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Patented Jan. 31, 1899.

H. M. PUTNAM.

DIE FOR ROLLING METAL BALLS.

(Application filed Aug. 16, 1897.)

(No Model.)

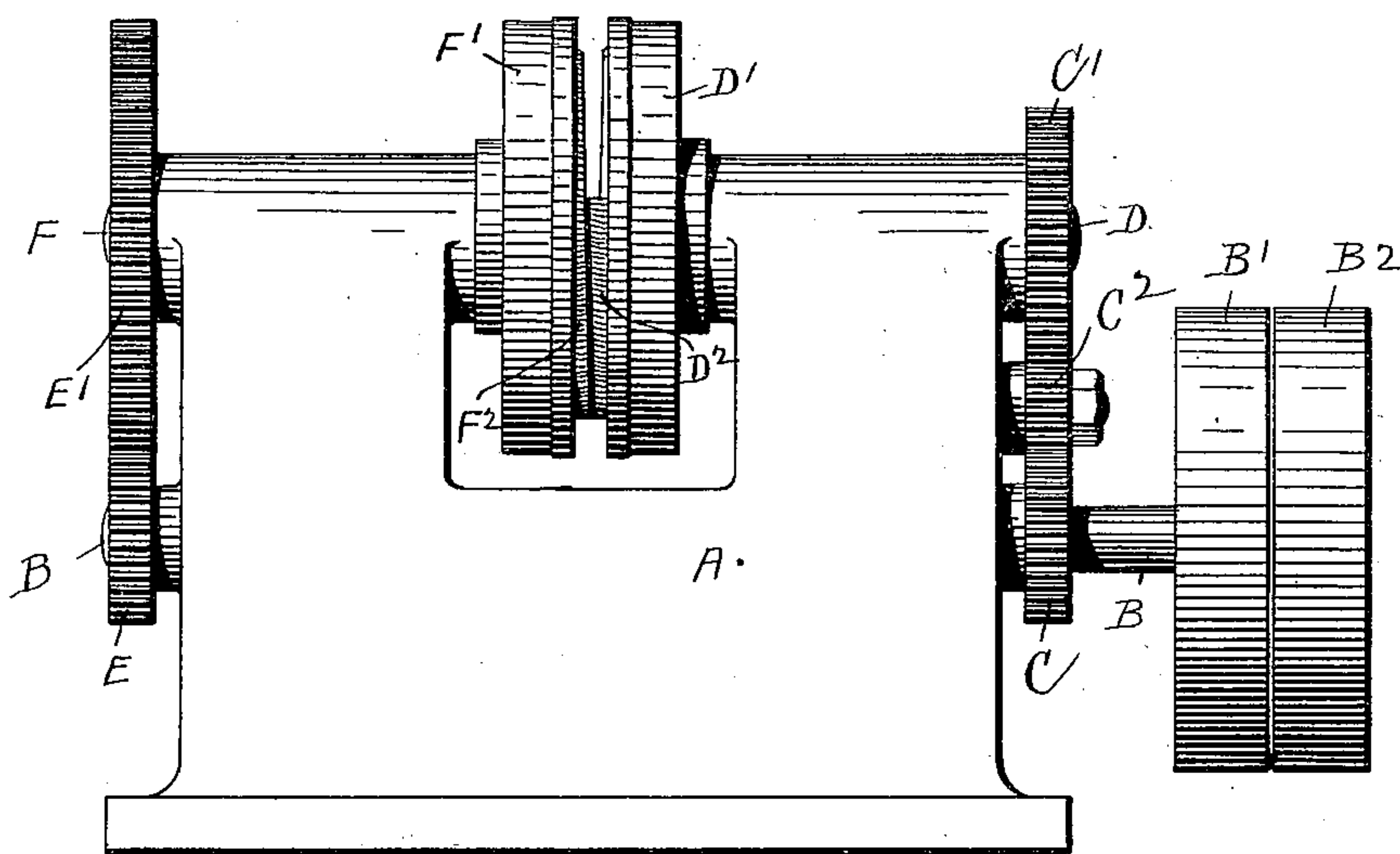


Fig. 1.

