

No. 645,715.

Patented Mar. 20, 1900.

E. F. CREAGER.  
RETAINER FOR BALL BEARINGS.

(Application filed May 1, 1899.)

(No Model.)

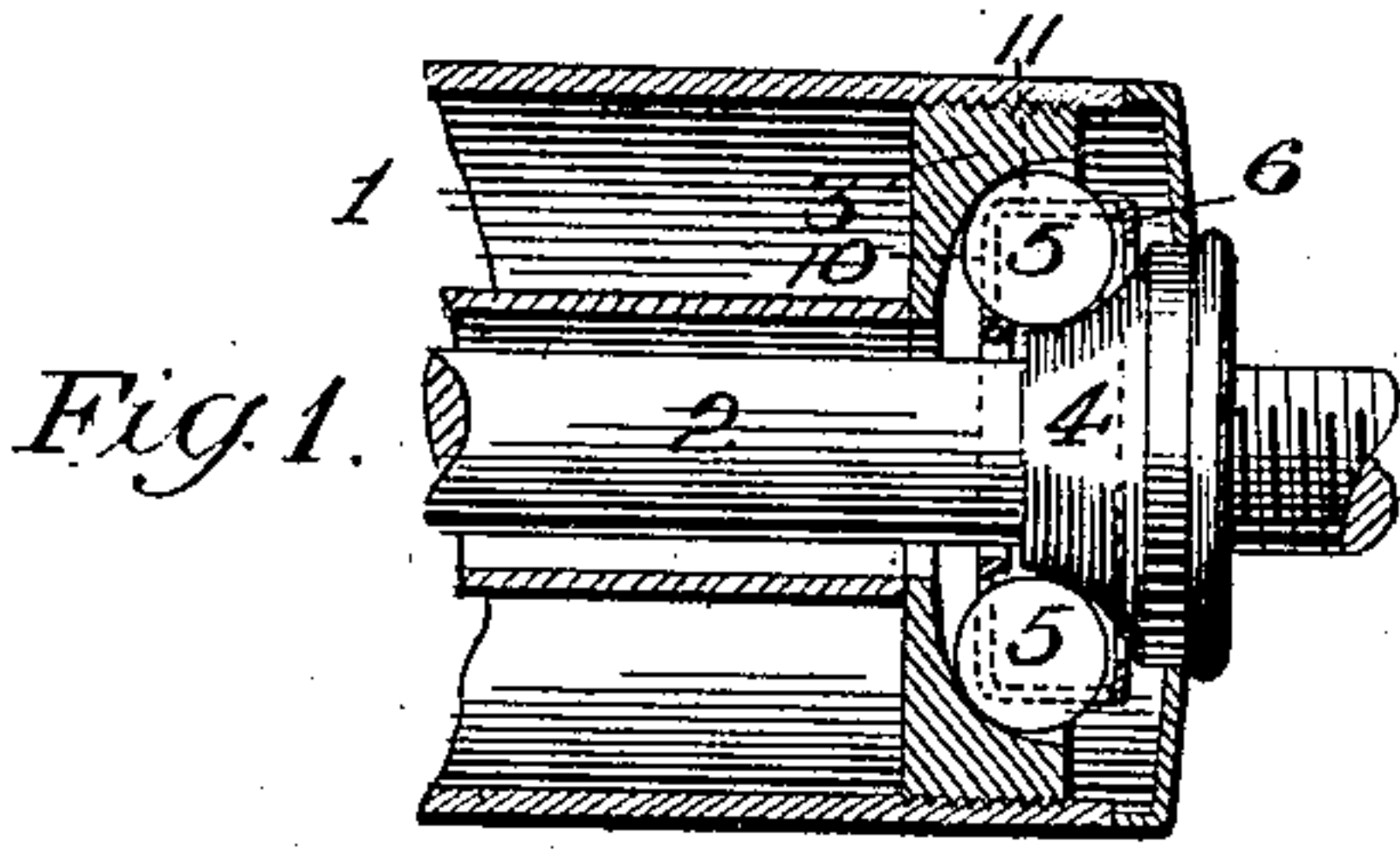


Fig. 1.

