

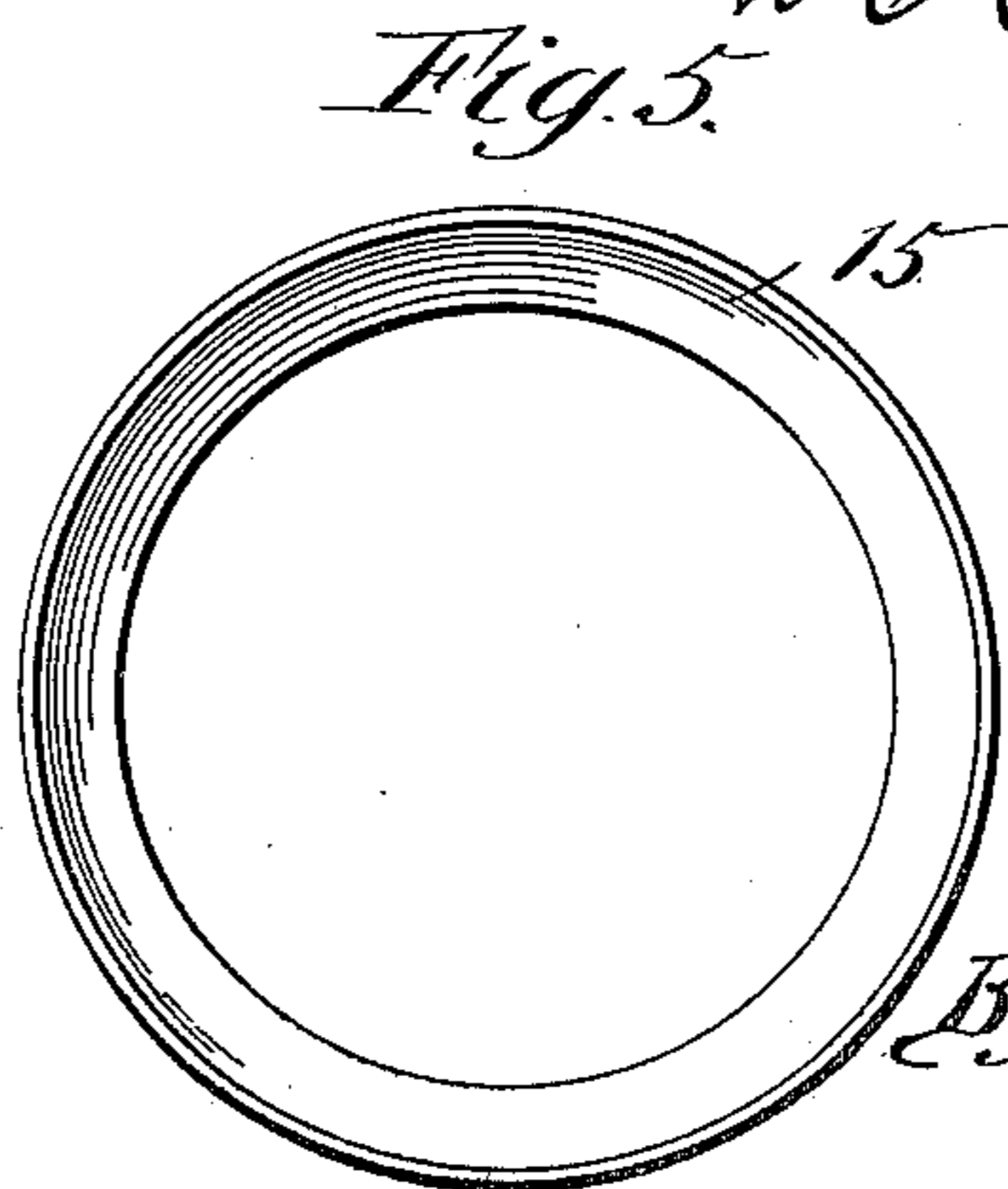
