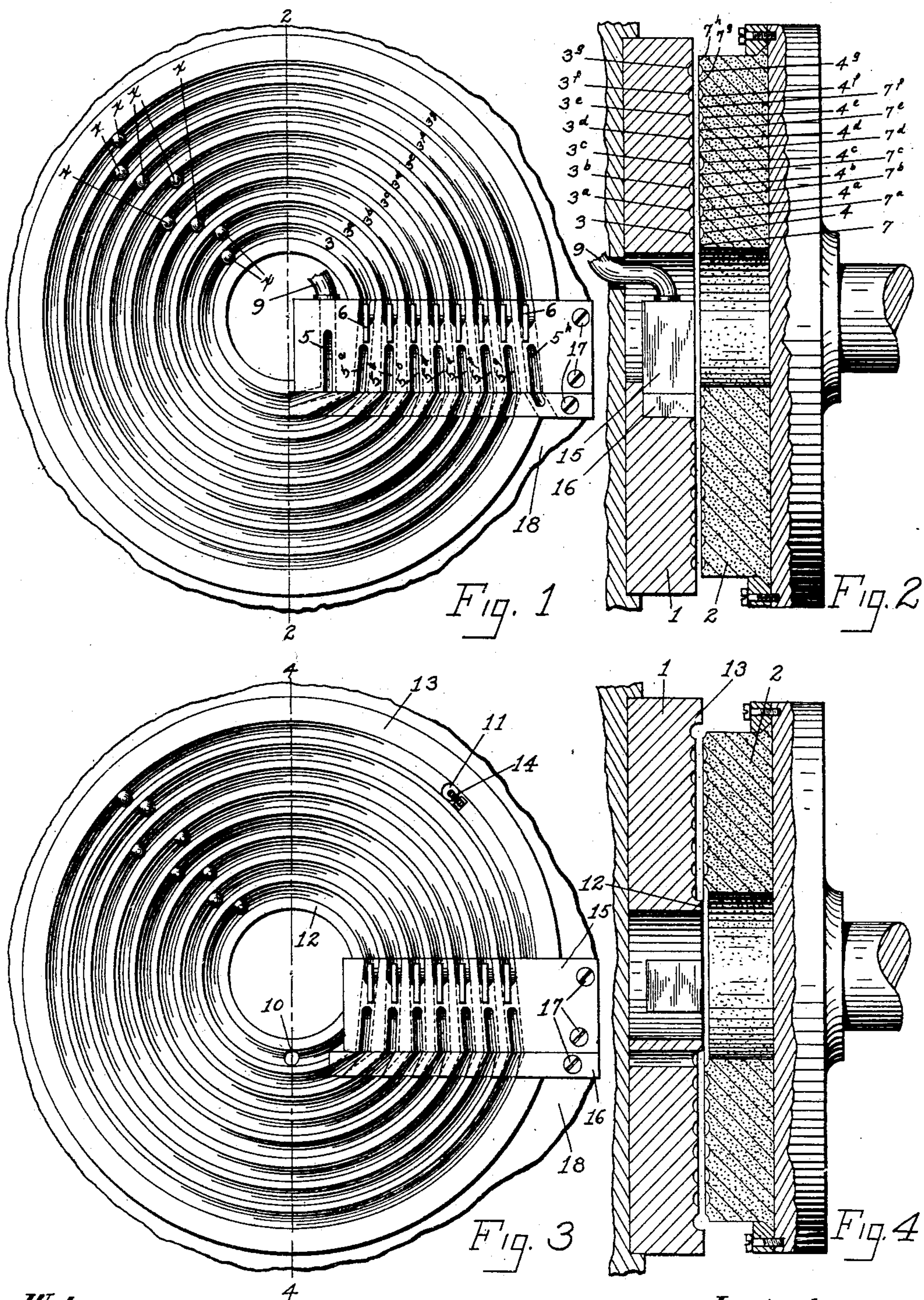


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J. F. LYNCH.
GRINDING MACHINE.
APPLICATION FILED JULY 29, 1909.

Patented Jan. 25, 1910.