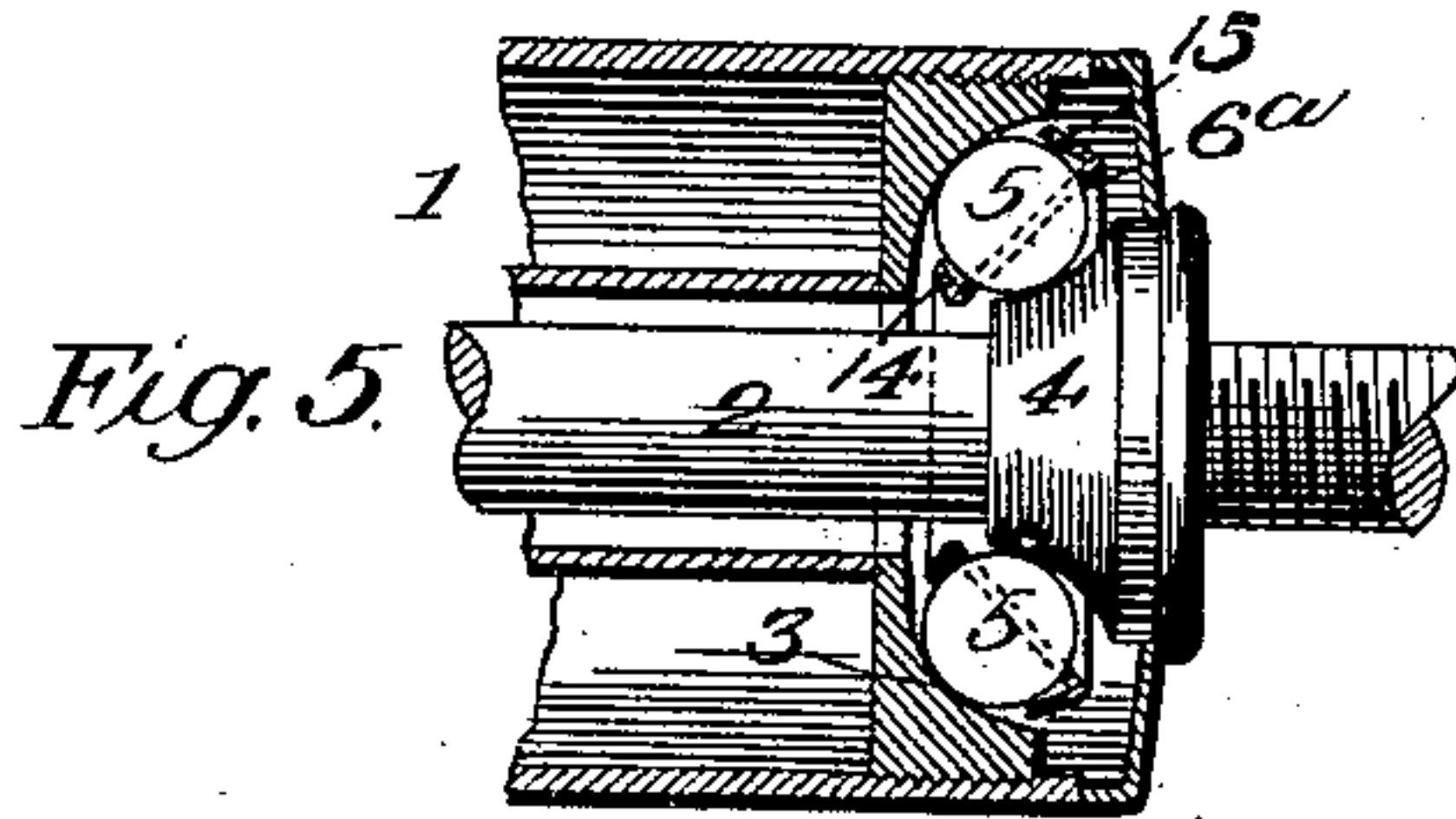


Fig. 5.

