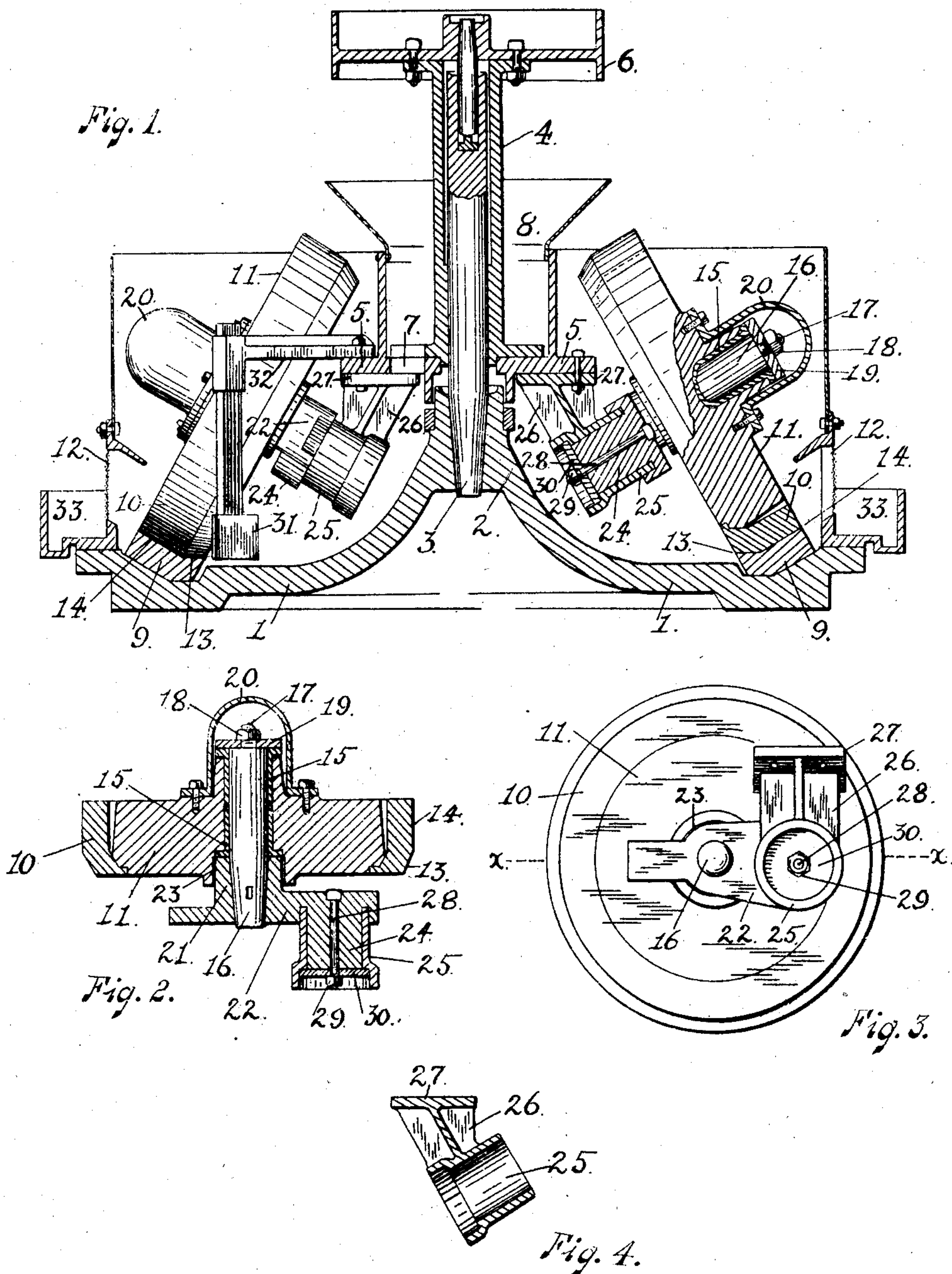


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PATENTED FEB. 18, 1908.

F. A. HUNTINGTON.
CRUSHING MILL.
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WITNESSES:

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FRANK A. HUNTINGTON, OF SAN FRANCISCO, CALIFORNIA.

CRUSHING-MILL.

No. 879,175.

Specification of Letters Patent.

Patented Feb. 18, 1908.

Application filed March 6, 1907. Serial No. 360,845.

To all whom it may concern:

Be it known that I, FRANK A. HUNTINGTON, a citizen of the United States, residing at the city and county of San Francisco, and State of California, have invented certain new and useful Improvements in Crushing-Mills, of which the following is a specification.

My invention relates to crushing mills of the roller type; and it consists in the novel construction of ring die and roller shoe forming the crushing surfaces, and also in the novel construction of the connection between the roller and the driver, as I shall hereinafter fully describe.

The objects of my invention are, first, to provide for an easy entrance of the ore to the crushing surfaces, and the discharge of the pulp therefrom directly against the screens of the pan rim; and, second, to provide a simple, durable and easily placed connection for the roller, which engages it wholly from its lower side, leaving its upper side free of obstructions.

Referring to the accompanying drawings Figure 1 is a vertical section of the mill, with the rollers and their connections shown partly in elevation and partly in broken section. Fig. 2 is a section of one of the rollers, taken through its crank, on line $x-x$ of Fig. 3. Fig. 3 is a side elevation of one of the rollers showing its connections. Fig. 4 is a detail section of the hanger.

1 is the pan having the central cone 2 in which is rigidly fitted the spindle 3, from the top of which is hung by its sleeve 4 the driver 5, driven by a pulley 6, secured to the sleeve, the ore being fed through holes 7 in the driver from a hopper 8 thereon; all substantially as disclosed in my previous patent No. 556,466 dated March 17, 1896. In the pan is the ring die 9 upon which the ore is crushed by the shoe 10 of the roller 11.