2 SHEETS—SHEET 1.



Witnesses:
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John F. Lynch,
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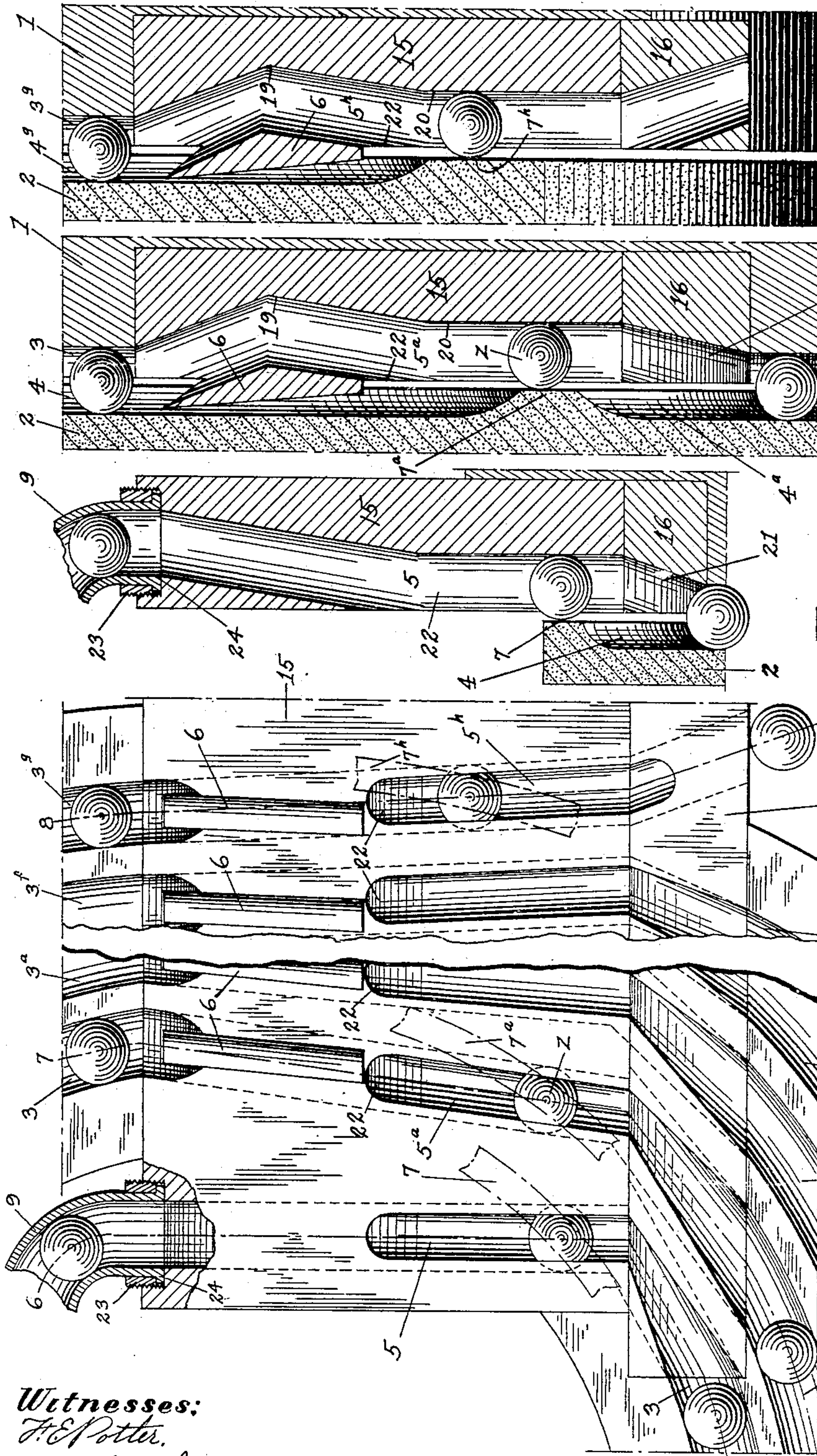


Fig. 8

Fig. 7

Fig. 6

Fig. 5

Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN F. LYNCH, OF BRISTOL, CONNECTICUT, ASSIGNOR TO THE NEW DEPARTURE MANUFACTURING COMPANY, OF BRISTOL, CONNECTICUT, A CORPORATION OF CONNECTICUT.

GRINDING-MACHINE.

947,249.

Specification of Letters Patent.

Patented Jan. 25, 1910.

Application filed July 29, 1909. Serial No. 510,243.

To all whom it may concern:

Be it known that I, JOHN F. LYNCH, a citizen of the United States, residing at Bristol, county of Hartford, State of Connecticut, have invented a certain new and useful Grinding-Machine, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to grinding machines and is particularly applicable to machines for grinding balls.

In machines of this class it has been customary to employ grinding disks having grooves in which the balls are received and ground. Naturally, in such machines the grooves wear deeper as the abrading disks are continued in use, so that it has been necessary to stop the operation of the machine from time to time and dress down the faces of the ribs at the sides of the grooves in order to prevent the grooves becoming of such depth that they perform little or no grinding.

One object of my invention is to provide means whereby the wearing down of the grooves is automatically compensated for.

