

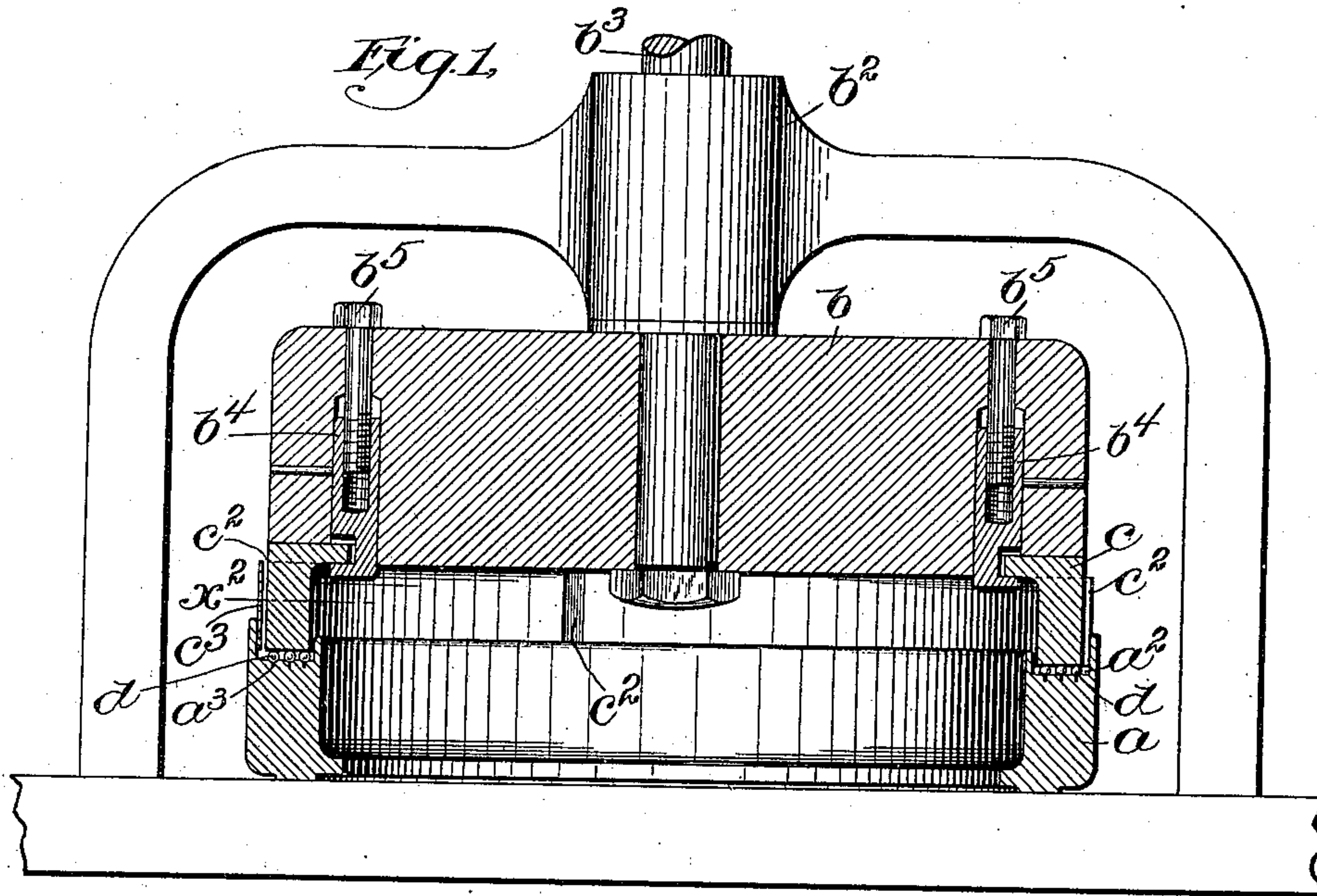
No. 618,502.

Patented Jan. 31, 1899.

