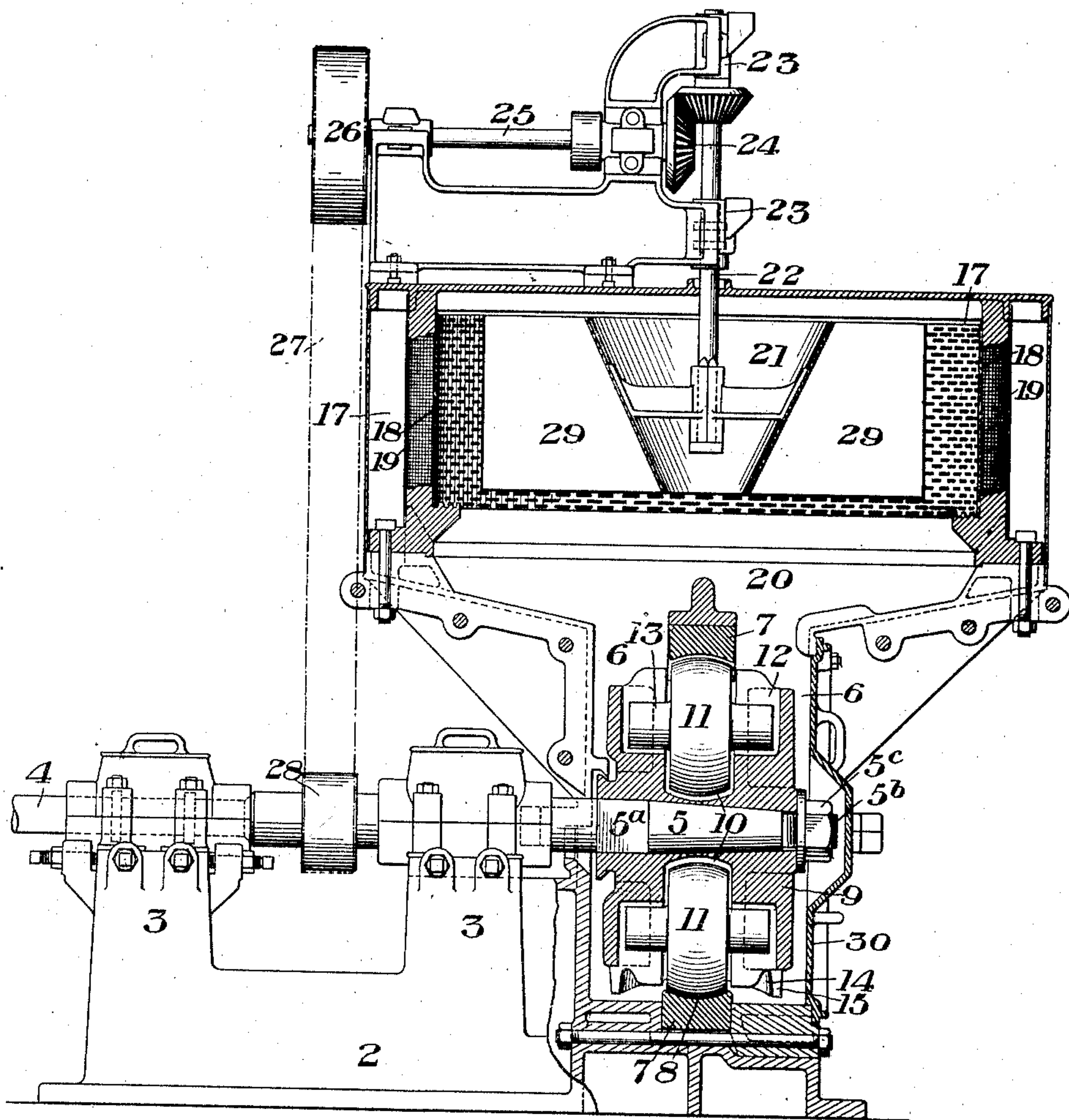


C. A. DORN, J. O. LUDLAM & C. F. & L. C. BONNOT.  
CRUSHING OR PULVERIZING MACHINE.  
APPLICATION FILED AUG. 25, 1908.

928,368.