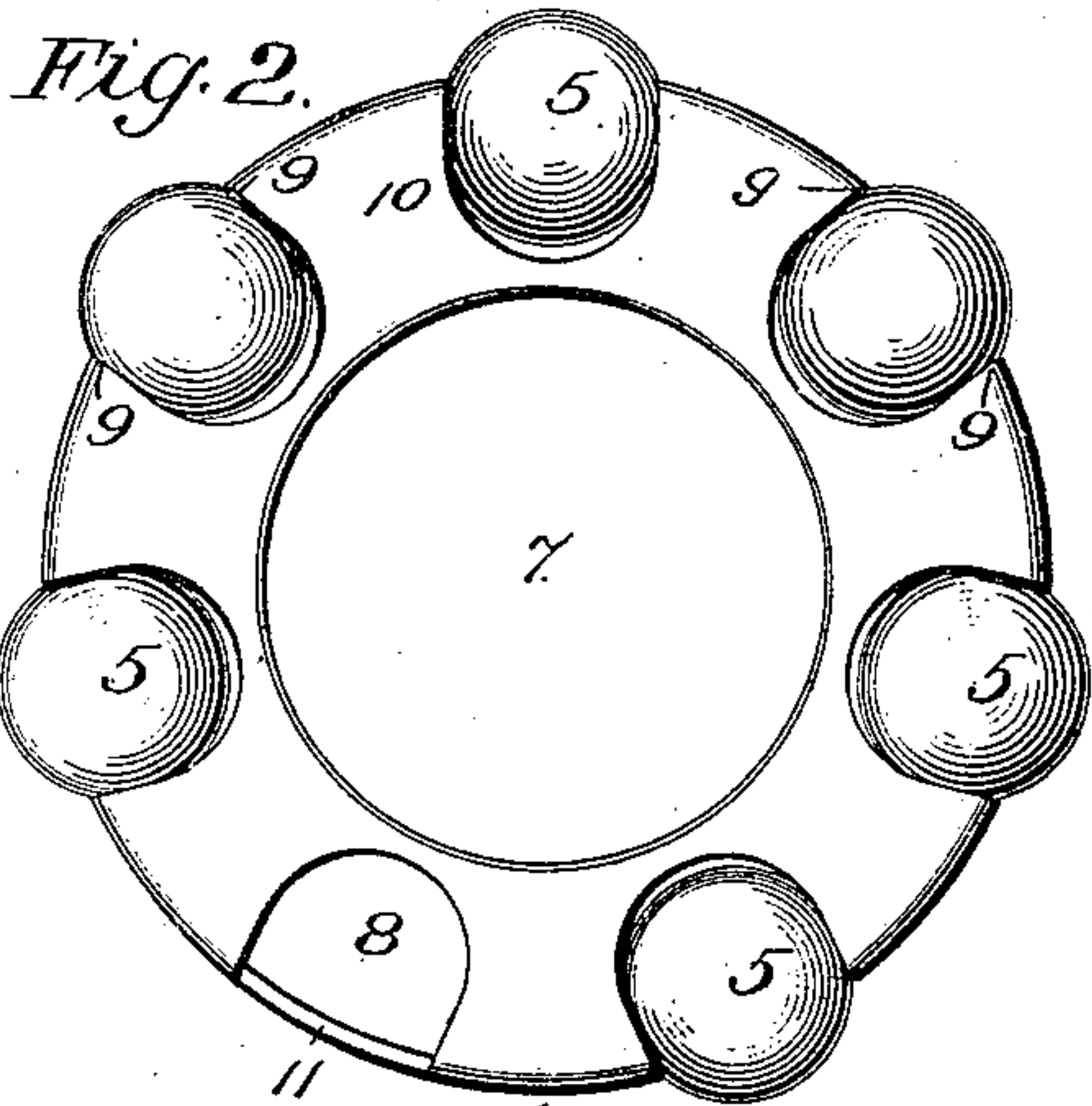


Fig. 2.

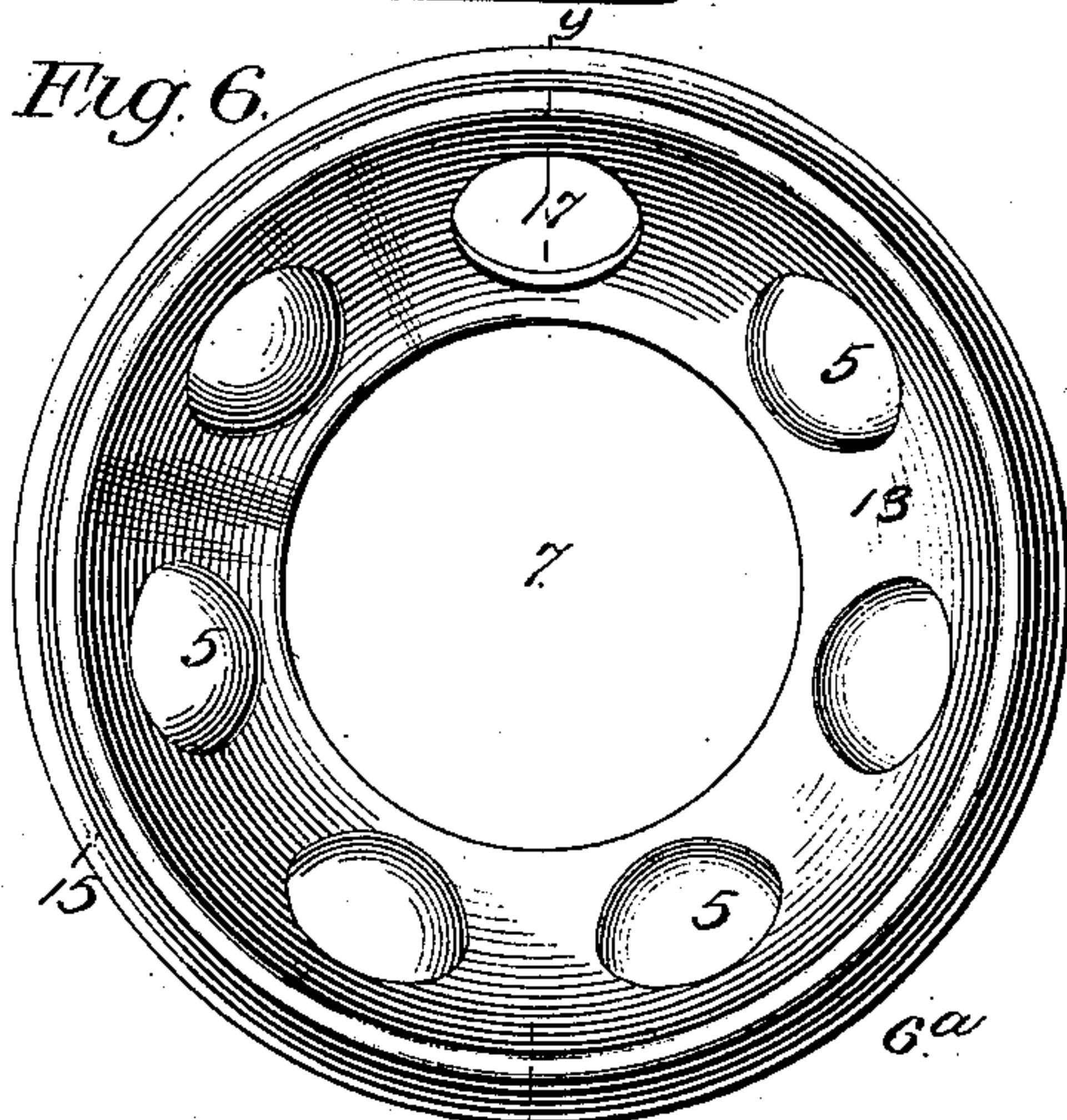


Fig. 6.