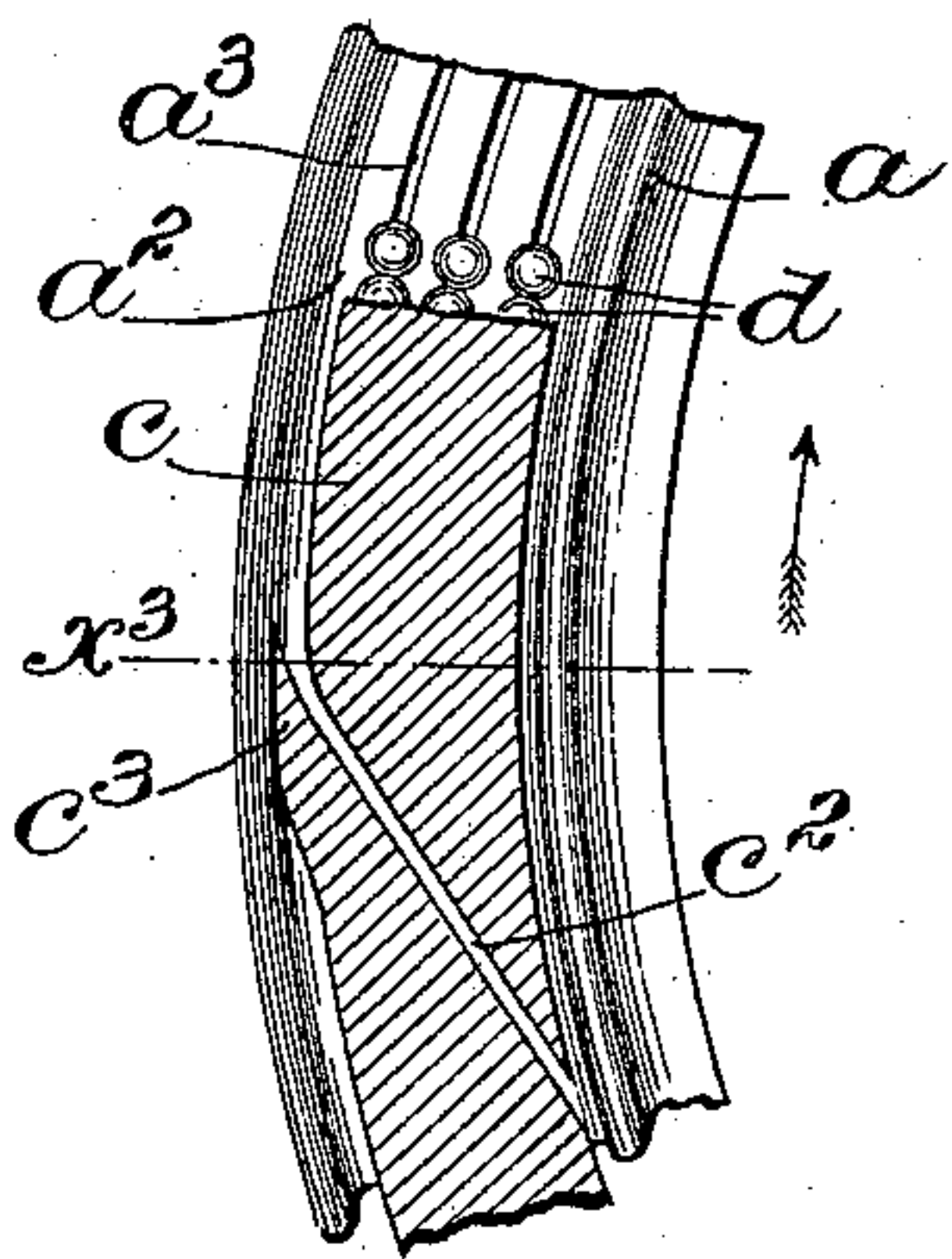
H. L. GANTT.  
BALL GRINDING MACHINE.

(Application filed May 16, 1898.)