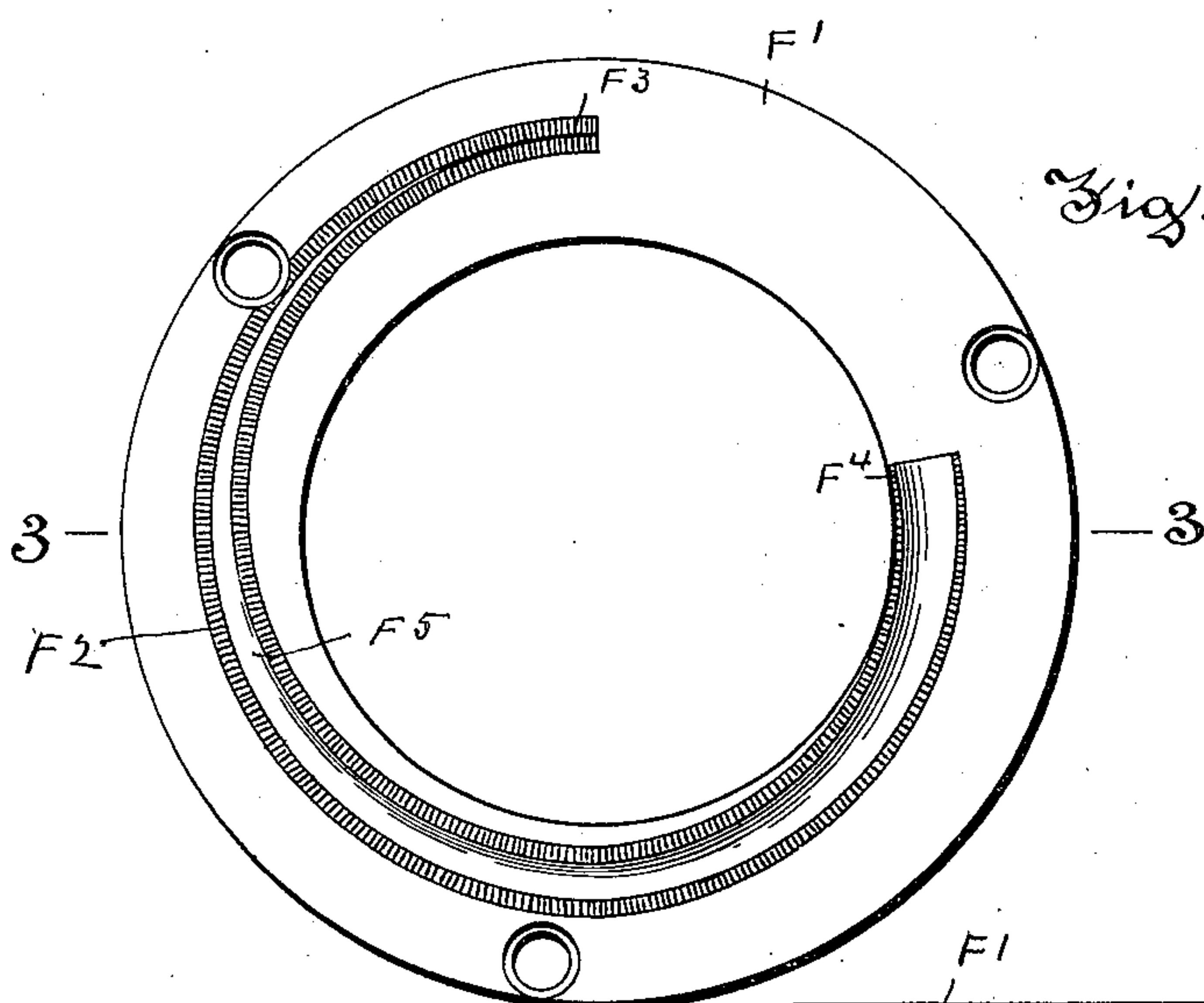


Fig. 2.

