

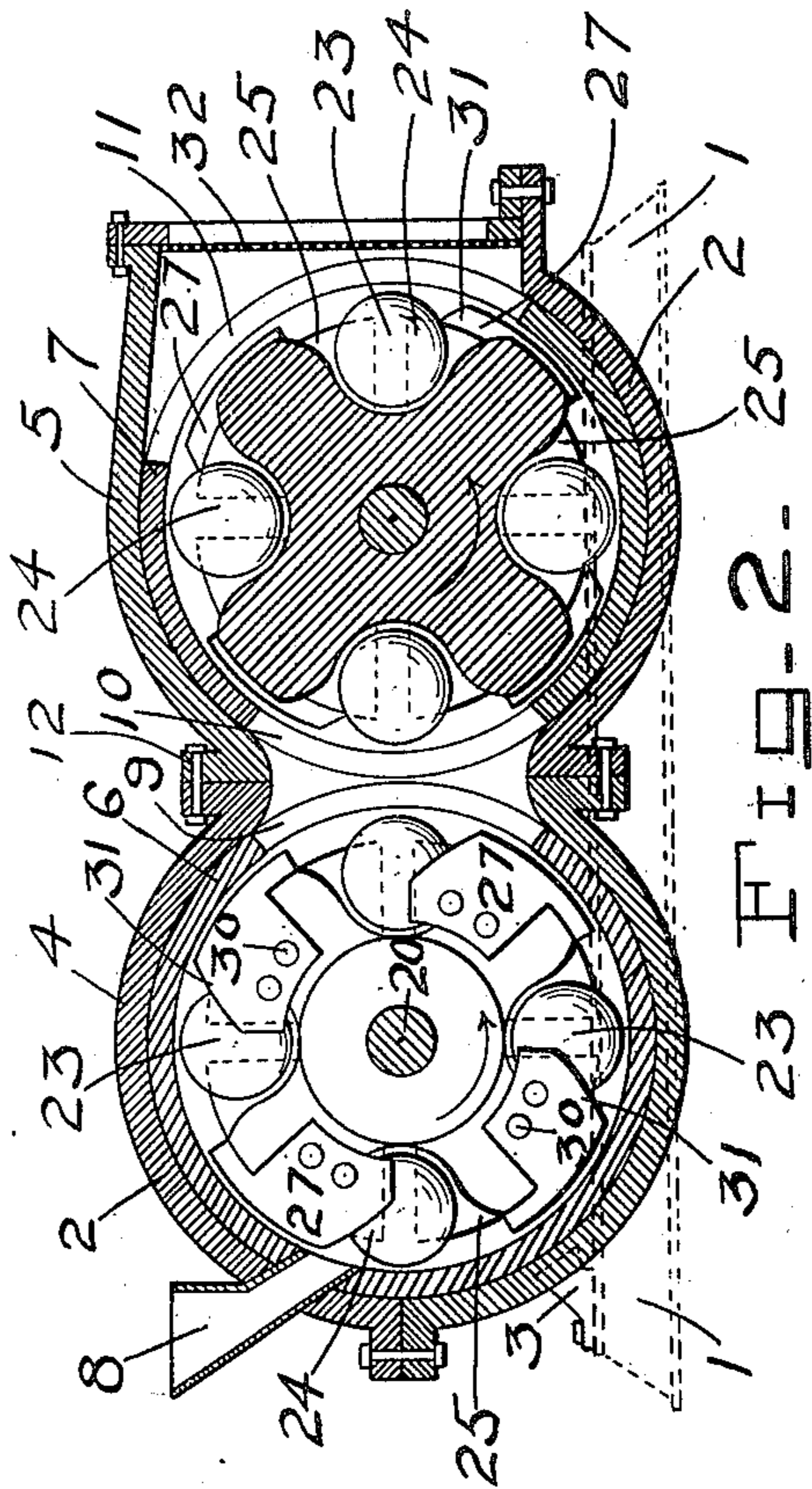
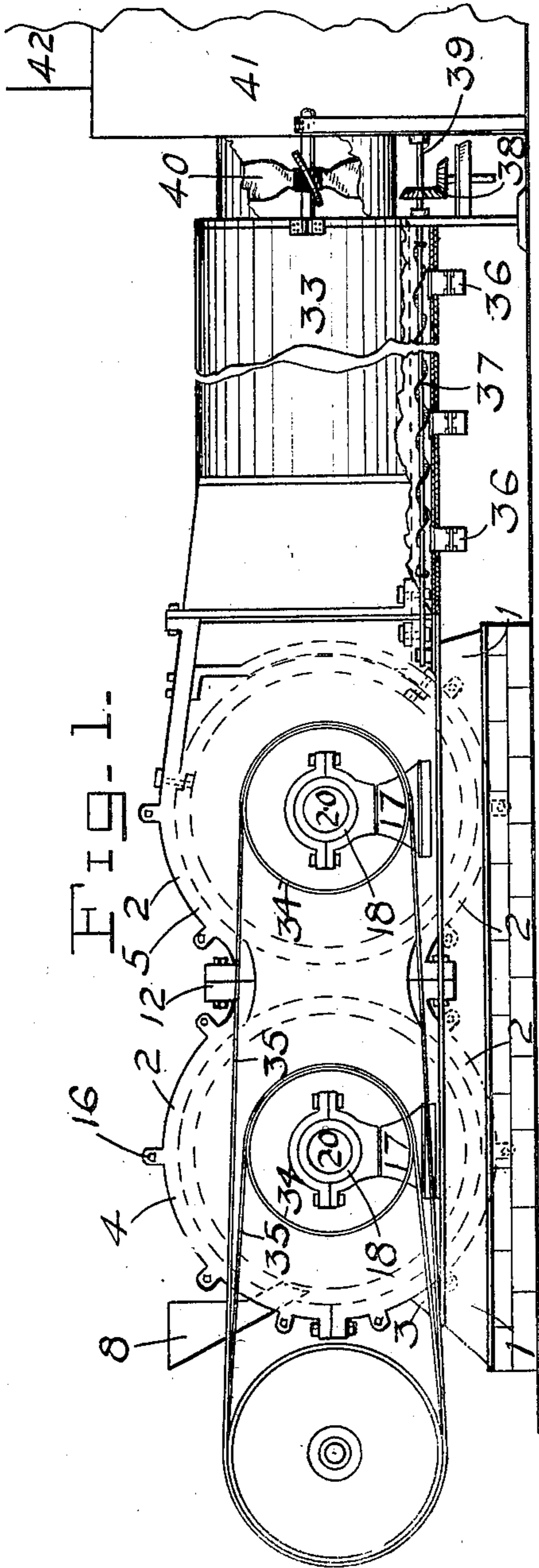
No. 875,143.