Patented July 20, 1909.  
2 SHEETS—SHEET 1.

*Fig. 1.*



WITNESSES

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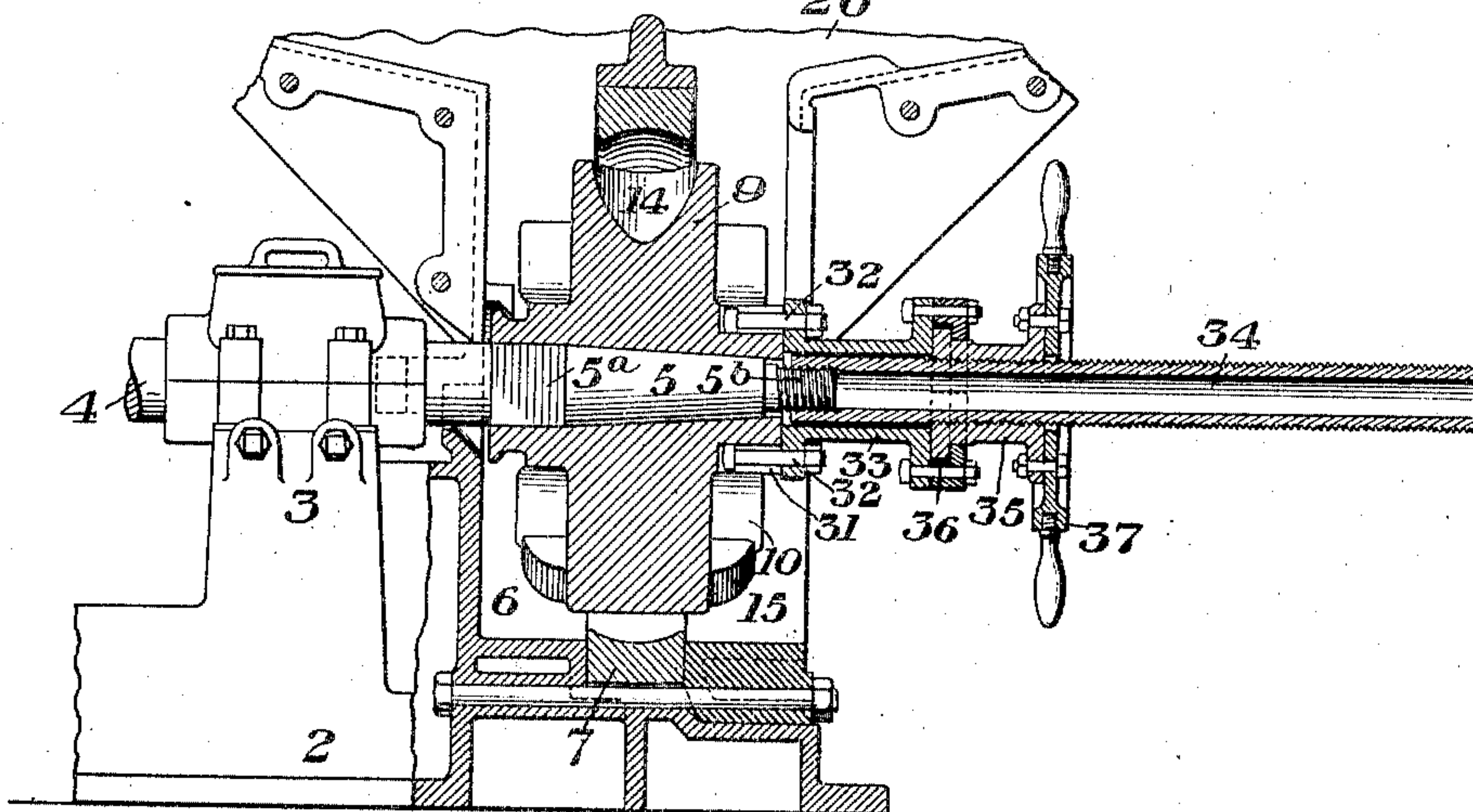
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CRUSHING OR PULVERIZING MACHINE.