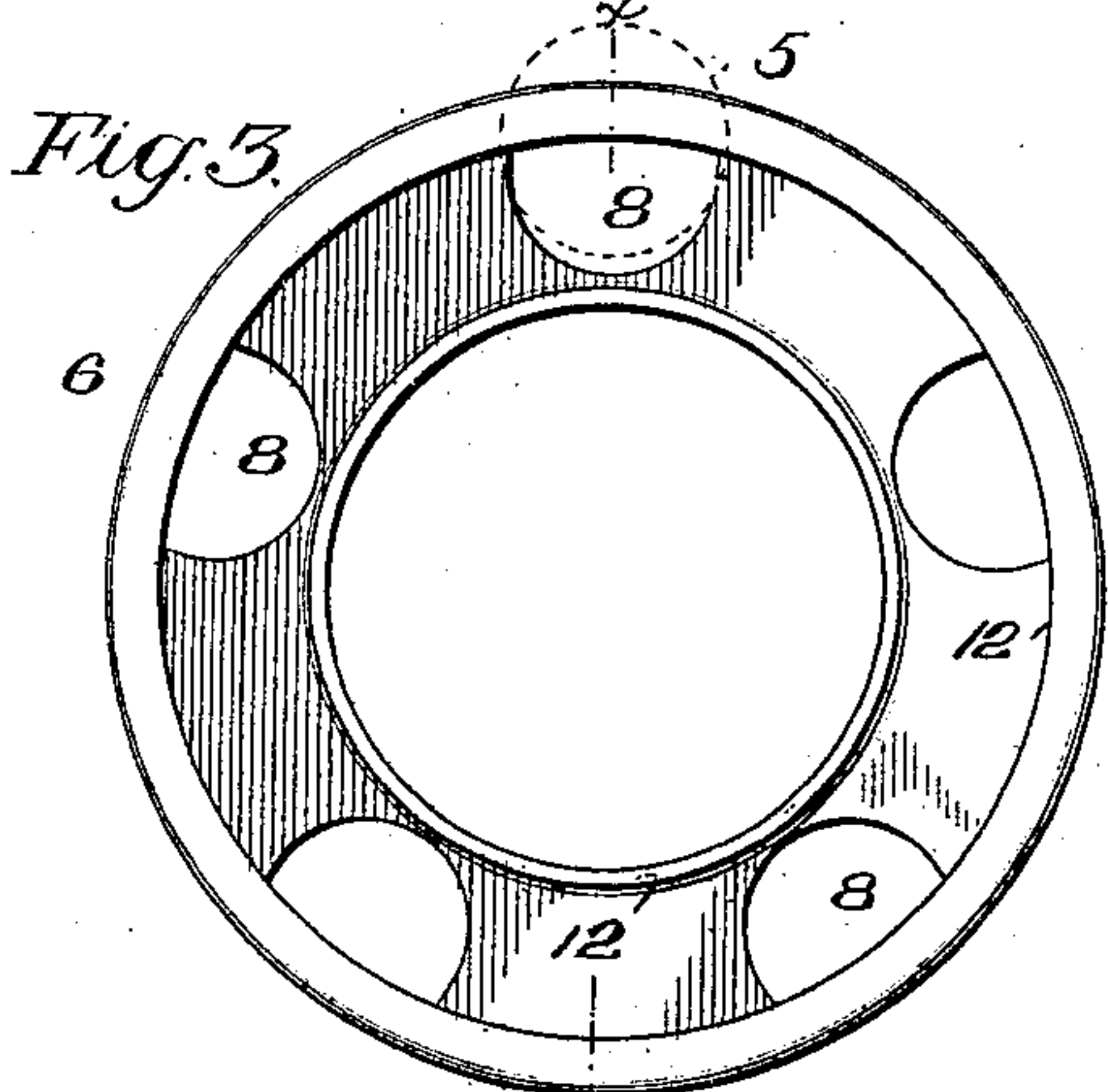


Fig. 3.