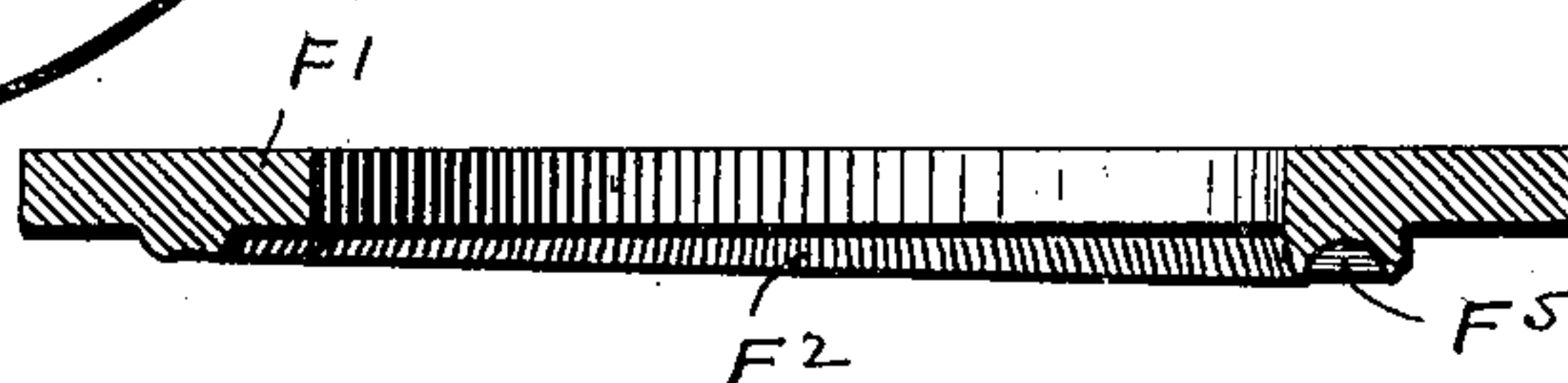


Fig. 3.

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McPrice

Inventor
Harry W. Putnam
By his Attorney
Rufus B. Fowler

UNITED STATES PATENT OFFICE.

HARRY M. PUTNAM, OF FITCHBURG, MASSACHUSETTS.

DIE FOR ROLLING METAL BALLS.

SPECIFICATION forming part of Letters Patent No. 618,584, dated January 31, 1899.

Application filed August 16, 1897. Serial No. 648,357. (No model.)

To all whom it may concern:

Be it known that I, HARRY M. PUTNAM, a citizen of the United States, and a resident of Fitchburg, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Dies for Rolling Metal Balls, of which the following is a specification, accompanied by drawings, forming a part of the same, in which—

Figure 1 represents a front elevation of a machine for rolling balls and containing dies embodying my invention. Fig. 2 represents the side or face of one of the rotating disks with a die formed thereon; and Fig. 3 is a sectional view of the disk and die on line 3 3, Fig. 2.

Similar letters refer to similar parts in the different figures.

My invention relates to the class of curved and grooved dies which are mounted upon the opposing sides of two rotating disks, between which a rod is seized as the dies are rotated and crowded into the grooves and by the operation of upsetting and rolling shaped into spherical form; and the object of my invention is to provide means for feeding the rod to the dies, so that a series of balls shall be successively and automatically formed; and it consists in the disposition of the dies on the face of the rotating disks in a scroll shape, with a circumferential space or gap between the ends of the die on each disk, so that the action of the dies in swaging a ball will move the rod longitudinally far enough to cause the advancing ends of the dies to engage a new section of the rod and swage the next succeeding ball.

Referring to the drawings, A denotes the supporting stand or frame of a ball-rolling machine, and B a shaft journaled therein and provided with belt-pulleys B' B². The shaft B, through the spur-gears C C' and intermediate gearing C², rotates a shaft D, which carries a disk D', having a grooved die D² formed upon its side. The shaft B, through the gears E E', also rotates in the opposite direction a shaft F, having its axis in alignment with the axis of the shaft D and carrying a disk F', having a die F², which is a duplicate of the die D². The disk F' and die F² are represented on a larger scale in Figs.