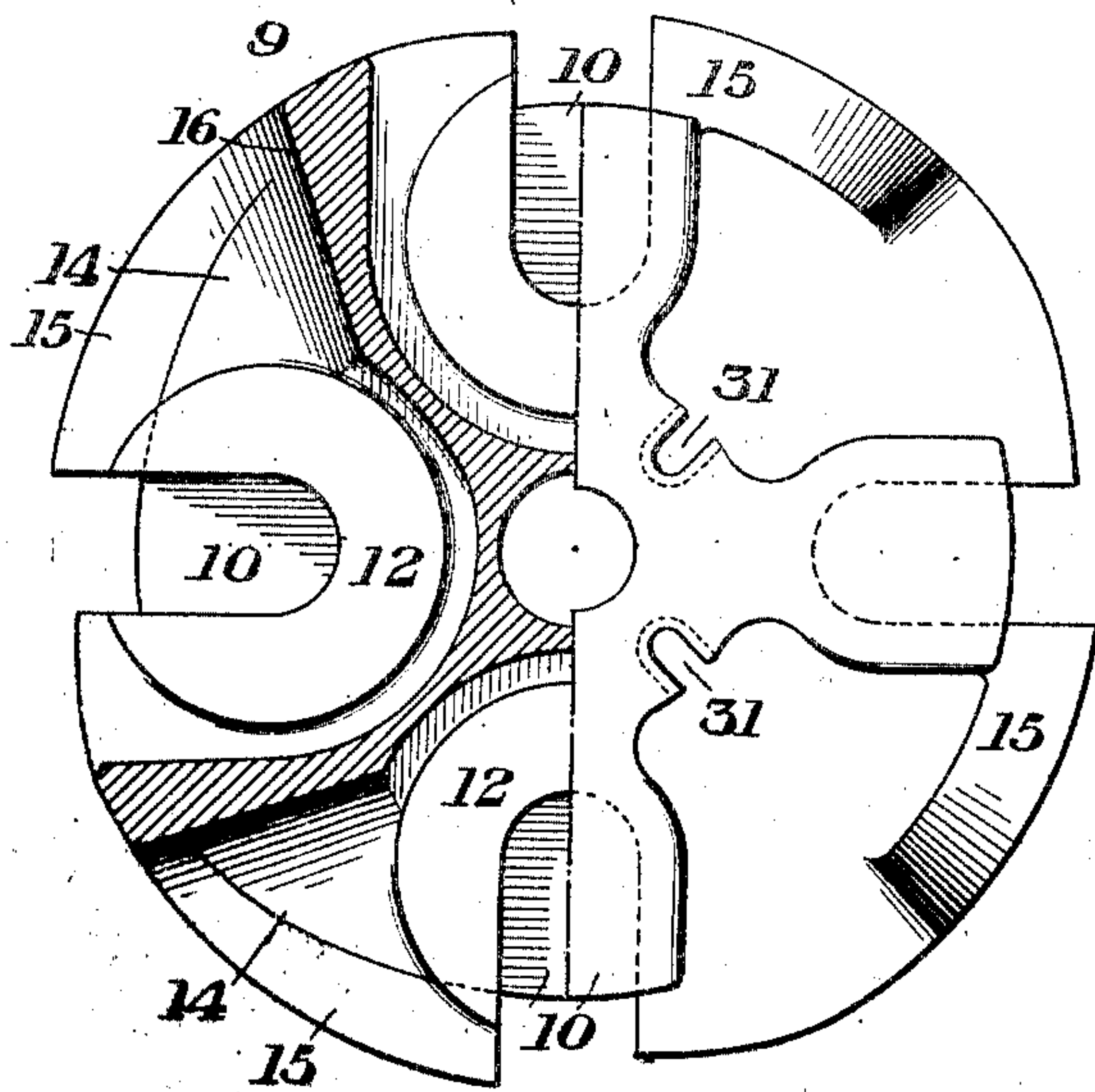
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