12 are the screens of the pan rim, and 33 is the discharge trough outside the screen.

My first improvement consists in the shape of the crushing surfaces of the ring die 9 and the roller shoe 10. As will be seen by reference to Fig. 1, the inner portion of the crushing faces of these two parts is a straight plane 13 substantially horizontal and parallel with the bottom of the pan, and the outer portion is also a straight plane 14, but extends at an upward inclination meeting the horizontal portion at an obtuse angle.

In constructions where the crushing sur-

faces of the die and shoe are horizontal throughout their cross sections, the effect is that while the entrance of the ore between them is easy, its discharge is not well directed against the rim screens. Again, where the crushing surfaces of the die and shoe are wholly inclined to the horizontal, the effect is that while the discharge is good, the entrance of the ore between them is difficult. Also in cases where these surfaces are inter-curved, as in my patent above mentioned, that is, one concave and the other convex, the effect is that both the entrance and discharge are difficult. What is required is a straight horizontal entrance portion and a straight inclined discharge portion, so that the ore may find easy access to the crushing surfaces, and the pulp be discharged therefrom freely and directly against the rim screens. The construction here shown fully serves these requirements, and in addition thereto affords a firm rest for the roller, the horizontal portion 13 bearing the stress of the roller's weight, and the inclined portion 14 guiding it accurately in its rolling path.

The second improvement lies in the construction of the crank connection of the roller with the driver, said connection being one which engages the roller wholly from its inner and lower side, leaving its outer and upper side free of any arms or other connections which offer obstructions and impediments to free access to the roller, and the falling away of any materials which tend to accumulate on the upper side.

In the axis of the roller is slipped a two part bushing 15, Fig. 2, one part from each side. An axle pin 16 passes through this bushing, and the roller turns on the pin. The outer end 17 of the pin is reduced and receives a nut 18, which through a washer 19, firmly clamps the pin to the bushing. A protecting cap 20 secured to the roller, covers this outer bearing of the roller. The inner end of the pin is keyed or otherwise secured fast in the hub 21, of the crank 22, said hub entering a socket 23 in the roller hub and bearing against the bushing. Thus the nut 18 tightens the crank to the bushing and completes the inner bearing. The other end of the crank 22 has a hub 24, about which is pivotally fitted the sleeve 25 on the lower end of a hanger 26, the top plate 27 of which is bolted solidly to the driver 5, as seen in Fig. 1. The pivotal joint between the crank hub 24 and the hanger sleeve 25 is completed by a

pin 28, which is headed in and passes through the hub and receives a nut 29 on its outer end, said nut acting against a washer 30 seated in the end of the sleeve. By this construction the roller is hung entirely from its under side, leaving its upper side free of all obstructions, and enabling a suitable protecting cap to be applied. The roller is easily mounted and can be readily removed.

31 is a scraper, secured by its arm 32 to the driver. There may be any number of rollers in the mill, a scraper being provided for each roller.

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

1. In a crushing mill of the roller type the combination of a pan, screens in the pan-rim, a crushing roller in the pan inwardly inclined from the bottom upwardly, said roller having the inner side of its crushing surfaces inclined to its axis of rotation to form a straight horizontal portion at the bottom, and having the remainder of its crushing surface parallel with the axis of rotation to form a straight upwardly inclined outer portion; a ring die in the pan against which the crushing roller acts, said die having its crushing surface formed with a straight horizontal inner portion and a straight upwardly inclined outer portion, to correspond with the crushing surface of the roller and a driving means for effecting the orbital travel of the roller in the pan, said driving means including pivotal connections to enable the roller to swing centrifugally.

2. In a crushing mill of the roller type, a crushing roller, a driver including a horizontally disposed plate, and a connection between the roller and its driver comprising a crank having a hub at each extremity, a pin seated in the axis of the roller and secured at its end to one of the crank hubs, and a hanger, depending from the horizontally disposed plate, having at its lower end a sleeve in which the other hub of the crank is pivotally mounted.

3. In a crushing mill of the roller type, a crushing roller, a driver including a hori-

zontally disposed plate provided with feed passages therethrough and a connection between the roller and its driver to support the roller wholly from its inner side, said connection comprising a crank having a hub at each extremity, a pin seated in the axis of the roller and secured at one end to one of the crank hubs and a hanger depending from the horizontally disposed plate having at its lower end a sleeve lying to the outer side of the vertical plane of the feed passages in the horizontally disposed plate to pivotally support the other hub of the crank.

4. In a crushing mill of the roller type, the connection between the roller and its driver comprising a crank having a hub at each extremity, one of said hubs being fitted to the inner side of the roller, a pin secured to said hub and passing through the axis of the roller, a nut fitted to the outer end of the pin, and a washer against which the nut acts to set up the bearing of the roller to the hub, and a hanger secured to the driver and having at its lower end a sleeve, in which is pivotally mounted the other hub of the crank.

5. In a crushing mill of the roller type, the connection between the roller and its driver comprising a crank having a hub at each extremity, one of said hubs being fitted to the inner side of the roller, a pin secured to said hub and passing through the axis of the roller, a nut fitted to the outer end of the pin, and a washer against which the nut acts to set up the bearing of the roller to the hub, a hanger secured at its upper end to the driver, and having at its lower end a sleeve, in which is pivotally fitted the other hub of the crank, a pin fitted to said hub, a nut on the pin end, and a washer seated in the sleeve and against which the nut bears to hold said sleeve to the hub.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK A. HUNTINGTON

Witnesses:

N. A. ACKER,
L. E. WILKINS.