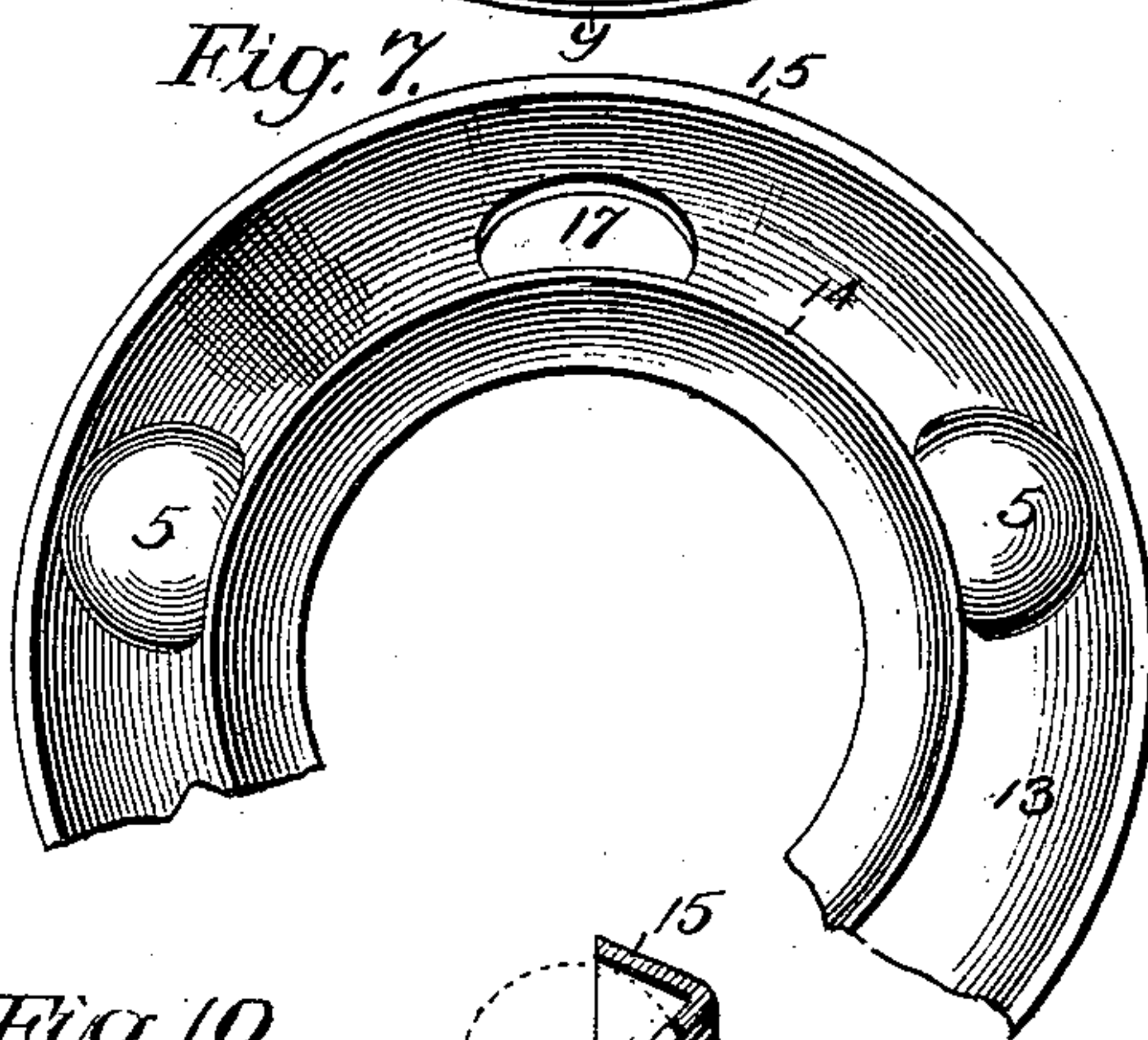


Fig. 7.