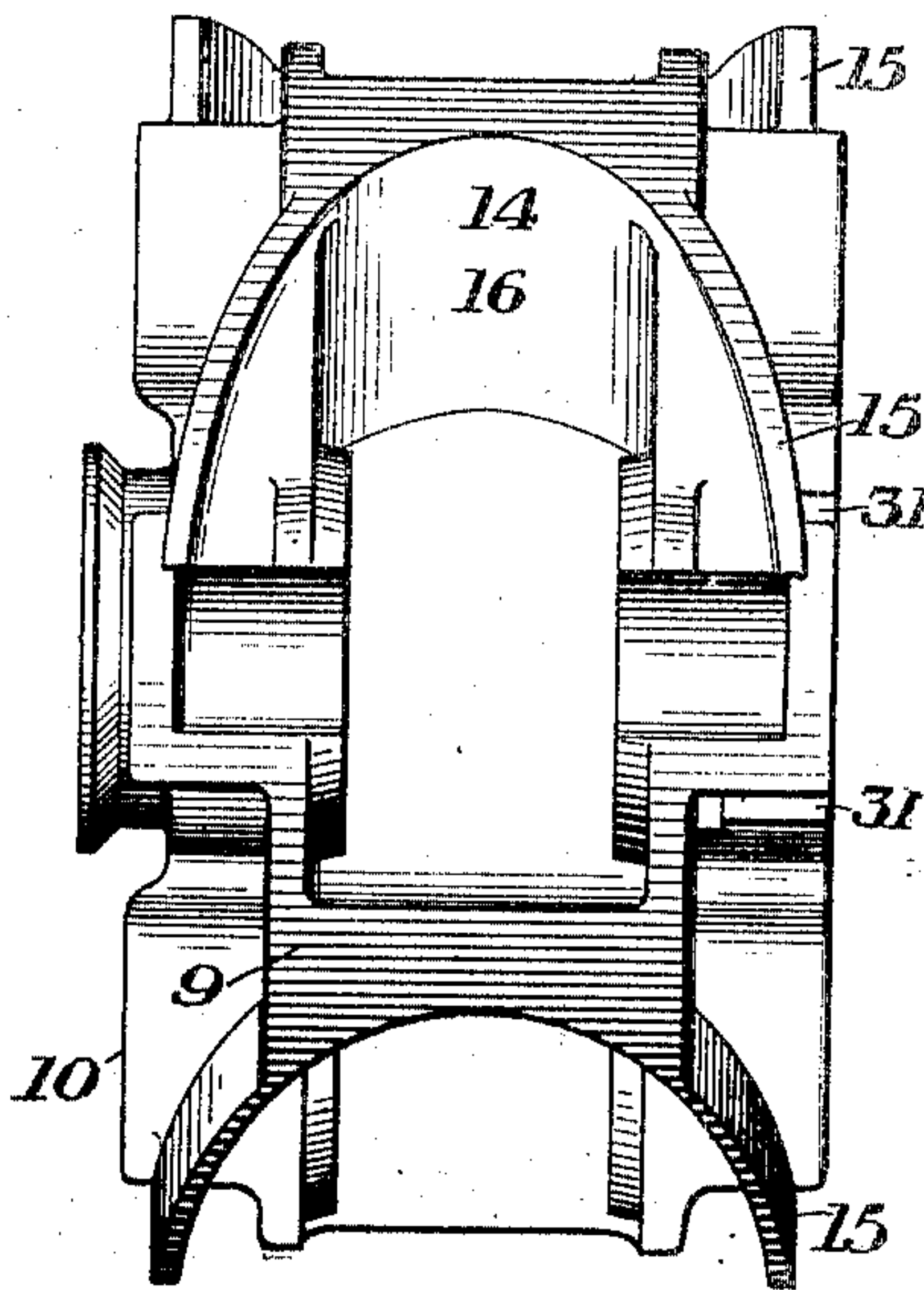
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*Fig. 3.*