PATENTED DEC. 31, 1907.

J. W. BOILEAU.
GRINDING MILL AND PULVERIZER.

APPLICATION FILED SEPT. 7, 1906.

2 SHEETS—SHEET 1.



Witnesses

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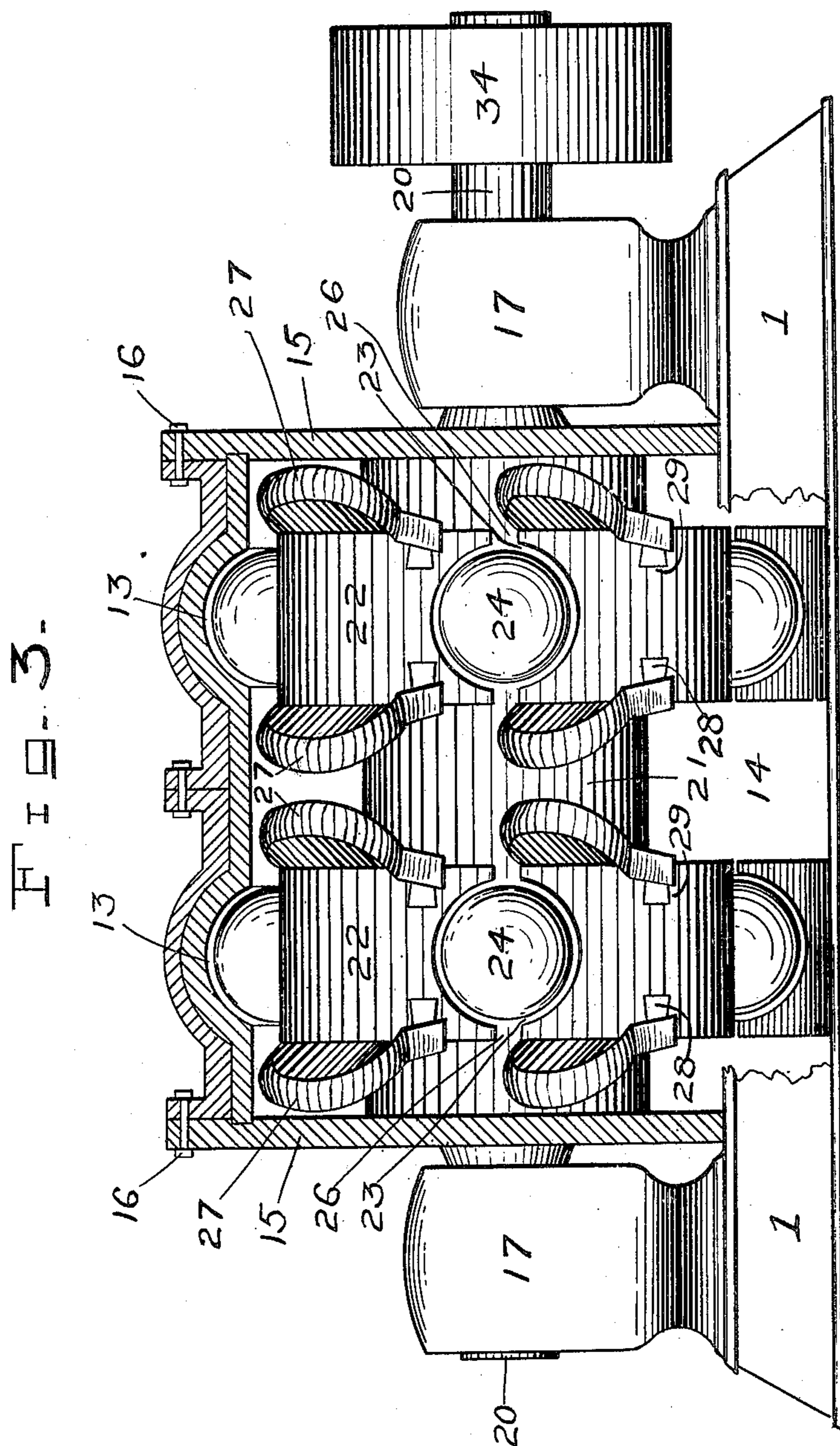
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UNITED STATES PATENT OFFICE.