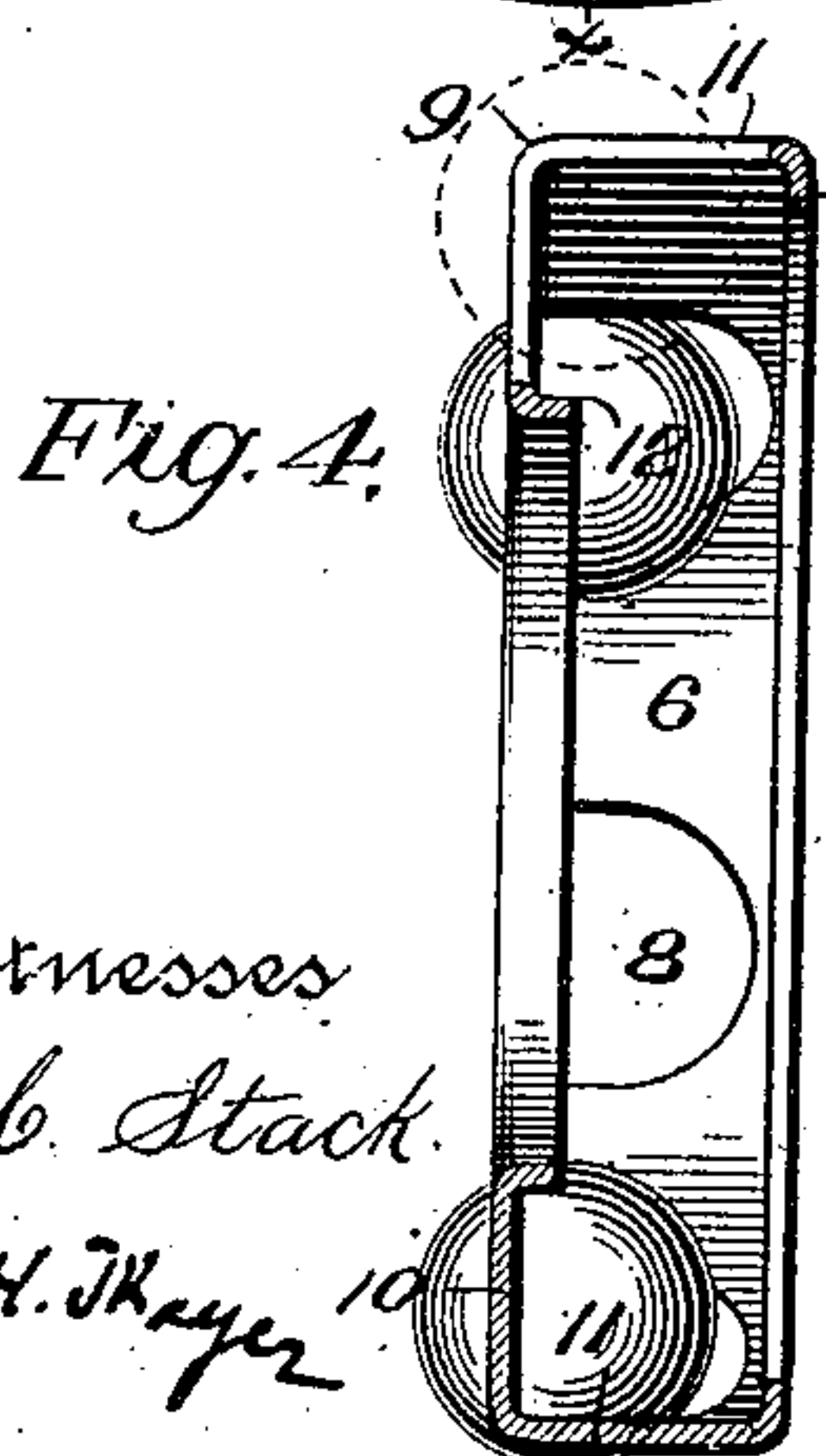


Fig. 4.

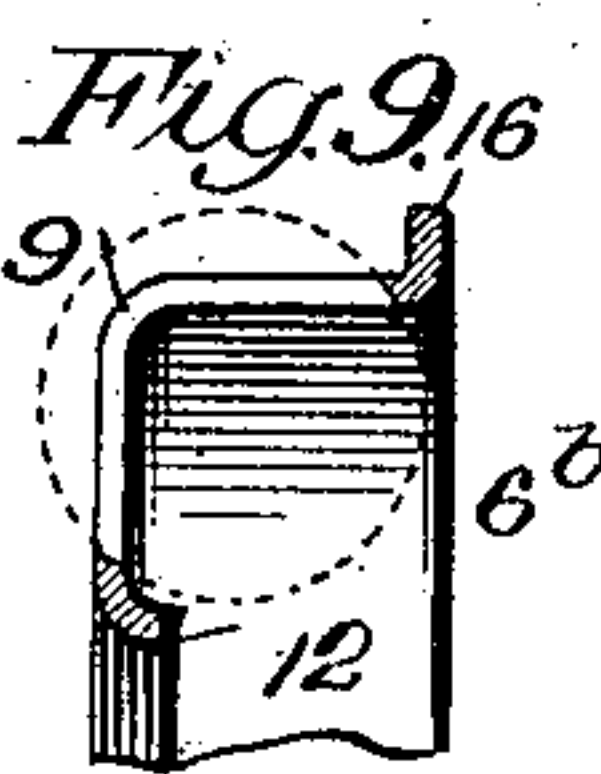


Fig. 9.

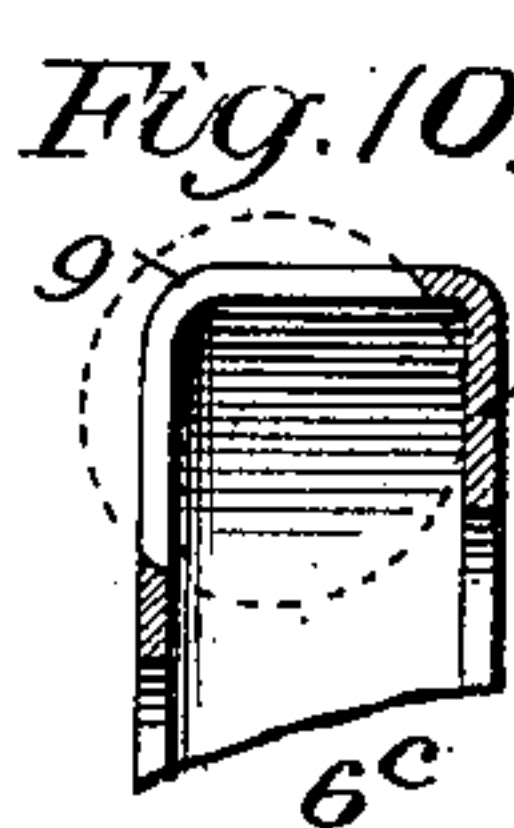


Fig. 10.

