

No. 785,663.

PATENTED MAR. 21, 1905.

C. H. CHAPMAN.

BALL RETAINER FOR BALL BEARINGS.

APPLICATION FILED APR. 18, 1904. RENEWED FEB. 6, 1905.

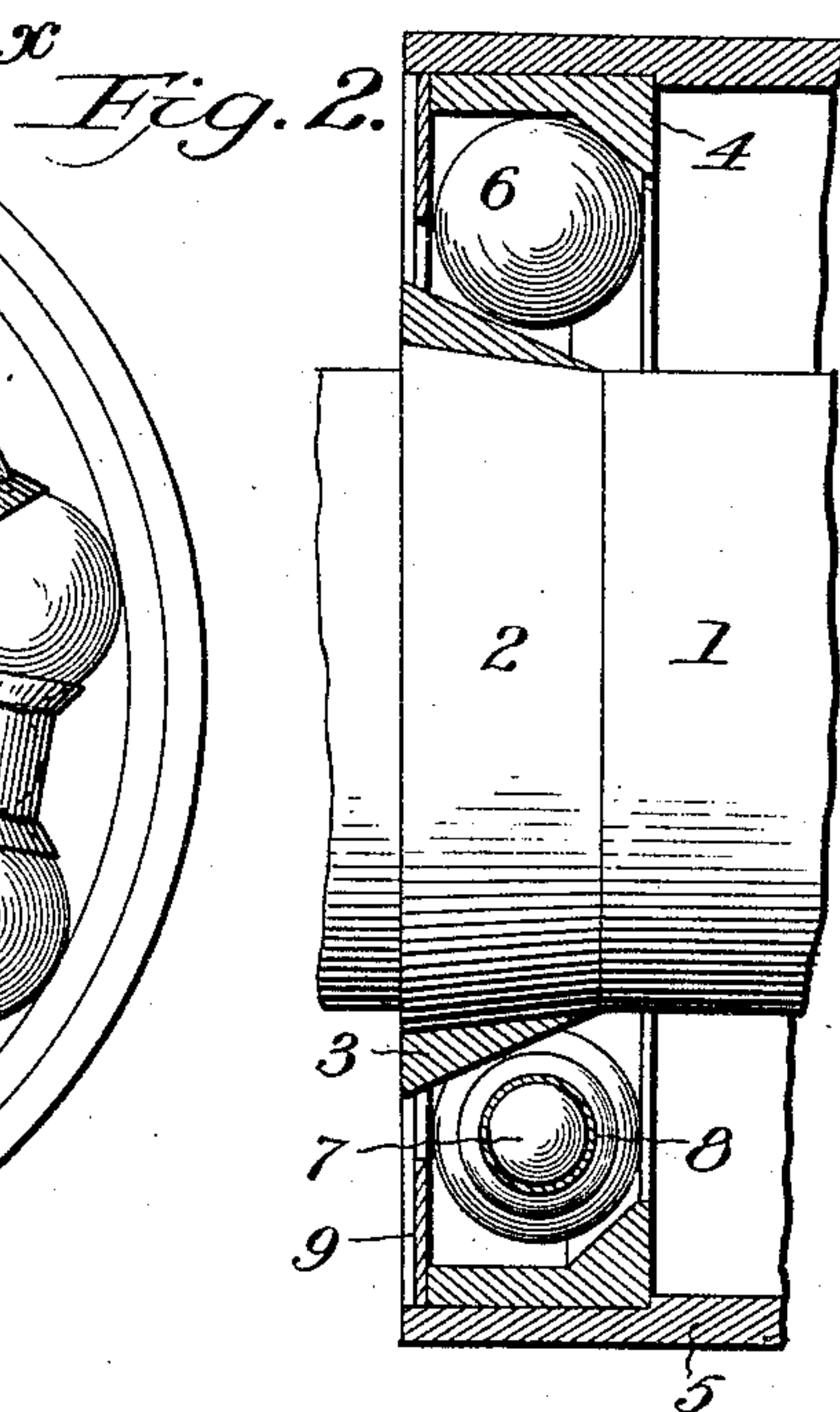
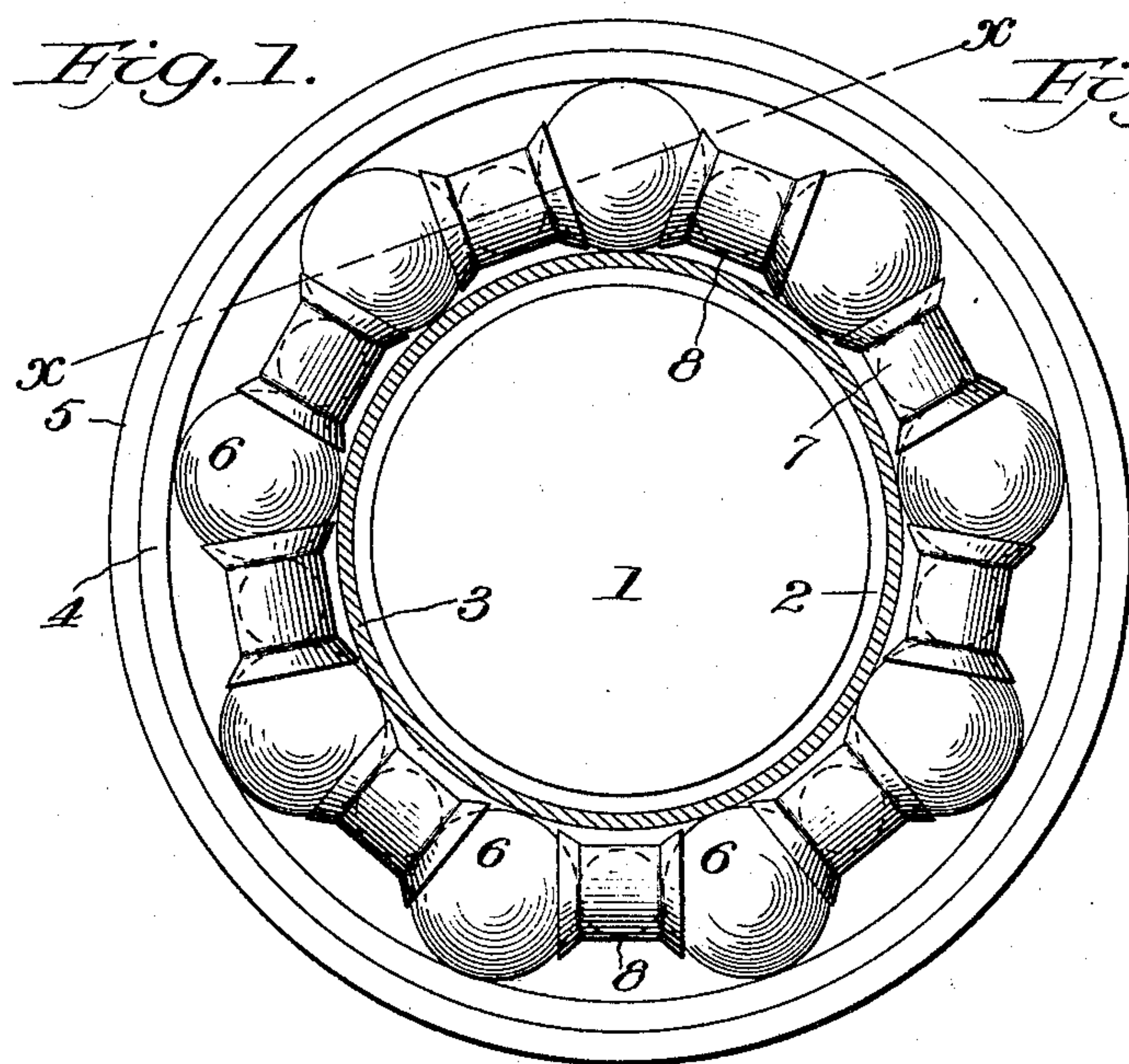