JAMES W. BOILEAU, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-SIXTH TO JOSEPH T. BELANGER AND ONE-SIXTH TO JOHN L. COCHRANE, OF DETROIT, MICHIGAN, AND ONE-SIXTH TO EUGENE O. SPAULDING, OF CARO, MICHIGAN.

GRINDING-MILL AND PULVERIZER.

No. 875,143.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed September 7, 1906. Serial No. 333,705.

To all whom it may concern:

Be it known that I, JAMES W. BOILEAU, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Grinding-Mills and Pulverizers; and I do 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.

My invention is an improved grinding mill and pulverizer, especially adapted for grinding or pulverizing mineral bearing rock, but also adapted for grinding or pulverizing other materials and substances, and it consists in the construction, combination, and arrangement of devices hereinafter described and claimed.

In the accompanying drawings,—Figure 1 is a side elevation of the mill and pulverizer embodying my improvements; Fig. 2 is a longitudinal sectional view of a portion of the same; Fig. 3 is a transverse sectional view taken on the plane indicated by the line *a—**a* of Fig. 2.

I will first describe that portion of the machine which grinds or pulverizes the material. On a bed-plate 1 is mounted a casing 2, which is here shown as supported by brackets or feet 3, which are bolted thereto and also bolted on the bed-plate. Said casing is here shown as forming a pair of cylinders 4, 5, disposed side by side and extending transversely over the bed-plate. In each of the said cylinders is a cylindrical tread or runway, that in the cylinder 4 being designated by the numeral 6, and that in the cylinder 5 being designated by the numeral 7.

The tread or runway 6 has an opening in one side which I will call the front side to receive the discharge end of a feed spout 8. On the rear side of the said tread or runway 6, are discharge slots 9 for the passage of ground or comminuted material to the tread or runway 7 through similar slots 10 with which said tread or runway 7 is provided. Said tread or runway 7 is further provided on its rear or discharge side with slots 11, of suitable fineness and length.

The casing 2 is here shown as made of two cylindrical or semi-cylindrical sections, bolted together, as at 12. It may be otherwise

constructed within the scope of my invention as defined by the appended claims, and I do not desire to limit myself in this particular. The tread or runway in each cylindrical portion of the casing is provided with a pair of annular ball tracks 13, which are semi-cylindrical in cross-section, and are disposed side by side and suitably spaced apart, as at 14, the feed spout 8 discharging into the said space 14 between the pair of ball tracks in the tread or runway 6. The sides 15 of the casing form the heads of the cylindrical portions thereof and the said sides are here shown as secured in place by bolts 16.

