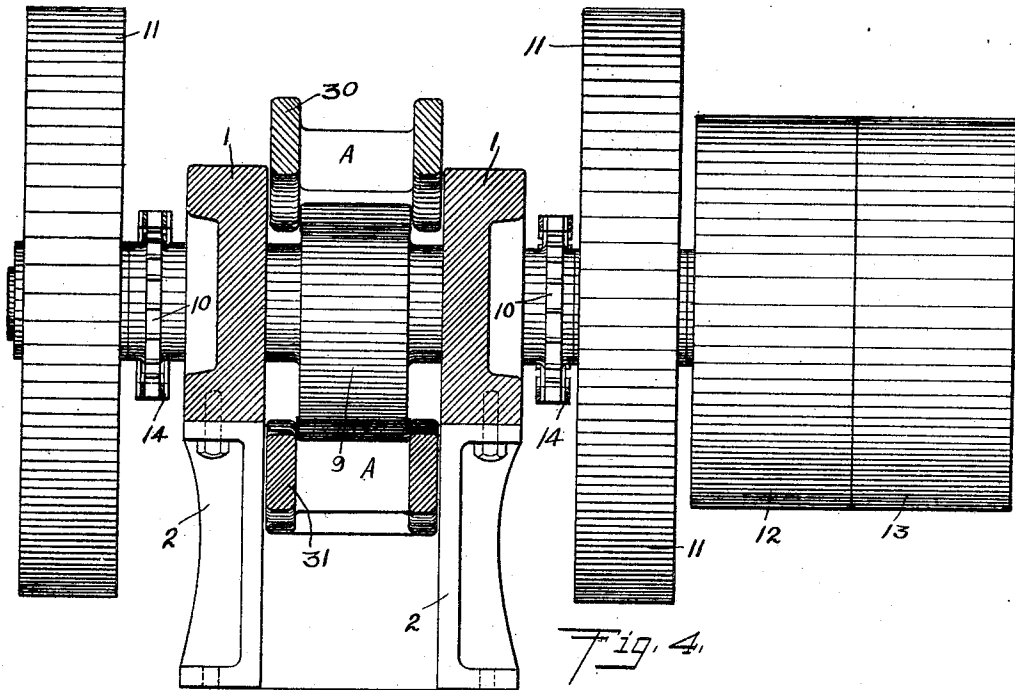
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

CHARLES O. MICHAELSEN, OF OMAHA, NEBRASKA.

ORE-CRUSHER.

No. 887,003.

Specification of Letters Patent.

Patented May 5, 1908.

Application filed August 19, 1907. Serial No. 389,301.

To all whom it may concern:

Be it known that I, CHARLES O. MICHAELSEN, a citizen of the United States, and a resident of Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Ore-Crushers, of which the following is a specification.

My invention relates to ore crushers and it is the object thereof to provide a simple, powerful, compact and economically constructed machine for crushing and pulverizing ore to any degree of fineness.

A further object is to provide means for adjusting and replacing the wearing parts of the mechanism.

A machine embodying my invention is shown in the accompanying drawings in which

Figure 1 is a longitudinal section thereof, Fig. 2 is a plan view thereof, Fig. 3 is a side elevation partly in section on the line $x-x$ of Fig. 2, Fig. 4 is a transverse section on the line $y-y$ of Fig. 3, and Fig. 5 is a transverse section on the line $z-z$ of Fig. 3.

In the construction shown I provide a suitable frame comprising the outwardly-flanged sides 1, supported by legs 2 and 3, the sides being connected at one end by the block 4 secured by bolts 5, and near the other end by the shouldered spacing-bolts 6.

The cam-shaft 7 is journaled in suitable bearings 8 formed in the side-frames 1 near one end thereof. Said shaft carries the cam 9 at its central part between the side-frames, the sprockets 10 just outside of the side-frames, the fly-wheels 11 outside of the sprockets, and the tight and loose pulleys 12 and 13 at one end outside of one of the fly-wheels. From the sprockets 10 chains 14 extend to the sprockets 15 which are carried on the ends of the roller-shaft 16. The sprockets 10 are made smaller than the sprockets 15 so that the roller-shaft is driven at a slower speed than the cam-shaft. The roller-shaft is journaled in suitable bearings 17 formed in the side-frames 1, as shown, and carries at its central part, between the frames, the roller 18. The inner surfaces of the side-frames and the end surfaces of the roller are smoothly machined so that said surfaces will fit closely together. In the periphery of the roller are regularly-spaced radial slots extending longitudinally of the roller, in which are driven the bars 19. Said bars 19 are of hard material, such as har-

dened tool-steel, and the outer edges thereof extend slightly above the surface of the roller, as shown. The roller is made of material such as cast-iron, being softer than the bars 19. A hopper 20 is secured to the side-frames 1, fitting over the roller, as shown.