Fig. 3.

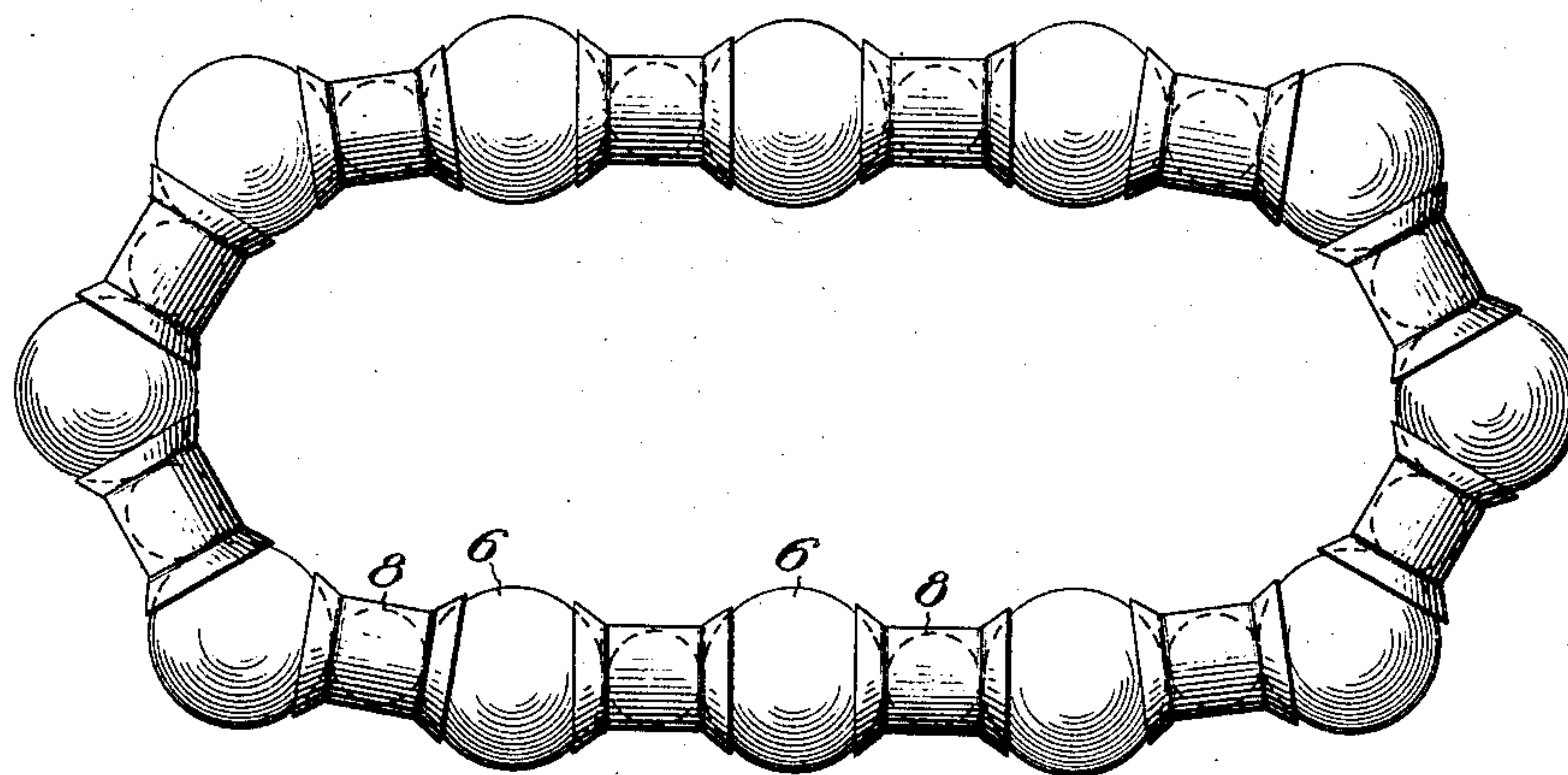


Fig. 4.