A further object is to provide means whereby in the usual grinding operation of the machine the articles operated upon so act upon the faces of the ribs at the sides of the grooves that these ribs wear down as the bottoms of the grooves wear, thus automatically preserving the proper depth of grooves.

To these ends, and also to improve generally upon devices of the character indicated, my invention consists in the various matters hereinafter described and claimed.

In the accompanying drawings: Figure 1 is a face view of the grinding disk which serves as the base plate for the articles being ground; Fig. 2 is a sectional elevation on about the line 2—2 of Fig. 1, and shows both grinding disks and the parts immediately associated therewith; Fig. 3 is a view of the character of Fig. 1 but showing a different means for introducing and delivering the balls; Fig. 4 is a view of the character of Fig. 2 taken on about the line 4—4 of Fig. 3; Fig. 5 is a fragmentary enlarged detail showing particularly the transfer grooves of the base plate, the relationship

of the ribs of the abrading disk being indicated by broken lines; and Figs. 6, 7 and 8 are fragmentary sectional elevations of the grinding disks taken respectively on about the lines 6—6, 7—7 and 8—8 of Fig. 5.

The invention is herein illustrated as applied to a ball grinding machine of well known type having the cast metal stationary grinding disk or bed-plate 1 and the rotating grinding disk or stone 2 of abrasive material, the stationary disk 1 having the concentric grooves 3—3^s and the rotating stone disk 2 having the corresponding grooves 4—4^s. The matching grooves produce channels for the balls *a*, and transfer grooves 5^a—5^s connect what may be termed the rear or delivery end of one grinding groove with what may be termed the forward or receiving end of the next, suitable deflecting fingers 6 extending into the said delivery ends of the grinding grooves to cause the balls to enter the transfer grooves. Thus, balls received in the inner groove 3 travel around all of the grooves and are then discharged from the outer groove 3^s, as will be more fully hereinafter explained.

As the ribs 7^a—7^s of the abrasive grinding disk 2 are concentric with the said grinding grooves while the transfer grooves 5^a—5^s extend across the lines of said ribs, it is manifest that as a ball traverses a transfer groove said ball moves across a rib. At the point at which a ball thus crosses a rib the transfer groove (as shown in Figs. 5 and 7, at the ball *a*) is open and is of such depth that the ball engages the face of the rib. Thus, the balls themselves wear down the faces of the ribs as they also wear down the bottoms of the grooves and groove-bottoms and ribs wear together so that the grooves are automatically kept the proper depth notwithstanding the wear incident to the grinding. Furthermore, the balls receive the grinding effect of the ribs as well as of the grooves, thus increasing the grinding received by each ball during its passage through the raceway of the machine.

Manifestly, the balls can be introduced into the machine and delivered therefrom in more than one way. Preferably the abrasive disk 2 has a rib 7 at the inner side of the first groove 4 and a rib 7ⁿ at the outer side of the last groove 4^s. In this event I prefer to introduce and discharge the balls in a manner substantially similar to that above

described for transferring the balls from groove to groove. To this end I provide an entrance transfer groove 5 which, as shown in Figs. 5 and 6, crosses the rib 7 just as the other transfer grooves cross the other ribs. Said groove 5 delivers into the grinding groove 3 and is open at the point of crossing the rib 7 to permit the entering ball to contact and thus wear the face of said rib. In the form herein illustrated in Figs. 1 and 2, a flexible pipe 9 leads the balls to the said groove 5. As shown particularly in Figs. 5 and 8, a final transfer groove 5ⁿ leads from the last groove 3^s to the outside of the grinding disks, said groove 5ⁿ crossing the outer rib 7ⁿ and being open at the point of such crossing to permit the outgoing ball to wear the face of the said outer rib.

If desired, the balls can be introduced and delivered without crossing a rib, as through the entrance and discharge openings 10 and 11 shown in Figs. 3 and 4. In this event the periphery of the grinding stone 2 and its inner circumference preferably lie respectively within the circumference of the outer and inner ball channels, as shown in Fig. 4, so that the stone has no rib at either its periphery or inner circumference, thus enabling the balls in the inner and outer channels to wear down the edges of the stone. To insure the retention of the balls in these inner and outer channels when the stone is thus constructed, the inner and outer ribs 12 and 13 of the base plate 1 are preferably extended slightly beyond the diameter of the balls, the diameter referred to being the vertical diameter as the parts are illustrated in Fig. 4. The part 14 illustrated in Fig. 3 is a deflecting finger to guide the balls into the outlet 11.

