

No. 695,838.

Patented Mar. 18, 1902.

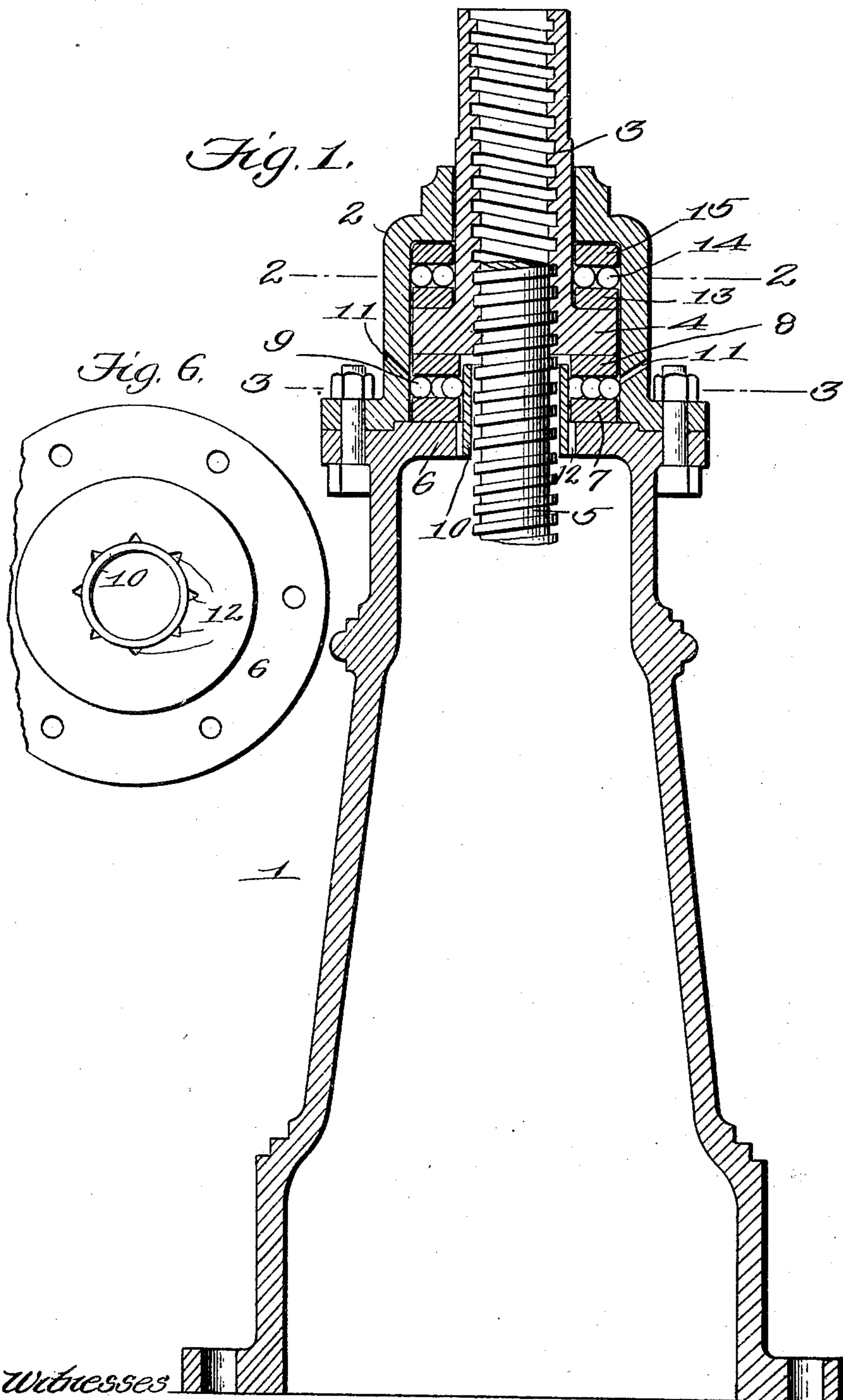
W. J. RITCHIE.

MECHANISM FOR OPERATING SLUICE GATES.

(Application filed Nov. 12, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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Fig. 2.