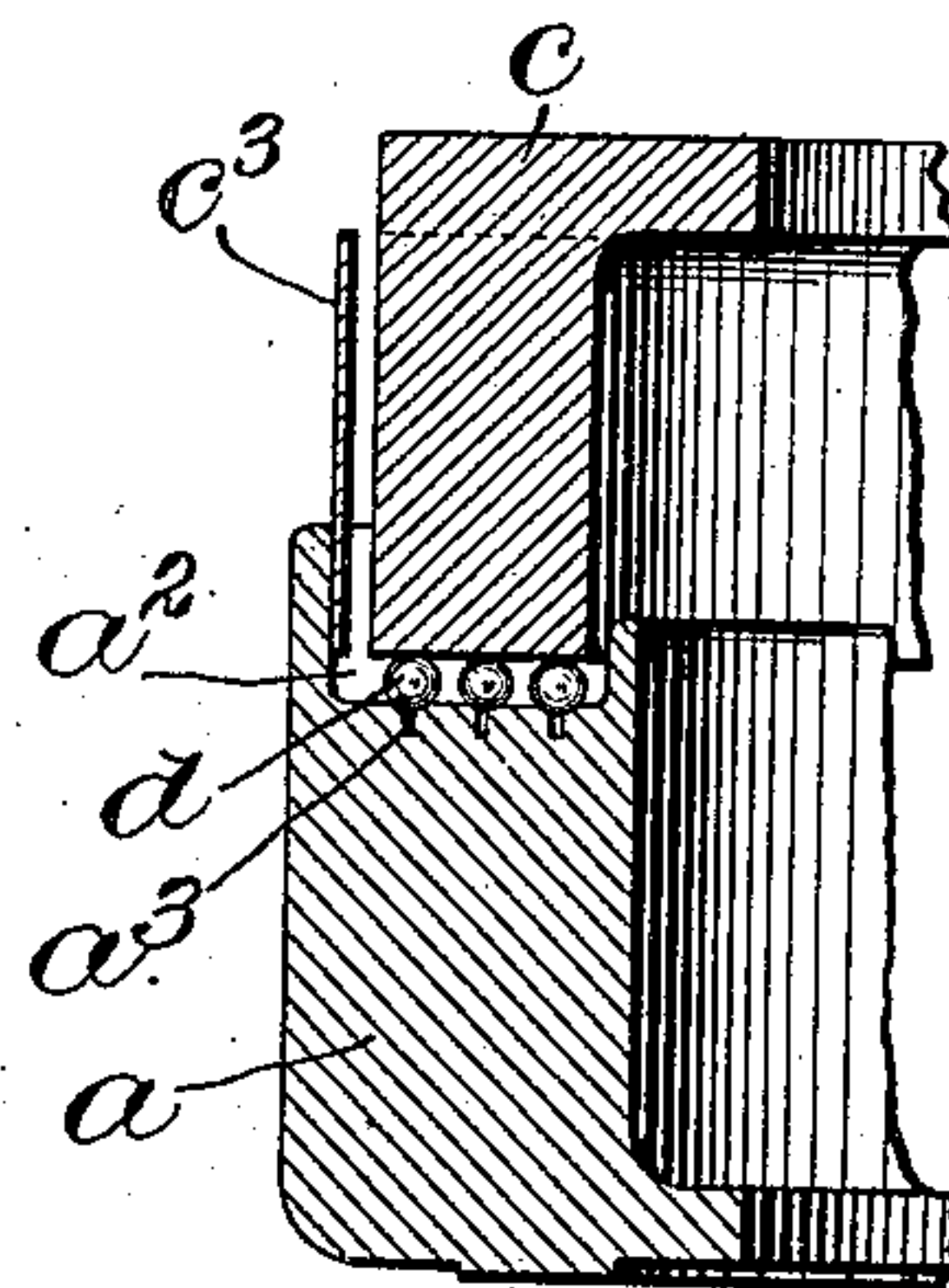
(No Model.)



*Fig. 2.*



*Fig. 3.*



Witnesses.  
Jas. J. Maloney.  
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Inventor,  
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Att'ys.



# UNITED STATES PATENT OFFICE.

HENRY L. GANTT, OF FITCHBURG, MASSACHUSETTS, ASSIGNOR TO THE  
SIMONDS ROLLING MACHINE COMPANY, OF SAME PLACE.

## BALL-GRINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 618,502, dated January 31, 1899.

Application filed May 16, 1898. Serial No. 680,830. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY L. GANTT, of Fitchburg, in the county of Worcester and State of Massachusetts, have invented an  
5 Improvement in Ball-Grinding Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 The present invention relates to an apparatus for grinding balls, and is embodied in an improvement in that form of machine in which the balls are supported in an annular channel and a ring is caused to engage with  
15 the tops of the balls in said channel, the said ring being rapidly rotated, so that the balls are ground between the face of the ring and the bottom of the channel. The channel is filled with a grinding mixture, usually oil  
20 and emery, and the ring is rotated at a high rate of speed. It has been found in operating machines constructed in this way that the fluid grinding mixture, in which, of course, there is a strong current set up in the direction  
25 of rotation of the ring, will tend by centrifugal force to flow outward toward the outer wall of the channel and away from the balls which are under the ring, so that where there are several lines of balls the balls in  
30 the inner line may become nearly dry or free from the grinding mixture, so that the operation is not carried out to the best advantage.

The object of the present invention is to obviate this difficulty, and in accordance  
35 with the invention the ring is provided with a series of channels extending through from one side to the other thereof, the said channels being preferably inclined away from the direction of rotation of the ring, starting from  
40 the outer side of said ring, the tendency thus being to scoop the oil which is banked up, so to speak, against the outer wall of the channel and deflect the same inward toward the inner wall, it being practicable by using the  
45 proper number of channels to practically equalize the amount of oil at both sides of the ring, so that the balls will at all times be completely submerged. To increase this ef-

fect, the rear wall of each channel at the outer or inlet end (the term "rear" being used  
50 as relative to the direction of forward rotation of the ring) may be extended or provided with a projection, so as to form an additional scoop or deflector to deflect the oil into and through the channel.