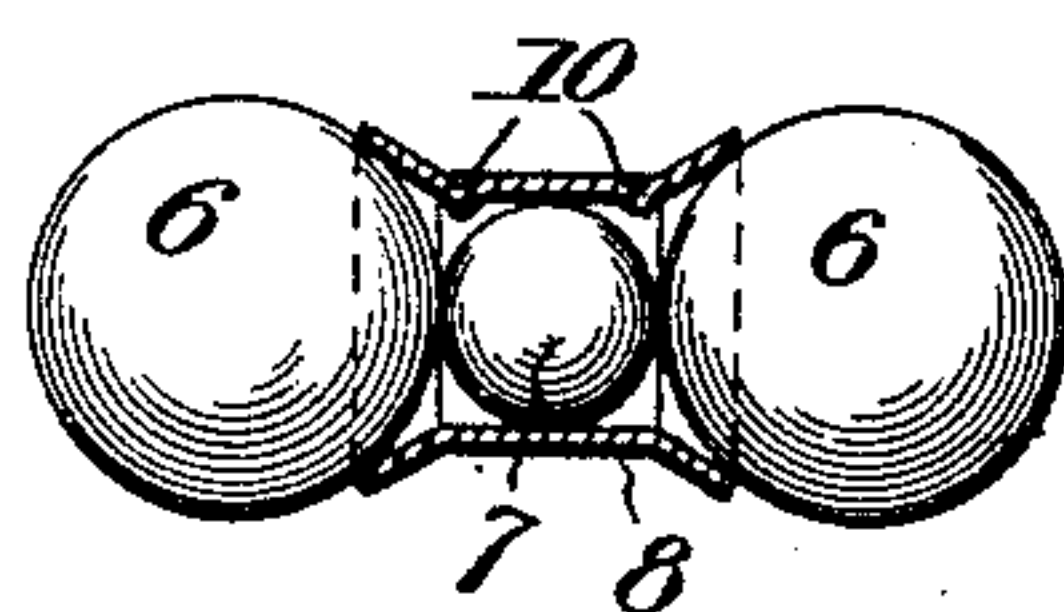


Fig. 5.

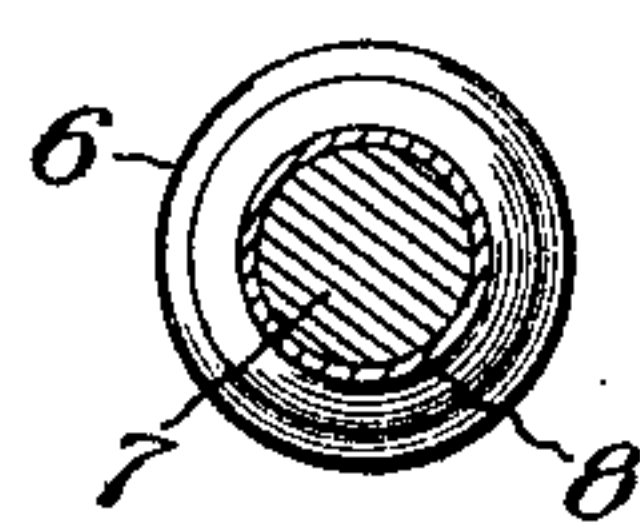


Fig. 6.

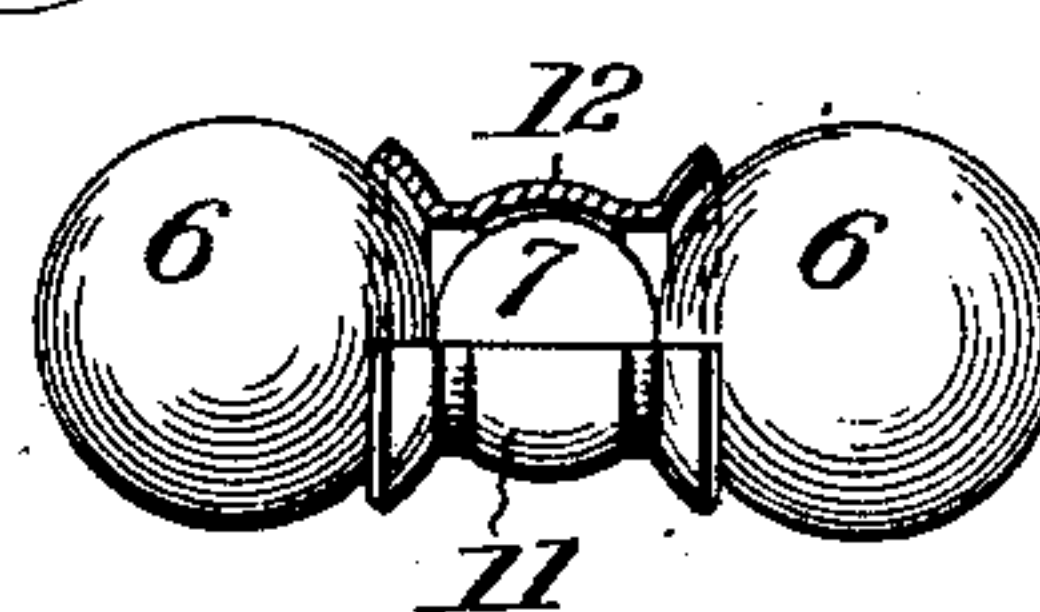
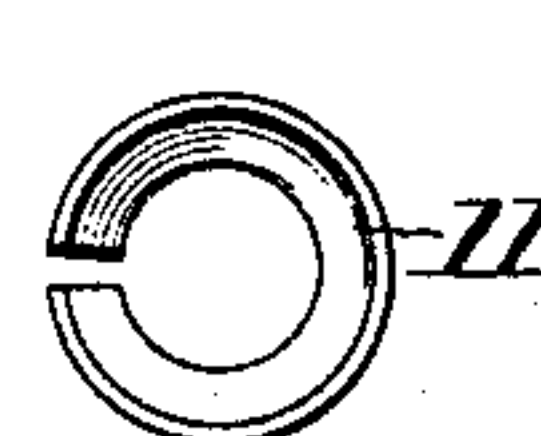


Fig. 7.