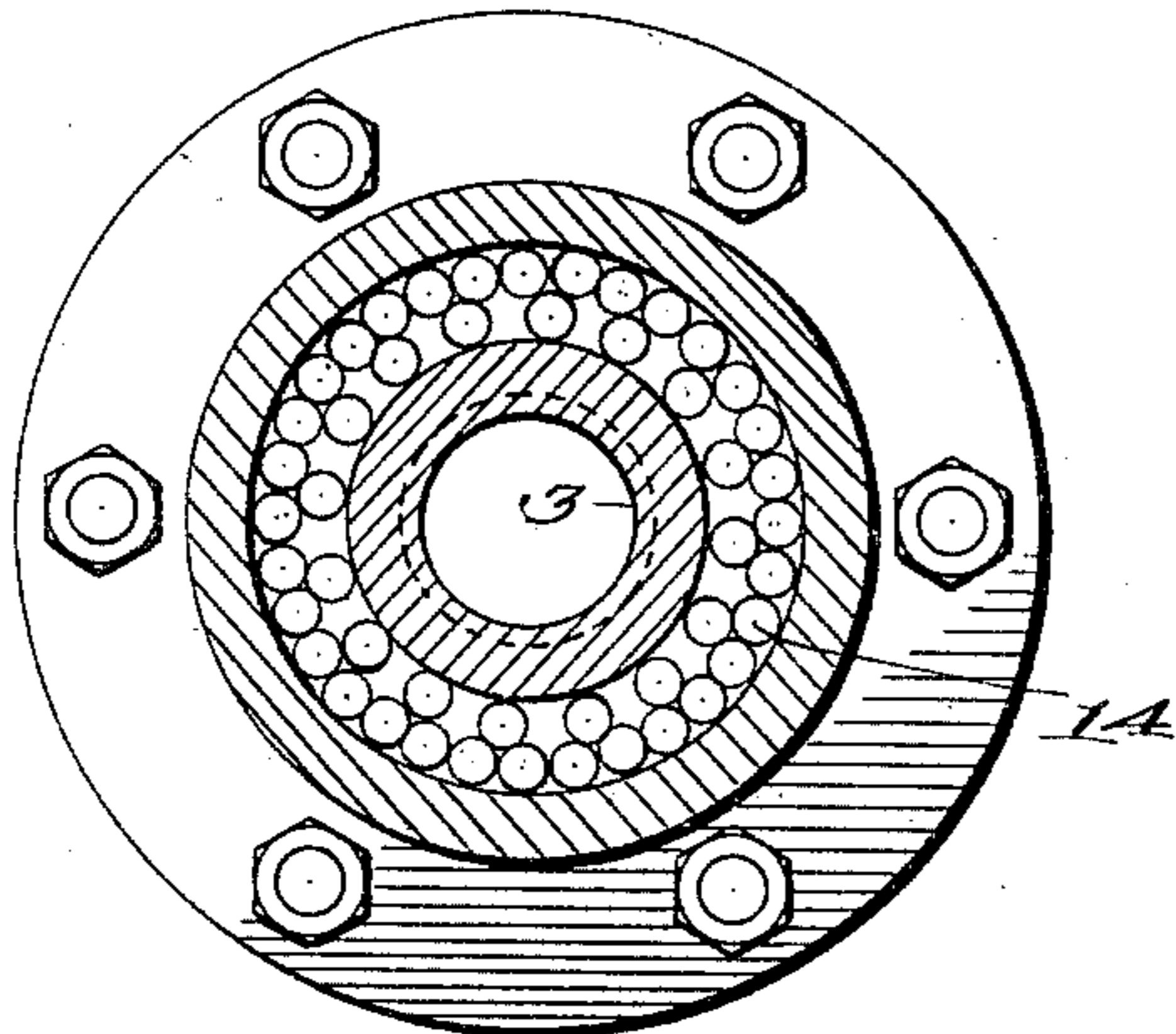


Fig. 3.