In the structures illustrated, the transfer grooves are formed in blocks 15 and 16 which are set into a suitable recess in the base plate 1 and appropriately fastened, as by the bolts 17 engaging the holding plate 18 to which the disk 1 is clamped. The two blocks 15 and 16 are employed for convenience in drilling the grooves. The deflecting fingers 6, extending into the grinding grooves to deflect the balls, are conveniently formed integral with the block 15 and project beyond the face of said block to extend well into the grinding grooves. The bottom of each transfer groove meets the bottom of the groove or pipe from which it receives the balls, and each transfer groove (except the entrance groove 5) then extends downwardly around the finger 6, as at 19, to leave ample support for the finger. Each transfer groove is then raised, as at 20, to present the balls to the face of the rib as above explained, and then each transfer groove (except the delivery one 5ⁿ) further rises, as at 21, to meet the groove to which its balls are

delivered. From about what may be termed the inner end of the finger 6 each transfer groove is open as at 22.

The delivery pipe 9 conveniently has a flanged end which enters a threaded seat in the portion of the block 15 which projects beyond the inner edge of the disk 1 and into the hollow center thereof, a threaded collar 23 screwing into said seat above the flange 24 to lock the pipe end in place. Preferably, the blocks 15 and 16 project beyond the periphery of the disk 2 and the bolts 17 are seated in such projecting portions, so that said bolts can be withdrawn and the blocks slid out of their recesses without removing the disk 2. Thus, in my present machine the ribs of the grinding disk are automatically dressed, and this dressing is effected by the very articles upon which the machine is operating, the dressing operation itself serving to grind said articles.

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

1. In a grinding machine, the combination with a grooved grinding disk, of means for causing a predetermined depth of groove to be automatically maintained; substantially as described.

2. In a grinding machine, the combination with a grooved grinding disk, of means for automatically dressing the outer face of the ribs in the operation of said disk; substantially as described.

3. In a grinding machine, the combination with a grooved grinding disk, of means for causing the articles being ground to automatically effect dressing of the outer face of the ribs of said disk; substantially as described.

4. In a grinding machine, the combination with a grooved grinding disk, of means for presenting the articles being ground to the outer faces of the ribs; substantially as described.

5. In a grinding machine, the combination with a grooved grinding disk, of a bed-plate having an open groove intersecting the line of the rib of said grinding disk and receiving the articles being ground, the distance from the bottom of said groove in the bed-plate to the face of said rib being such that the said articles contact said rib-face in passing along said bed-plate groove; substantially as described.

6. In a grinding machine, the combination with a grinding disk having a grooved race-way for the articles being operated upon, of a bed-plate having a groove with both of its ends in communication with said race-way, said bed-plate groove intersecting the line of the rib of said grooved grinding disk and being open at such intersection, the distance from the bottom of said open bed-plate groove to the face of said rib being

such that the articles being operated upon contact said rib-face in passing along said open bed-plate groove; substantially as described.

5 7. In a grinding machine, the combination with a grinding disk having a series of concentric grinding grooves, of a plate having a transfer groove connecting two of said grinding grooves and intersecting the rib of
10 said grinding disk, said transfer groove at such intersection being open and of such depth that the articles operated upon passing along said groove contact the face of said rib; substantially as described.

15 8. In a grinding machine, the combination with a grooved grinding disk, of a bed-plate coöperating therewith to form a raceway for the articles being operated upon, and a deflecting finger upon said bed-plate and ob-
20 structing said raceway, said bed-plate having a groove which communicates at both ends with said raceway and intersects the rib of the grinding disk, said bed-plate groove extending below said finger, then
25 rising to such a point that its bottom is such a distance from the face of said rib that articles passing along the groove contact said rib-face, and then further rising to again meet said raceway; substantially as de-
30 scribed.

9. In a grinding machine, the combination with a grinding disk having a recess, of a

block in said recess and having an entrance groove communicating with the grinding surface of said disk; substantially as de- 35 scribed.

10. In a grinding machine, the combination with a grinding disk having a recess, of a block in said recess and having a delivery groove communicating with the grinding 40 surface of said disk; substantially as described.

11. In a grinding machine, the combination with a disk having a grooved raceway for the articles being ground and provided 45 with a recess, of a block in said recess, said block having an entrance groove communicating with said raceway, a transfer groove connecting portions of said raceway, and a delivery groove also communicating with 50 said raceway; substantially as described.

12. In a grinding machine, the combination with a grinding disk having a recess, of a block in said recess and projecting beyond the edge of said disk, said block having a 55 groove which opens in its said projecting portion and communicates with the grinding face of said disk; substantially as described.

In testimony whereof, I hereunto affix my signature, in the presence of two witnesses. 60

JOHN F. LYNCH.

Witnesses:

WM. E. WIGHTMAN,
GALES P. MOORE.