WITNESSES:

C. M. Walker
Ada C. Briggs

Fig. 8.

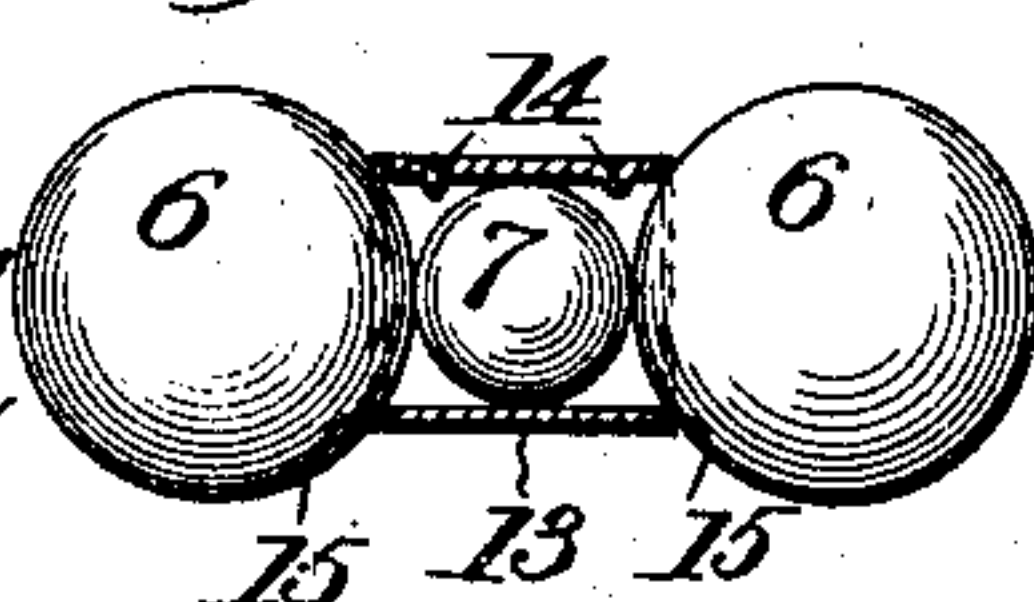


Fig. 9.



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BALL-RETAINER FOR BALL-BEARINGS.

SPECIFICATION forming part of Letters Patent No. 785,663, dated March 21, 1905.

Application filed April 18, 1904. Renewed February 6, 1905. Serial No. 244,391.

To all whom it may concern:

Be it known that I, CHARLES H. CHAPMAN, a citizen of the United States, residing at Winchester, in the county of Middlesex and State of Massachusetts, have invented a certain new and useful Improvement in Ball-Retainers for Ball-Bearings, of which the following is a full, clear, and exact description.

The object of this invention is to provide a holder for the ball used to separate adjacent load-carrying balls of a ball-bearing, which in addition to its function as a holder also assists in separating the said load-carrying balls and automatically assures the alinement of the separating-balls and load-carrying balls practically upon the dead-center line of the latter, thereby preventing cross-friction between the balls and insuring a positive revolution of the load-carrying balls. Since this holder has this double function, it is herein referred to as a "retainer."

The invention consists of a retainer in which the separating-ball is secured so that both the retainer and the separating-ball have surface-contact with adjacent load-carrying balls, each of the retainers and its separating-ball which enters into the formation of a ball-bearing being an independent unit and automatically adjusting itself to its two adjacent load-carrying balls and seeking a dead-center alinement with them.

In the accompanying drawings, illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a front elevation, and Fig. 2 is a vertical section, illustrating a ball-bearing in circular series. Fig. 3 is an elevation illustrating a ball-bearing in oblong series and omitting the cone and raceway. Fig. 4 shows the retainer in longitudinal section, balls in elevation; and Fig. 5 is a cross-section thereof. Fig. 6 shows a spring-retainer in half-section and elevation; and Fig. 7 is an end view thereof, balls omitted. Fig. 8 shows a tubular retainer in longitudinal section, balls in elevation. Fig. 9 is an end elevation of the form of retainer of Fig. 8.

1 may represent a journal having a conical collar 2, surrounded by a bearing-cone 3, beyond and parallel with which is a concentric

cup 4, surrounded by a housing 5. Between the cone 3 and the cup 4 the balls and their retainers are arranged.