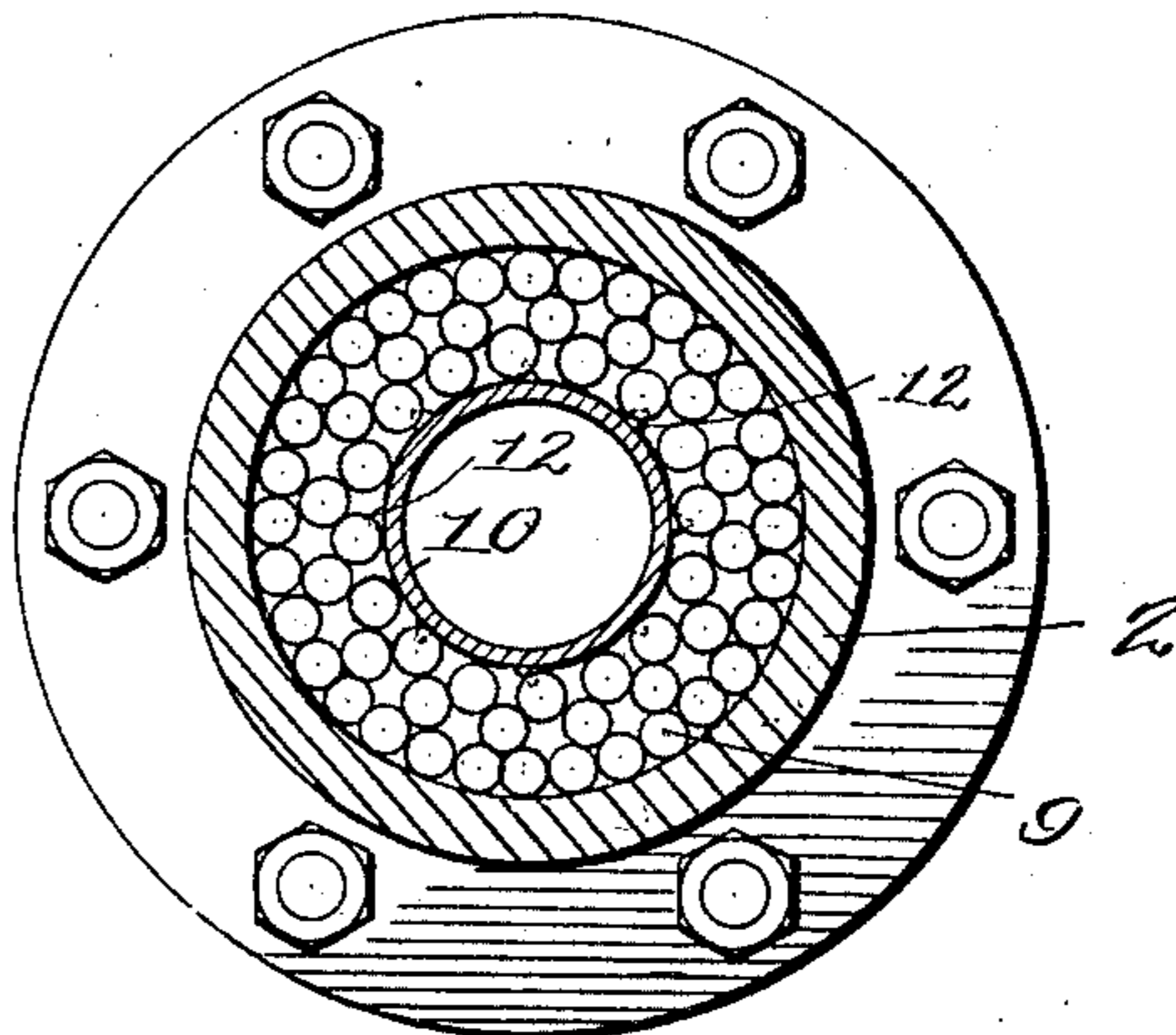


Fig. 4.