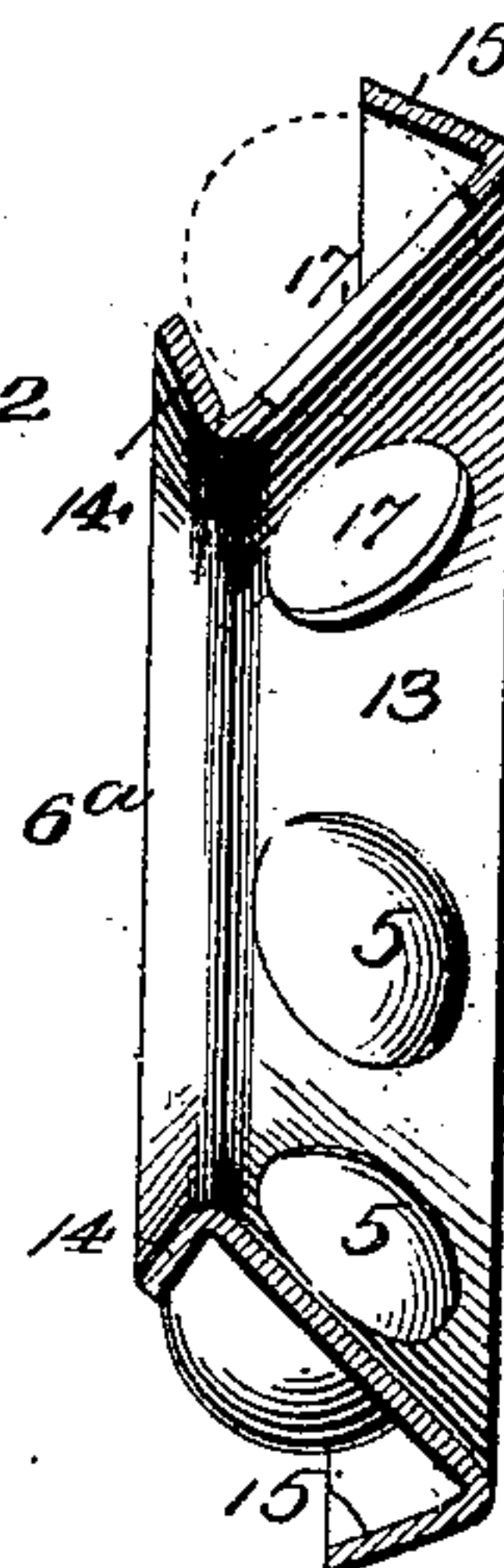


Fig. 8.

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# UNITED STATES PATENT OFFICE.

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## RETAINER FOR BALL-BEARINGS.

SPECIFICATION forming part of Letters Patent No. 645,715, dated March 20, 1900.

Application filed May 1, 1899. Serial No. 715,226. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN FRANCIS CREAGER, a citizen of the United States, residing at Lancaster, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in Retainers for Ball-Bearings; and I do hereby 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 relates to improvements in ball-bearings, and particularly to retainers and separators to be used with ball-bearings. Its object is to provide a retainer which may be easily manufactured, shall be applicable to ball-bearings generally, and shall give the greatest freedom to the balls in action.

It consists, essentially, of a ring perforated to receive the balls and retain them in one direction and bent to form approaching walls to guard and retain the balls in the opposite direction.

In the accompanying drawings, Figure 1 is a longitudinal section of an approved form of hub with my retainer and separator applied. Fig. 2 is, relatively to the following views, a top plan view of the separator. Fig. 3 is a bottom plan view, and Fig. 4 is a central vertical section on the line *xx* of Fig. 3, showing two balls in place. Fig. 5 is a longitudinal section of an approved form of hub, with a different form of retainer, involving the same principle as that shown in Figs. 1 to 4. Figs. 6 to 8 are views of the form of retainer shown in Fig. 5, Fig. 6 being, relatively to the following figures, a bottom plan, Fig. 7 a top plan, and Fig. 8 a central vertical section, showing two balls in place. Figs. 9 and 10 are further modifications.

The figures are arranged with reference to the position of the balls and the position the retainer occupies when in place.

In the drawings, 1 designates a hub; 2, a shaft; 3, a cup or ball chamber; 4, a cone; 5, antifriction-balls; 6, one of the principal forms of retainer, and 6<sup>a</sup> the other form.

7 designates an axial perforation; 8, a series of perforations between the axial perforation and the rim of the retainer; 9, the short axis of the perforations 8; 10, the inner wall of the retainer 6, and 11 the outer wall of that

form—that is, inner and outer with respect to the location of the retainer in place, as shown in Fig. 1.

12 represents contact-lips, a bend being given one or both of the walls in the form 6 or the modifications shown in Figs. 9 and 10 to form the contact-lips.

13 is an inclined wall of the form 6<sup>a</sup>.

14 and 15 are approaching walls of the same form, being, respectively, the inner and the outer walls—that is, inner and outer with respect to the location of the retainer, as illustrated in Fig. 5.