*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

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## CRUSHING OR PULVERIZING MACHINE.

No. 928,368.

Specification of Letters Patent.

Patented July 20, 1909.

Application filed August 25, 1908. Serial No. 450,242.

*To all whom it may concern:*

Be it known that we, CHARLES A. DORN, JOHN O. LUDLAM, and CHARLES F. BONNOT, of Canton, Stark county, Ohio, and LOUIS C. BONNOT, of Louisville, Stark county, Ohio, have invented a new and useful Crushing or Pulverizing Machine, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section of the preferred form of machine embodying our invention; Fig. 2 is a similar view of the lower portion of the machine and showing the attachment for removing the grinding elements and their carrier; Fig 3 is a view partly in section and partly in end elevation of the carrier for the grinding elements; and Fig. 4 is a top plan view of the same.

Our invention has relation to the class of crushing or pulverizing machines and is designed to provide an improved machine of this character which will pulverize materials rapidly and economically.

The present invention has more particular relation to the means employed for feeding the material to be crushed or pulverized into the machine and to the construction of the carrier for the grinding elements, together with means whereby said carrier with the grinding elements can be readily removed from the machine.

The precise nature of our invention will be best understood by reference to the accompanying drawings in which we have shown our preferred embodiment thereof, it being premised, however, that various changes may be made in the details of construction and arrangement without departing from the spirit and scope of our invention as defined in the appended claims.

In these drawings, the numeral 2 designates the frame of the machine, in bearings 3 of which is supported the main driving shaft 4, having an overhung portion 5 which carries and drives the grinding elements, hereinafter described, and which extends within the grinding chamber 6. This chamber is located at the base of the machine and is provided with an internal grinding ring or track 7 which is arranged in a vertical plane, which is preferably provided with a concave inner grinding surface 8.

9 designates the carrier for the grinding elements, this carrier consisting of an integral casting, the preferred form of which is shown in detail in Figs. 3 and 4. It consists of a body portion formed with a series of pockets 10 to receive the grinding wheels or elements 11 and provided with the offset slotted open bearing seats 12 for the gudgeons 13 of said wheels. Intermediate of the grinding wheels or elements the casing is shaped to form the scoops 14, there being one of these scoops intermediate of each pair of grinding wheels or elements. These scoops are of U-shape and form pockets which extend into the body portion and have the curved side walls 15 which diverge in the direction of the rotation of the carrier, and the angular forward wall 16, the shape and arrangement of these scoops being such as to converge the material inwardly from both sides of the grinding chamber on to the track or ring 8.

As will be seen from Figs. 3 and 4, the side portions 15 are flared outwardly at their rear ends, slightly beyond the ends of the open seats 12 for the gudgeons of the grinding elements. As before stated, this carrier is preferably cast in an integral piece and the portions thereof which are subjected to most wear and service, such as the seats 12 and the scoops, are preferably chilled in casting. The overhung portion 5 of the shaft 4 is provided with a square or angular portion 5<sup>a</sup> which fits within a corresponding socket in one end of the hub portion of the carrier to form the driving engagement between the shaft and carrier. Forward of the portion 5<sup>a</sup> the shaft is preferably tapered as shown, with the cylindrical threaded end portion 5<sup>b</sup> upon which is screwed a securing nut 5<sup>c</sup>.