On the sides of the bed-plate are standards 17, provided with bearings 18, in which are mounted shafts 20, of a pair of revolving rolls 21, which are disposed in the cylindrical portions of the casing and revolve within the treads or runways of said casing cylinders. Each of the said rolls comprises a pair of cylindrical portions 22, spaced apart and with their peripheries in line with the ball tracks 13 of the treads or runways. Said cylindrical portions 22 of the rolls are provided with pockets 23, for the reception of balls 24. The said pockets are radially disposed. Their inner portions are semi-cylindrical in form and of a size to enable the balls 24 to snugly fit therein, and their outer portions are widened, as at 25. Passages 26 are made in the sides of the cylindrical portions 22 and extend to the ball pockets to enable material to pass into and from said ball pockets.

On the sides of the cylindrical portions 22 of the rolls are wings 27. The said wings are provided on their inner sides near their rear ends with dovetailed ribs 28, which fit in similarly-shaped grooves 29 that are made radially in the sides of the cylindrical portions 22 and are bolted therein. The front portions of the said wings 27 bear on the sides of the cylindrical portions 22 of the rolls and are bolted thereto, as at 30. The direction of rotation of the rolls is indicated by the arrows in Fig. 2. The wings 27 are arranged opposite each other in pairs and diverge forwardly. Their outer edges are concentric with the treadways and they are partly cut away and rounded at their front ends, as at 31. These wings, during the rotation of the rolls, serve to cause the material to be forced into the paths of the balls which

are carried around within the ball tracks by the rotation of the rolls and also serve to cause the finely divided particles of the material as the same becomes comminuted by the action of the balls and the ball tracks to be discharged from the said casing cylinders through the openings 9 or 11, as the case may be. The balls are thrown centrifugally against the ball tracks by the rotation of the rolls, are carried by the rolls and are caused to revolve in the said ball tracks, and to act on the material therein so as to grind the same. It will be understood that the ground material discharged from the initially acting roll will be reground and more finely reduced by the next roll.

As will be obvious any desired number of the rolls may be employed. Two are here shown for the purposes of this specification, but I do not desire to limit myself in this particular.

In addition to the centrifugal action of the rolls and the balls in discharging the ground or reduced material, the arrangement and construction of the wings is such as to cause said wings to create strong blasts of air, which are also effective in discharging the reduced material.

Behind the last mill unit in the series, here shown as consisting of the casing cylinder 5 and the roll therein, is a screen 32 of suitable fineness, through which the reduced material passes into a dust chamber 33.

Any suitable means may be employed to drive the rolls. Their shafts 20 are here shown as provided with pulleys 34, driven by belts 35. The dust chamber 33 is provided at its lower side with a plurality of discharge spouts 36. A discharge screw 37 is here shown as operating in the bottom of said dust chamber to convey dust that drops to the bottom thereof to the several discharge spouts. The shaft of said discharge screw is shown as connected by a pair of miter gears 38 to a shaft 39, which may be driven by any suitable means. A fan or blower 40 is located at the rear end of the dust chamber 33 to cause the finer material to be drawn there-through and be discharged into a chamber 41, which is provided with a dust stack 42.

Having thus described my invention, what

I claim as new, and desire to secure by Letters-Patent, is,—

1. A mill of the class described having a casing provided with an annular runway on its inner side, said runway having an annular ball track substantially semi-cylindrical in cross section and plain annular surfaces on opposite sides of said ball track, a roller located and revoluble in said casing, said roller having a main portion cylindrical in form and of a width exceeding that of the ball track and projecting portions cylindrical in form, of less diameter than and projecting from opposite sides of said main portion and concentric therewith, said main portion having semi-spherical, peripheral pockets, passages extending from said pockets to its sides and further provided with wings on its sides intermediate said pockets, projecting radially from said main portion, diverging in the direction of the rotation of the roller, disposed opposite the plain annular surfaces of the runway, and overhanging the projecting portions of the roller, and centrifugally-acting grinding balls partly in said pockets and partly in said ball track and retained in said pockets by said ball track, substantially as described.

2. A mill of the class described, having a plurality of casings, each communicating with the one adjacent thereto, the first of said casings having a feed opening and the last having a screened discharge opening, each of said casings having a lining formed with an annular runway on its inner side having a ball track, said lining having grated openings in their opposing sides to permit the passage of reduced material from one lining to another, a roller located and revoluble in each casing and having peripheral pockets and concentrically-acting revoluble grinding balls partly in said pockets and partly in the ball track, substantially as described.

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

JAMES W. BOILEAU.

Witnesses:

JOSEPH T. BELANGER,
HARVEY F. BELANGER.