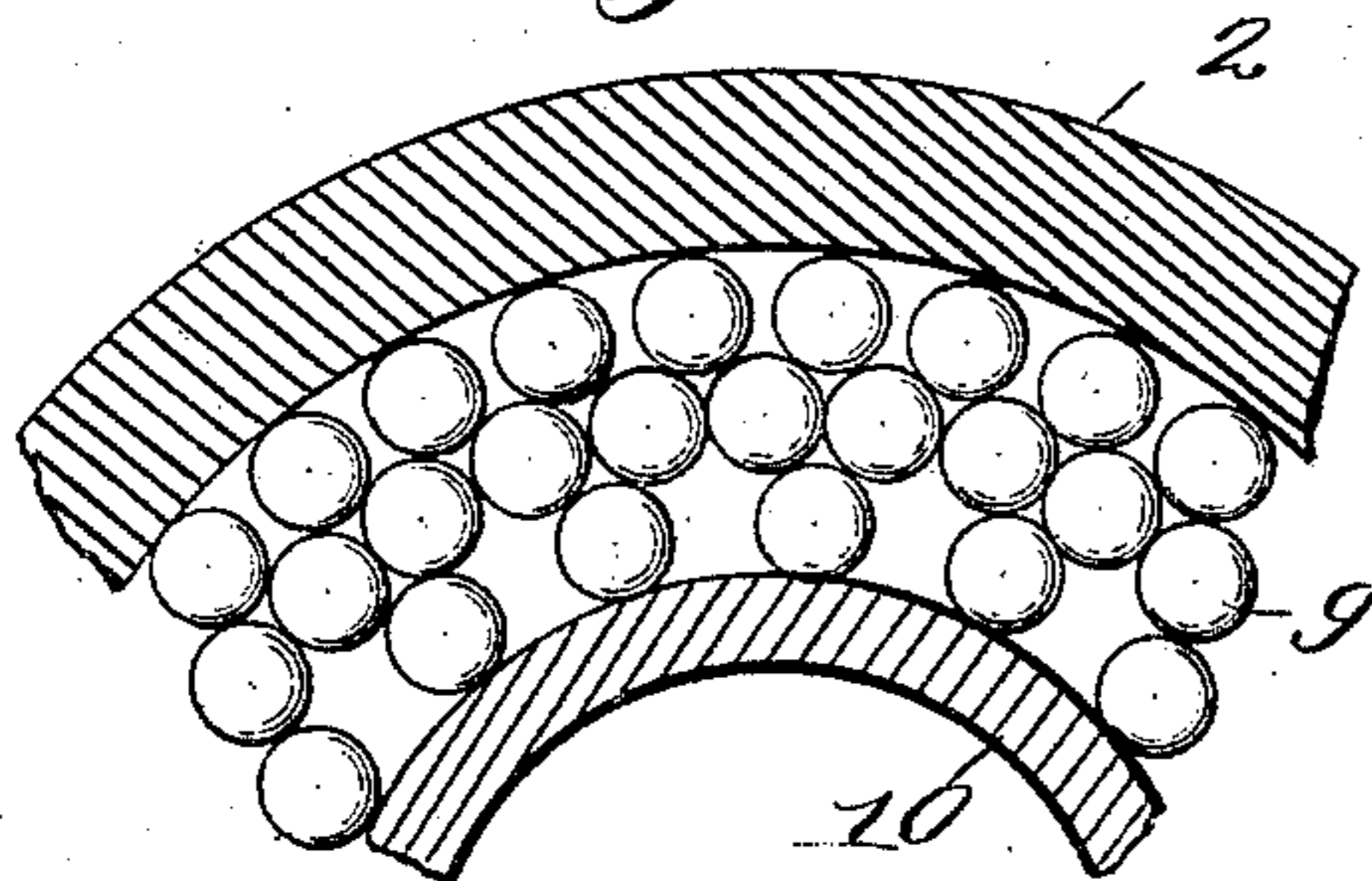