17 designates the screening chamber which is supported on the frame above the grinding chamber. This screening chamber is preferably of circular form with an inner screening wall 18 and an outer screening wall 19, these two walls being placed concentrically with respect to each other.

20 is an intermediate hopper section which connects the screening chamber with the grinding chamber.

21 is a downwardly converging feeding hopper placed centrally within the screening chamber and rigidly secured to the shaft 22



which is journaled in bearings 23. This shaft may be driven by any suitable means, such as by the bevel gears 24 from a shaft 25 having a pulley 26 connected by belt 27 with the pulley 28 on the shaft 4. Secured to the hopper 21 are radial deflector blades 29 which rotate within the screening chamber and which serve to deflect the material outwardly against the screen wall 18 in a manner hereinafter described. The hopper 21 is open at its upper end and the material to be crushed or pulverized is fed through this hopper and thence downwardly into the pulverizing chamber to the action of the grinding elements. As the material is pulverized it is thrown upwardly by the action of the rotating carrier and its scoops into the pulverizing chamber where it is caught by the deflecting blades 29 and thrown outwardly against the screen walls of the chamber where the separation is effected. The material which is too coarse to pass through the screens falls backwardly into the converging throat or hopper section which unites the screening chamber with the pulverizing chamber and is again brought to the action of the grinding elements. The rotating action of the carrier and grinding elements, act in the direction in which the material is to be thrown upwardly into the screening chamber, and therefore the direction of the material does not have to be changed until it reaches the screening chamber and is caught by the deflecting blades 29. In this manner the lower portion of the grinding chamber is kept comparatively free from any accumulation of pulverized or partially pulverized material which by its presence would tend to cushion the grinding elements and reduce the efficiency of the machine. The cone surface of the hopper 21 also acts as a deflecting surface for the material thrown upwardly into the screening chamber; and by feeding the material downwardly through this hopper, it is not caught and thrown outwardly by the deflecting blades before reaching the grinding chamber, as would be the case if the material were fed directly through the screening chamber without the provision of this hopper. By using pulleys 26 of different diameters, the speed of the deflectors can be varied as may be desired independently of the speed of rotation of the grinding elements. This is an important feature, since for different kinds of materials, it is advisable to rotate the deflectors at different speeds.

The material separated out by the screens is discharged through suitable passages which have nothing to do with the present invention, the general construction and arrangement of the machine herein shown and described having been fully described and claimed by us in other pending applications.

The end wall 30 of the grinding chamber is made in a separate section so that it can be readily removed for the purpose of obtaining access to the chamber and to the grinding elements, the opening provided by this removable wall being of such diameter as to permit the carrier to be removed bodily therefrom in an endwise direction and out underneath the overhung portion of the intermediate hopper section. For the purpose of providing for this removal, the adjacent end portion of the carrier is provided with slots 31 which may be engaged by headed bolts 32 in the manner shown in Fig. 2 for the purpose of securing thereto a removing attachment. A simple and convenient form of this attachment is shown in Fig. 2. This attachment consists of a flanged sleeve member 33 which is secured to the carrier by the bolts 32 before referred to, after the casing section 30 and securing nut 34 have been removed.

34 is a hollow shaft having an exterior thread and also formed at its inner end with an internal thread to engage the threaded end portion of the shaft 4. The shaft 34 extends through the sleeve 33 and its thread is engaged by the internal thread of a nut member 35 which has a rotary connection at 36 at the outer end of the sleeve member 33.

37 is a hand wheel which is secured to the nut member 35. It will be readily seen that when the hand wheel 37 is actuated, the nut member 35 will travel on the thread of the shaft 34 and will pull with it the sleeve member 33 and the carrier. In this manner the carrier may be quickly removed from the shaft and a new carrier inserted, this operation being capable of being very readily effected.