2 and 3, which show the arrangement of the die on the disk.

Referring to Figs. 2 and 3, representing the disk F' and die F², having a groove F⁵, which are duplicated in the disk D' and die D², it will be observed that the advancing ends F³ of the die are placed farther from its axis of rotation than the rear end F⁴, the die being disposed on the face of the disk in the shape of a scroll, with a circumferential space or gap between the advancing end F³ and the rear end F⁴ of the die preferably greater than the diameter of the rod to be swaged, so that after the rod is released from the rear end F⁴ of the die the rod will again be engaged by the advancing end F³ in order to roll the next succeeding ball, the eccentricity of the die being sufficient to draw the rod lengthwise far enough to form a new ball. Each of the dies also gradually increases in thickness from its forward to its rear end, forming two opposing inclined surfaces between which the rod is rolled and crowded into the grooves which extend lengthwise the dies and gradually diverge or increase in size from the front to the rear end of the dies, so that the rod, which is gradually compressed between the inclined surfaces of the dies, becomes expanded into the grooves and shaped into spherical form until it is separated from the rod and delivered from the rear end of the groove.

In the operation of the machine a rod from which the balls are to be rolled is suitably supported in the usual manner in machines of this class and presented between the opposing faces of the disks F' and D' and is seized simultaneously by the advancing ends of the dies F² and D². As the dies rotate past each other in opposite directions their opposing sides gradually approach each other, so that the metal between the faces of the dies is gradually crowded into the grooves, causing the metal included between the faces of the opposing dies to be shaped into true spherical form and detached from the rod and delivered from the rear end of the dies. As the dies are arranged in scroll shape, with their advancing ends farthest from their axes of rotation, the rod during the operation of rolling will be drawn longitudinally toward the

center of the revolving disks until the ball is finally completed at the rear end of the dies. The advancing ends of the dies will then engage a new section of the bar and swage the succeeding ball, and as the second ball is formed by the rotation of the dies the rod is again drawn in, causing a new section to be seized by the advancing end of the dies to form the next succeeding ball, the operation of feeding and rolling being repeated with each successive revolution of the dies.

The operation of rolling or swaging a metal rod between a pair of dies provided with inclined surfaces and gradually - diverging grooves is now practiced, and therefore these features form no part of my present invention, which relates to the means for feeding the rod for the succeeding ball at each successive rotation of the disks.

I am aware that dies have been arranged on the side of a rotating disk and eccentrically to their axis of rotation; but in such machines the die has been carried one or more times around the disk and the metal to be rolled has been first severed from the rod and fed to the dies in separate pieces, as dies thus arranged are incapable of imparting a lengthwise feeding movement to the rod. By my improved machine when a rod has been seized between the opposing faces of the dies it is fed lengthwise the distance equal to the eccentricity of the dies to their axes of rotation, and when the rod has been released from the rear ends of the dies it is seized at a new sec-

tion by the advancing ends of the dies and a new ball rolled, and the operation of rolling and feeding the rod is continued until the entire rod is rolled.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with two disks having their axes in alinement and capable of rotation in opposite directions, of dies carried upon the opposing sides of said disks and having opposing working faces, said dies being disposed eccentrically to the axes of said disks with the advancing ends of said dies farthest from the centers of said disks, and with a circumferential space between the ends of each die, whereby a rod engaged by said dies is drawn lengthwise by the passage of the dies, substantially as described.

2. In a machine for roll-forging metal articles, a pair of rotating dies having opposing working faces and arranged eccentrically to their axes of rotation, with their advancing ends moving in a path farther from their axis of rotation than their opposite ends, and with a circumferential space between the ends of each die, whereby a new section of the rod is engaged at each successive rotation of the dies, substantially as described.

Dated this 7th day of August, 1897.

HARRY M. PUTNAM.

Witnesses:

WALTER HALL,
F. A. CURRIER.