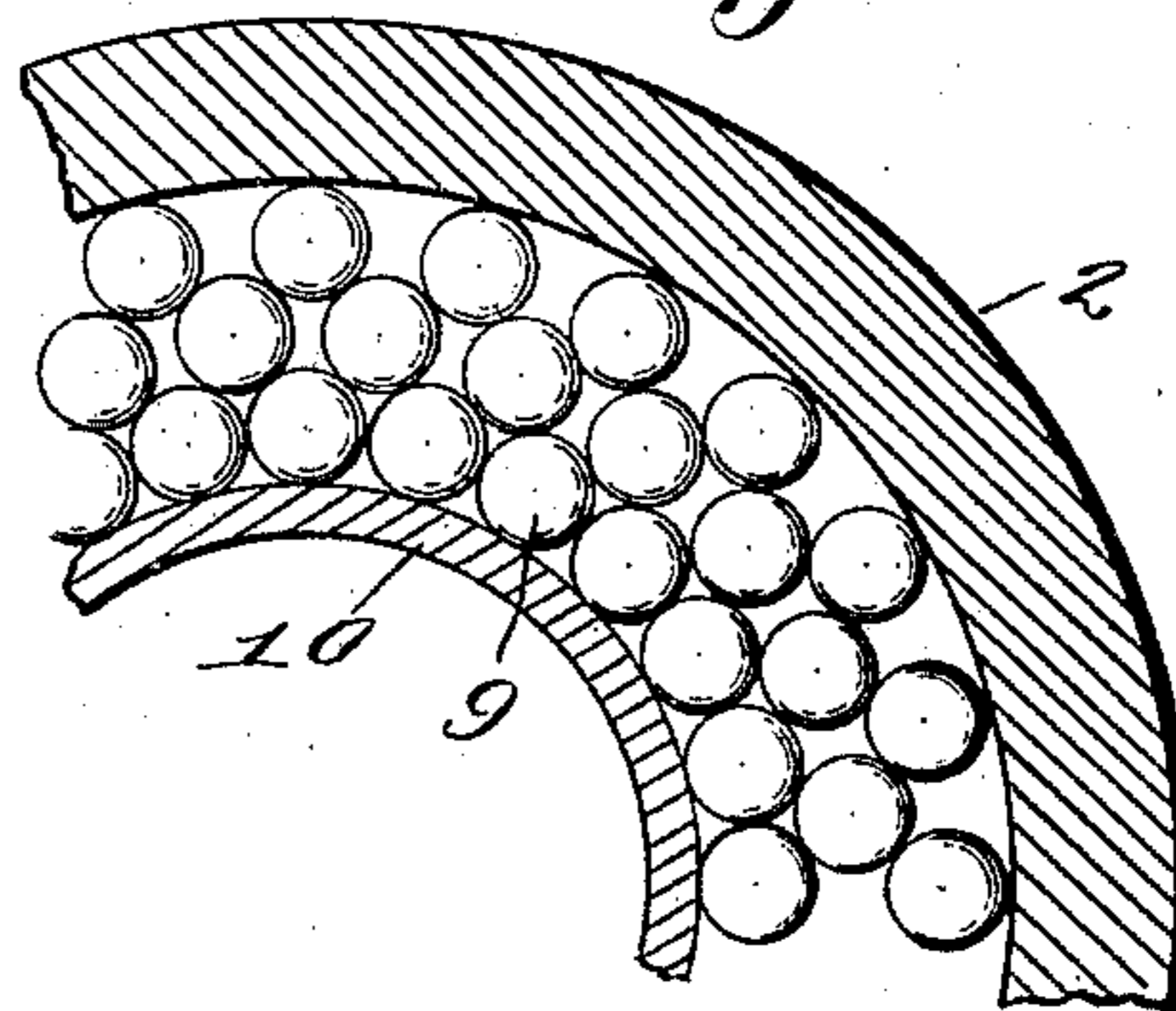