It will be noted that owing to the form of the scoops 14 the material in the lower portion of the grinding chamber will be engaged by these scoops and forced inwardly from opposite sides of the chamber toward the grinding track or ring so as to direct the material to be pulverized on to the inner face of said track or ring directly in the path of the grinding rollers or wheels. The latter being freely mounted in the open slots of the carrier can readily yield to any obstruction which they may encounter and are at the same time free to move outwardly by the centrifugal force of rotation to exert their grinding and pulverizing action. These scoops, as before stated, also act to throw the material upwardly into the screening chamber to the action of the deflecting blades.

Other features of the machine shown which have not been described in detail herein, form the subject matter of other applications now pending, the present invention being more particularly concerned, as above stated, with the means for feeding the



material into the machine and to the construction and removal of the carrier for the grinding elements.

It will be obvious that various changes may be made in the details of construction and arrangement of the parts without departing from our invention, since

What we claim is:—

1. A pulverizing machine, having a reducing chamber, a screen chamber above the reducing chamber, reducing means in the reducing chamber arranged to throw the reduced material directly upward into the screen chamber, an inverted cone shaped rotary feed hopper extending centrally downward within the said screen chamber and having a central discharge at its lower end, deflecting blades secured to said hopper, and means for rotating said hopper and blades, the outer inclined surface of the hopper also forming a deflecting surface; substantially as described.

2. A pulverizing machine, having a reducing chamber, a screen chamber above the reducing chamber, reducing means in the reducing chamber arranged to throw the reduced material directly upward into the screen chamber, an inverted cone-shaped rotary feed hopper extending centrally downward within the said screen chamber and having a central discharge at its lower end, deflecting blades secured to said hopper, and means for rotating said hopper and blades, independently of the reducing means, the outer inclined surface of the hopper also forming a deflecting surface; substantially as described.

3. A rotating carrier for the grinding rolls of a pulverizing machine, said carrier consisting of an integral casting having a plurality of bearing seats for the grinding elements, and having rearwardly inclined U-shaped scoop portions in the form of pockets extending inwardly into the body of the carrier intermediate said seats; substantially as described.

4. In a machine of the character described, a pulverizing chamber having a portion of its end wall removable, a driving shaft having an overhung portion extending into such chamber, a carrier for the grinding elements detachably secured to said shaft, and provided with means for the attachment thereto of a removing device, whereby said carrier may be removed bodily from the shaft by endwise movement and taken out at the re-

movable side of the casing; substantially as described.

5. In a machine of the character described, a pulverizing chamber, a driving shaft having an overhung portion extending into such chamber, said shaft having an angular portion and a tapered portion forward of the angular portion, a carrier for the grinding elements within said chamber on the overhung portion of the shaft and having a driving engagement with the angular portion of the shaft, and means for attaching to said carrier a removing device, said chamber having an opening in its side wall closed by a removable plate and through which opening the carrier can be removed; substantially as described.

6. In a grinding or pulverizing machine, grinding or pulverizing means, comprising a fixed circular track or ring, and a carrier rotatably supported within said track or ring, and comprising an integral casting of general cylindrical form, having therein a plurality of radial slots or pockets formed at each side with open slots, said casting also having intermediate of said pockets, other pockets extending into said body and forming U-shaped scoops having side walls which diverge in the direction of rotation of the carrier, and grinding elements seated in the first named pockets and having gudgeons seated in said slots; substantially as described.

7. A rotating carrier for the grinding rolls of a pulverizing machine, comprising a body having a plurality of open radial slots to receive the gudgeons of driving rollers, and having intermediate of the said slots integral scoop portions in the form of depressions in said body, each scoop having rearwardly converging side walls and a rearwardly inclined rear wall, whereby the material is converged by the scoops inwardly from opposite sides toward the center and into the path of the grinding rolls, substantially as described.

In testimony whereof, we have hereunto set our hands.

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JOHN O. LUDLAM.  
CHARLES F. BONNOT.  
LOUIS C. BONNOT.

Witnesses:

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CHAS. KIRCHBAUM.