A shaft 21 extends across the frame adjacent the roller 18, being removably held by the boxes 22 at the lower edges of the frames 1. On said shaft is pivotally mounted the rocking-lever 23. On the face of the rocking lever adjacent the roller 18 are carried the jaw-blocks 24 and 25, which are made of hard material such as tool-steel, and are adjustably held on the face of the lever by screws 26 threaded thereinto and passing through vertically-elongated holes in the lever, recesses 27 being made in the rearward side of the lever to accommodate the heads of said screws. The faces of the jaw-blocks 24 and 25 adjacent the roller 18 are curved, the radii thereof being slightly greater than the radius of the roller. The curved face of the upper block 24 has a number of transverse V-grooves therein forming flat pointed teeth, as shown. At the upper and lower ends of the rocking-lever are projecting lugs 28 through which pass set-screws 29 which bear on the upper and lower ends, respectively, of the upper and lower jaw-blocks and receive the thrust thereof longitudinally of the rocking-lever.

The rocking lever is actuated by the following means: The cam-levers 30 and 31 are pivoted on the shafts 32 and 33 which are held, respectively, in the boxes 34 and 35 on the side-frames 1. Said cam-levers each comprise two side-bars working adjacent the inner faces of the side-frames 1, the said side-bars being connected by cross-pieces A integral therewith. Between the front ends of said side-bars of the cam-levers are rollers 36 revolvably mounted on the shafts 37, said rollers normally bearing on the rearward face of the rocking-lever adjacent the upper and lower ends thereof, as shown. At the rearward ends of the cam-levers rollers 38 are similarly mounted on the shafts 39, said rollers bearing on the cam 9. The form of the cam 9 is an oval disposed eccentrically to the cam-shaft 7, and during the rotation thereof the same alternately actuates the upper and lower cam-levers 30 and 31 between the positions shown in full and dotted lines in Fig. 1, the rocking-lever being actuated thereby as indicated.

In the operation of the machine the same is driven by a belt extending to the pulley 12 from a suitable source of power. The cam-shaft being driven thereby, the cam-levers and rocking lever are actuated as described, and the roller 18 is driven in the direction indicated through the connection formed by the sprockets 10, chain 14, sprockets 15 and roller-shaft 16. The materials to be crushed are placed in the hopper 20 and fall upon the roller 18, being carried rearwardly thereby and under the toothed upper jaw-block 24 which, by its oscillating motion partly crushes the materials between the same and the roller. The material, continuing to move with the roller, is again engaged and further reduced by the lower jaw-block 25, the oscillating motion of which, together with the rotary motion of the roller 18, carrying off and discharging the material near the lower edge of the roller. The sizes to which the material is crushed may be regulated by adjustment of the jaw-blocks, by means of the screws 26 and 29, to bring the faces of the blocks the required distance from the roller. Wear of the blocks or of the roller may be compensated in the same manner.

It should be noted that, on account of the rocking-lever fulcrum-shaft 21 being positioned near the lower jaw-block 25, a point X on the face of said block and located on a line drawn between the centers of the shafts 16 and 21, does not appreciably change in position with respect to the roller, so that no material can pass through the machine and be discharged therefrom which is not reduced to particles small enough to pass between the point X and the roller.

The longitudinal ridges formed on the face of the roller 18 by the projecting edges of the bars 19 are automatically retained as the roller wears, for the reason that the material of which the roller is made is softer than said bars, so that the portions of the roller face between the bars wear more easily than the edges of the bars and are, consequently, constantly worn below the same.

Now, having described my invention, what I claim and desire to secure by Letters Patent is:

1. In an ore crusher, a roller having a plu-

55 rality of longitudinally extending bars of hard material set in the peripheral surface thereof, a rocking-lever pivoted adjacent said roller, jaw-blocks of hard material secured to said rocking-lever adjacent opposite ends thereof, the faces of said blocks working adjacent and cooperating with the roller to crush materials between the same, means for adjusting the positions of said jaw-blocks longitudinally of the rocking-lever, a cam, cam-levers actuable thereby, said cam-levers engaging the rocking-lever to actuate the same, and means for simultaneously actuating the cam and the roller. 60 65

2. In an ore crusher, a frame, a roller journaled therein, a rocking lever fulcrumed adjacent said roller, jaw-blocks carried by said rocking-lever at each side of the fulcrum thereof and adjacent the roller, a cam having driving means connecting the same with said roller, cam-levers each having a roller at one end engaging said cam and a roller at the opposite end engaging said rocking-lever near the end thereof, the cam being formed to alternately actuate the cam-levers and thereby move the rocking-lever to cause alternate oscillating motions of the jaw-blocks toward and away from the roller. 70 75

3. In an ore crusher, a roller, a rocking-lever fulcrumed adjacent said roller, driving means for actuating said roller and rocking-lever, a jaw block secured to said rocking-lever adjacent one end thereof and adapted to cooperate with the roller to crush materials between the same, a second jaw-block secured to the rocking lever adjacent the other end but extending past the fulcrum thereof, whereby a portion of said block constantly maintains a substantially fixed distance from the surface of the roller, and adjustable means for receiving the thrust of the jaw-blocks longitudinally of the rocking-lever. 80 85 90

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses. 95

CHARLES O. MICHAELSEN.

Witnesses:

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