Fig. 5.



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# UNITED STATES PATENT OFFICE.

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## MECHANISM FOR OPERATING SLUICE-GATES.

SPECIFICATION forming part of Letters Patent No. 695,838, dated March 18, 1902.

Application filed November 12, 1901. Serial No. 82,065. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM JAMES RITCHIE, a citizen of the United States, residing at Hoboken, in the county of Hudson and State of New Jersey, have invented new and useful Improvements in Mechanism for Operating Sluice-Gates, of which the following is a specification.

My invention relates to mechanism for operating sluice-gates, the same being designed as an improvement upon the construction disclosed in United States Patent to Richard S. Gillespie, No. 611,472, dated September 27, 1898.

The object of the invention is to provide a novel construction of ball-bearing between the rotatable internally-threaded nut or cylinder in which the screw-shaft to which the sluice-gate is connected is mounted and the stationary part in which said nut or cylinder is adapted to turn, whereby a plurality of series of balls may be employed which are caused to travel in true circular lines.

A further object of the invention is to provide a novel construction of parts whereby the balls may be readily cleaned and the dirt removed therefrom and the cleansing material may be carried off.

Other objects and advantages of the invention will hereinafter appear and the novel features thereof will be set forth in the claims.

In the drawings forming part of this specification, Figure 1 is a vertical central sectional view illustrative of my invention. Fig. 2 is a transverse section on the line 2 2 of Fig. 1. Fig. 3 is a similar section on the line 3 3 of Fig. 1, and Figs. 4 and 5 are part-sectional views showing alternative forms of arrangement of the balls. Fig. 6 is a plan view of the pedestal on which the parts of the device are supported.

Like reference-numerals indicate like parts in the different views.

The pedestal 1, the cap 2 thereon, the internally-screw-threaded nut or cylinder 3, with its outwardly-extending flange 4, and the screw-shaft 5 within the nut or cylinder 3 may all be of substantially the same form and construction as those described in the patent to Gillespie, above referred to. The pedestal 1 is provided at its upper end with an inwardly-extending annular flange 6, and

resting upon and supported by said flange is a bearing-ring 7, having a flat or plane upper surface. Above the bearing-ring 7 and beneath the flange 4 on the lower end of the nut or cylinder 3 is a bearing-ring 8, between which and the ring 7 are located the balls 9. The ball-race in which the balls 9 fit and move is formed by the rings 7 and 8, the inner walls of the cap 2, and by the tube 10, which is secured to and lies in close contact with the inner surface of the flange 6 and projects up around the inner surfaces of the rings 7 and 8, as shown. The walls of the cap 2 are provided with passages 11, through which kerosene-oil or other cleansing material may be passed into the ball-race, the said oil and the dirt removed from the balls being discharged through V-shaped passages 12 in the inner surface of the flange 6. A passage of course is provided for the dirt and cleansing material between the tube 10 and the ring 7, by reason of the fact that the outer surface of the former is slightly separated from the inner surface of the latter. The balls 9 are arranged between the bearing-plates 7 and 8, the tube 10 and the cap 2 in a plurality of annular series concentric with the nut or cylinder 3. They are also disposed so that they are incapable of radial movement in the ball-race in which they are mounted, or, in fact, of any movement except in true circular lines. This is effected by arranging the balls so that they completely fill the space between the tube 10 and the cap 2 by having the individual balls in said rows in constant contact with the balls in the adjacent row or rows. In the arrangement of balls shown in Fig. 2 of the drawings those which make up the outer series are in constant contact with each other and are also in constant contact with those which make up the intermediate series. The balls in the intermediate series, however, are not in contact with each other, but are in constant contact with the balls in the outer series and with those in the inner series. The balls in the inner series are also out of contact with each other, but are in constant contact with the balls in the intermediate series and with the outer surface of the tube 10. It will thus be seen that it is impossible for any of the balls 9 to move in any except a circular path. This is a feature of great importance in devices of this kind, as the sluice-

gate and the parts connected therewith, which are operated by a turning movement of the nut or cylinder 3, frequently weigh several tons, and with this extreme weight on the ball-bearings irregular grooves will be formed in the bearing-plates unless provision is made for causing said balls to move in a circular path only. Above the flange 4 on the nut or cylinder 3 is located a bearing-ring 13, supporting thereon the balls 14, and above the balls 14 is arranged a correlative bearing-ring 15. The balls 14 are confined between the bearing-rings 13 and 15 and between the outer surface of the nut or cylinder 3 and the inner surface of the cap 2. They are also so arranged that they are incapable of movement in any except a circular line which is concentric with the nut or cylinder 3. This is done, as in the case of the balls 9, by providing for the constant contact between the balls in one series and those in the next adjacent one, for the constant contact between the balls in the outer series and the inner surface of the cap 2, and for the constant contact of the balls in the inner series with the outer walls of the nut or cylinder 3.

Now in opening the gate the thrust is received by the balls 9, the upper bearing-ring 8 for the balls 9 moving with the nut or cylinder 3, while the lower bearing-ring 7 remains stationary. During this movement of the nut or cylinder 3 and the ring 8 the balls 9 will be caused to move in true circular lines upon the upper surface of the lower bearing-ring 7. During this operation of the device the balls 14 and the parts cooperating therewith remain inactive. In closing the gate, however, the thrust of the nut or cylinder 3 is borne by the upper series of balls 14, the lower bearing-ring 13 being moved with said nut or cylinder and the upper bearing-ring 15 remaining stationary. During this operation of the device the lower balls 9 and the parts cooperating therewith remain inactive, while the balls 14 are caused to move in contact with the stationary bearing-ring 15 in true circular lines.