6 represents the load-carrying balls, and 7 represents the separating-balls. These separating-balls are arranged in the retainers 8, which, as shown in Figs. 1 to 5, may be composed of cylindrical portions having flared ends of an internal diameter substantially equal to the adjacent surfaces of the load-carrying balls and adapted to impinge loosely against such load-carrying balls, the separating-balls 7 taking the direct contact with the peripheries of the load-carrying balls, so that there is entire freedom of motion between the load-carrying balls as they revolve and the said retainers. As indicated by the line $x x$, Fig. 1, the axes of the load-carrying balls and the separating-balls are coincident, or, in other words, there is a common dead-center line between these several adjacent balls. The series of balls and retainers constituting the ball-bearing are arranged within the cone and cup and held in place therein by means of a washer 9, forced into the housing 5 up against the cup; but of course any other raceway or other receptacle for the balls and their retainers may be used instead of the cone, cup, and washer, or, in other words, any suitable arrangement may be provided for assembling and confining the several balls and their retainers either in use or while being handled.

As shown in Figs. 1 and 2, a circular series of balls is used, while, as shown in Fig. 3, it is possible with this present invention to use a ball-bearing of oblong or other profile suitable to the part to which the bearing is to be applied.

As shown in section, Fig. 4, the separating-ball 7 may be loosely held in its retainer 8 by depressions 10 in the retainer on opposite sides of the ball. As an alternative means for holding the separating-ball in its retainer reference is made to Figs. 6 and 7, where the retainer 11 is made as a longitudinally-split spring-tube provided in its cylindrical portion with a concavity 12, in which the ball finds a loose seat. In this construction the retainer will spring open and allow the separating-

rating-ball to be forced into place therein. Again, as shown in Figs. 8 and 9, the retainer 13 may be made as a cylindrical tube having the separating-ball 7 secured therein against accidental displacement by means of the indentations 14, and the opposite edges of this tube are countersunk or reamed out, as at 15, so as to conform to the adjacent surfaces of adjacent load-carrying balls.

10 In these several constructions of ball-bearings it will be seen that each retainer works independently of the others in the same bearing and that the load-carrying balls project into the ends of the retainers. The retainers 15 are of a length to permit the load-carrying balls to press against the separating-balls without pressing tightly against the retainer, and hence when the balls are thus in contact they, with their retainers, are automatically 20 brought onto a dead-center line with the load-carrying balls.

The retainers themselves may be made quite light, and hence there is little weight to be moved around in the bearing. Moreover, 25 these retainers may be very cheaply and readily made.

What I claim is—

1. A ball-bearing, comprising load-carrying balls, a separating-ball, and an independent tubular retainer within which the separating-ball is loosely confined, said separating-ball and its retainer interposed between two adjacent load-carrying balls, in superficial contact therewith, and on a dead-center 35 line therewith.

2. A ball-bearing, comprising load-carrying balls, a separating-ball, and an independent retainer for said separating-ball of a length greater than the diameter of the separating-ball and interposed between two adjacent 40 load-carrying balls and in superficial contact

therewith, the retainers and their separating-balls automatically adjusting themselves onto a dead-center line relatively to said load-carrying balls. 45

3. In a ball-bearing, load-carrying balls, a separating-ball, a retainer for said separating-ball, having flared ends, said separating-ball and its retainer being interposed between adjacent load-carrying balls. 50

4. In a ball-bearing, load-carrying balls, a separating-ball, and a retainer for said separating-ball, provided with means for confining said separating-ball within it, said separating-ball and its retainer being interposed 55 between and in contact with adjacent load-carrying balls.

5. In a ball-bearing, load-carrying balls, a separating-ball, a retainer for said separating-ball, provided with means for loosely confining the separating-ball therein, and also provided with flared ends, said separating-ball and its retainer being arranged between and in contact with adjacent load-carrying balls. 60 65

6. A ball-bearing, comprising a series of load-carrying balls, a separating-ball interposed between each adjacent two load-carrying balls, and an independent tubular retainer for each of said separating-balls within which 70 retainer the separating-ball is confined, said retainer supported by and between the load-carrying balls and adapted to automatically maintain the separating-balls on a dead-center line between adjacent load-carrying balls. 75

In testimony whereof I have hereunto set my hand this 16th day of April, A. D. 1904.

CHARLES H. CHAPMAN.

Witnesses:

W. E. PUTNEY.

A. I. KENDALL.