55 Figure 1 is a vertical section of a machine embodying the invention; Fig. 2, a horizontal section, on an enlarged scale, of a portion of the ring and the channel therein, the section being taken on the line  $x^2$  of Fig. 1; and  
60 Fig. 3 is a vertical section on line  $x^3$  of Fig. 2.

The machine to which the invention is applied consists of the annular portion  $a$ , in which is formed the annular channel  $a^2$  and the rotatable frame-piece or disk  $b$ , to which  
65 is suitably secured the grinding-ring  $c$ , the edge of which extends into the channel  $a^2$ , so as to rest upon the balls  $d$ , lying in the bottom of the said channel. There may be any number of rows of balls, and to keep the  
70 balls in rows there are subchannels  $a^3$ , the said channels preferably extending below the balls to contain the grinding mixture. The frame-piece  $b$  is shown as mounted in a vertical bearing  $b^2$  and provided with the shaft  $b^3$ ,  
75 which is adapted to be driven in any suitable way to set up a rapid rotation of the frame-piece  $b$  and the ring  $c$  carried thereby, so that the said ring travels rapidly along the surface of the balls  $d$ , rolling them as they  
80 travel along the bottom of the channel, whereby every part of each ball is caused to be acted upon by the ring and ground thereby.

In the operation of the machine the channel is filled or partially filled with a liquid  
85 grinding mixture, such as oil and emery, so that the balls in their travel are subjected to the action of the emery, as is necessary for the grinding operation. In machines of this class as heretofore commonly constructed, how-  
90 ever, it has been found that the grinding mixture, which is carried rapidly around by the rotation of the ring, tends by centrifugal force to bank up against the outer wall of the channel, so that it does not properly come in  
95 contact with all of the balls. To obviate this



difficulty, the ring, in accordance with the present invention, is provided with transverse channels  $c^2$ , extending from one side of the said ring to the other, the said channels being preferably formed by merely cutting slots in the said ring across the bottom thereof, the said slots extending upward substantially to or above the normal level of the grinding mixture in the channel. The said channels are preferably inclined, as shown, toward the rear from the outer wall of the ring, it being obvious that in the rotation of the said ring in the direction of the arrow shown in Fig. 2 the tendency will be for the oil to be caught by the said channels and deflected through the same to the inner side of the ring. It is desirable, however, to provide each channel, as shown, with an additional scoop or deflector  $c^3$ , projecting beyond the wall of the ring toward the wall of the channel, there being a space between the mouth of the said scoop and the mouth of the channel  $c^2$ , so that the said scoop in traveling will deflect the oil lying on the outside of the channel into and through the channel, causing it to flow back toward the inner side of the ring.

It is obvious that the ring may be provided with any number of such channels which may be found best suited for the purpose, and the said channels may be arranged at any desired angle or in some instances may be directly transverse to the ring or radial to the axis of rotation thereof, while the additional scoop  $c^3$  may be applied or not, as is found essential or desirable. The ring  $c$  may be rotated in any suitable way and is herein shown as detachably secured to the rotary disk or frame-piece  $b$  by means of clamping-pieces  $b^4$ , adapted to be drawn into position to clamp the ring  $c$

against the surface of the frame-piece  $b$  by means of cap-screws  $b^5$ .

I claim—

1. In a machine for grinding metal balls, the combination with an annular channel adapted to receive the balls, of an annular grinding-ring extending into the said channel to engage and grind the balls lying in the channel, means for rotating said ring, and oil ducts or channels extending through the said ring from one side to the other thereof, substantially as and for the purpose described.

2. In a machine for grinding metal balls, the combination with an annular channel adapted to receive the balls, of an annular grinding-ring extending into the said channel to engage and grind the balls lying in the channel, means for rotating said ring, and oil-ducts rearwardly inclined with relation to the direction of rotation of said ring and extending from the outer to the inner side thereof, substantially as and for the purpose described.

3. In a machine for grinding metal balls, the combination with an annular channel adapted to receive the balls, of an annular grinding-ring extending into the said channel to engage and grind the balls, means for rotating said ring, oil ducts or channels extending through the said ring from one side to the other thereof, and scoops or deflectors adjacent to the openings of said oil-ducts at the outer side of the ring, substantially as described.

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

HENRY L. GANTT.

Witnesses:

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H. J. LIVERMORE.