16 is an extension lip or flange which may be applied to some of the forms within the principle, as shown in Fig. 9, and 17 is a perforation, substantially circular, of the form 6<sup>a</sup>.

In the retainer illustrated, for example, in Fig. 4 there are two diverging walls 10 and 11 and two approaching walls, otherwise specifically designated as the "contact-lips" of the walls.

The retainer may be formed of metal, cast, spun, or stamped in any approved manner, and I may form the retainer from a templet or plate in which the axial perforation 7 and the ball-receiving perforations 8 have been formed. The short axis 9 of each perforation 8 is less than the diameter of the ball it is to receive, and in the retainer 6 the perforations are substantially oblong or elliptical in outline and include a space greater than the area included within the equator or circumference of any ball held by the retainer. The retainer 6 is bent upon the line of the short axis 9 of each perforation 8, and this bending forms walls 10 and 11. The perforations are intermediate the contact-lips of the walls, each perforation being divided between the walls or a part of each perforation extending beyond the line of bending or division into each wall. The bending may, as more fully set forth in a separate application of even date with this, Serial No. 715,225, bring all the points of contact on the periphery of any perforation 8 a less distance apart than the diameter of a ball, so that the perforation will retain the ball in each direction. In the forms shown in this application, however, the short axis of the perforation being of a less length than the diameter of a ball retains it in one direction, while the lips formed on the



walls retain the ball in the opposite direction. In the retainer 6, as illustrated, for example, in Figs. 1 to 4, both the walls 10 and 11 are bent in near the ends to form the retaining-lip 12. In the form shown in Fig. 9 one lip is bent in for the same purpose. The same is true of Fig. 10, the bend being at a different place and the lip straight and longer, one form being lettered 6<sup>b</sup> and the other 6<sup>c</sup>. In other words, I bend or curve the ring to form a cylindrical side wall and an end wall with the openings and the spacing apart of the walls so related to the size of the balls to be used that a ball may be sprung into an opening from the inner side of the ring and held from accidental displacement by the contact-points at the opposite ends of the transverse diameter, or, briefly, by what may be termed as the "side walls" of the openings, and held from displacement in the opposite direction by the lips of the approaching walls on the open side. The ball-receiving perforations or openings may be said to be inclosed—that is, in the specific illustrations they are distinguished from mere notches or recesses in the side of a cup or ring—and considering the real size of the openings they may be rudely but fairly described as of greater length than width.

In the form shown in Figs. 5 to 8 the ball-retaining perforations 17 are substantially circular and the bend which forms the wall on each side is beyond the periphery of the perforations. The form is that of a cone with a flaring lip or flange at the bottom and a flaring lip or flange at the top, or, with reference to the retainer 6<sup>a</sup> as applied, an inner and an outer flange. The diameter of each perforation 17 is less than that of any ball to be retained, so that the perforation guards and retains a ball in one direction while the approaching walls guard and retain the ball in the opposite direction, presenting points of contact a less distance apart than the diameter of a ball.

The extension lip or flange 16 (shown in Fig. 9 and form 6<sup>b</sup>) is a feature of construction more fully set forth in an accompanying application of even date, Serial No. 715,224. Its purpose is to permit the use of additional metal in the rim of the retainer so positioned as to easily fit within the space accorded to a retainer.

The principles of construction illustrated in Fig. 8 may be modified in accordance with the plan of Figs. 9 and 10—that is, a single lip may suffice, and where desired the extension lip or flange may also be added.

I have used the word "retainer" throughout the specification as a convenient term to designate a device having the functions of both a retainer and a separator—that is, a cage for holding all the balls in place when removed from the hub and preventing contact of the balls in action.

Having fully described my invention, what I claim is—

1. A ball-retainer, comprising a ring having approaching walls to guard balls in one direction and intermediate openings to receive and guard the balls in the opposite direction.

2. In a ball-bearing, the combination of a ball-retainer and balls, the ball-retainer comprising a ring bent to form opposite contact-lips a less distance apart than the length of the diameter of a ball, and having intermediate perforations of less diameter than the balls.

3. In a ball-bearing, the combination of a ball-retainer and balls, the ball-retainer comprising a ring bent to retain the balls by approaching walls and having perforations to receive the balls, the shortest diameter of a perforation being less than the diameter of a ball, but the circumference of a perforation including a larger area than that included within the equator or circumference of a ball, substantially as described.

4. A ball-retainer comprising a ring having a series of substantially oblong or elliptical perforations to receive balls, the ring being bent along the line of the short axis of each perforation to form approaching walls or portions to guard the balls.

5. A ball-retainer for ball-bearings comprising a ring bent to form diverging walls having their extremities bent to form approaching walls to retain balls and having perforations to receive balls, each perforation extending beyond the line of division between the diverging walls.

6. A ball-retainer, comprising a ring bent or curved to form a cylindrical side wall and an end wall and having inclosed ball-receiving openings in its bend of greater length than width to hold the balls from accidental displacement, the ring also having approaching walls spaced apart a less distance than the diameter of the ball to be used to retain the balls within the ring at its open side.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN FRANCIS CREAGER.

Witnesses:

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