Instead of arranging the balls as above described I may accomplish the same result by arranging them as shown in Figs. 4 and 5 of the drawings. In all cases, however, the balls are so arranged that all of those in one series will be in constant contact with each other and with those in the adjacent series. In Fig. 4, however, the balls in the outer row or series are out of contact with each other and the balls in the inner row or series are out of contact with each other, but the balls in the intermediate row or series are in constant contact with each other and with those in the outer and inner row or series. In the construction shown in Fig. 5, however, the balls in the inner row or series are in constant contact with each other, with the outer surface of the tube 10, and with the balls in the intermediate series. The balls in the intermediate series are out of contact with each

other and the balls in the outer series are out of contact with each other, but, as before stated, the balls in each series are in constant contact with those in the adjacent series.

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

1. The combination with a rotatable nut and a screw-shaft longitudinally movable thereby, of a thrust-bearing for said nut comprising a plurality of annular rows or series of balls, plane-faced bearing-rings for said balls, and means for preventing radial movement of said balls, as and for the purpose set forth.

2. The combination with a rotatable nut and a screw-shaft longitudinally movable thereby, of a thrust-bearing for said nut comprising an annular ball-race, and a plurality of annular rows or series of balls therein, the balls in one of said rows or series being in constant contact with each other, the balls in all of said rows or series being in constant contact with the balls in the adjacent rows or series, the balls in the outer row or series being in constant contact with the outer wall of said race and the balls in the inner row or series being in constant contact with the inner wall of said race, as and for the purpose set forth.

3. The combination with a rotatable nut having a flange thereon, a cap having a contracted upper end within which said nut is mounted to turn, an annular support for said cap and a shaft longitudinally movable by said nut, of a pair of plane-faced bearing-rings located between said support and said base-flange and within said cap, balls between said bearing-rings, and a tube secured to the inner surface of said annular support and projecting up above said balls, the said balls being arranged in a plurality of annular rows or series, the balls of one of said rows or series being in constant contact with each other, the balls in the outer row or series being in constant contact with the inner surface of said cap, the balls in the inner row or series being in constant contact with said tube, and the balls in each of said rows or series being in constant contact with the balls in the adjacent rows or series, as and for the purpose set forth.

4. The combination with a rotatable nut having a flange thereon, a cap having a contracted upper end within which said nut is mounted to turn, an annular support for said cap, and a shaft longitudinally movable by said nut, of a pair of plane-faced bearing-rings located between said support and said base-flange and within said cap, balls between said bearing-rings, a tube secured to the inner surface of said annular support and projecting up above said balls, a pair of plane-faced bearing-rings located above said flange, below the contracted upper end of said cap and between said nut and the inner side wall of said cap, and balls arranged between the

latter bearing-rings, the balls in each set being arranged in a plurality of annular rows or series concentric with said nut, the balls in one of said rows or series being in constant  
5 contact with each other, the balls in the outer row or series being in constant contact with the inner surface of said cap, the balls in the inner row or series being in constant contact with said tube, and the balls in each of said  
10 rows or series being in constant contact with the balls in the adjacent rows or series, as and for the purpose set forth.

5. The combination with a rotatable nut having a flange thereon, a cap or casing within  
15 which said nut is mounted to turn, provided with openings leading through the side walls thereof, an annular support for said cap or casing having notches around the edge of the opening therein, and a screw-shaft longitudi-  
20 nally movable by said nut, of a pair of bear-

ing-rings between said support and said flange and within said cap, balls located between said rings opposite the inner ends of the openings through said cap, and a tube secured to the inner surface of said support, projecting  
25 upwardly above said balls and slightly separated from the inner surfaces of said rings, the said openings, the space between said tube and the lower of said rings, and the notches in said support forming passages for the in-  
30 troduction and discharge of cleansing material for the bearings, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing wit-  
35 nesses.

WM. JAMES RITCHIE.

Witnesses:

WM. A. RITCHIE,  
WILHELM SCHWICK.