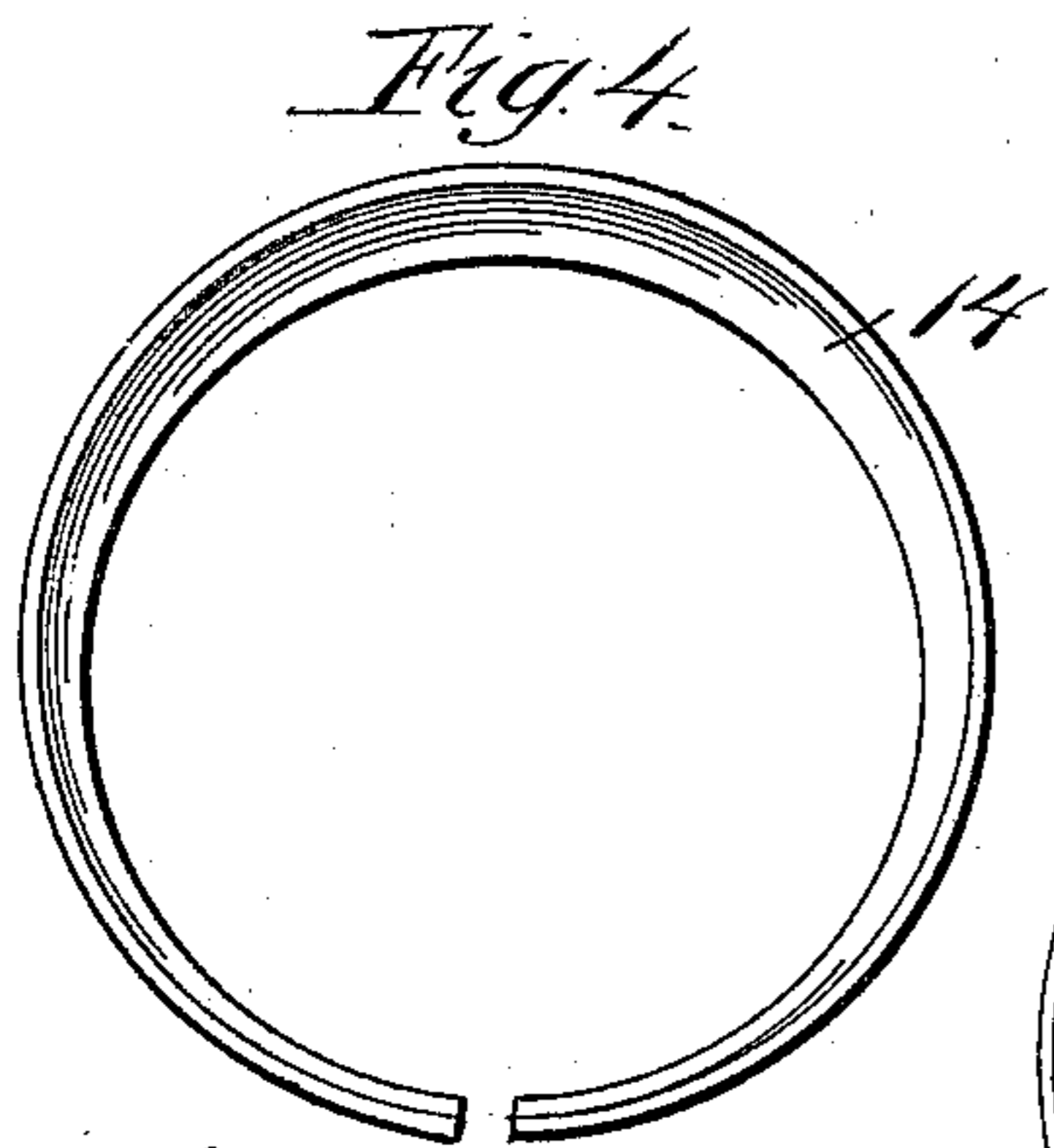
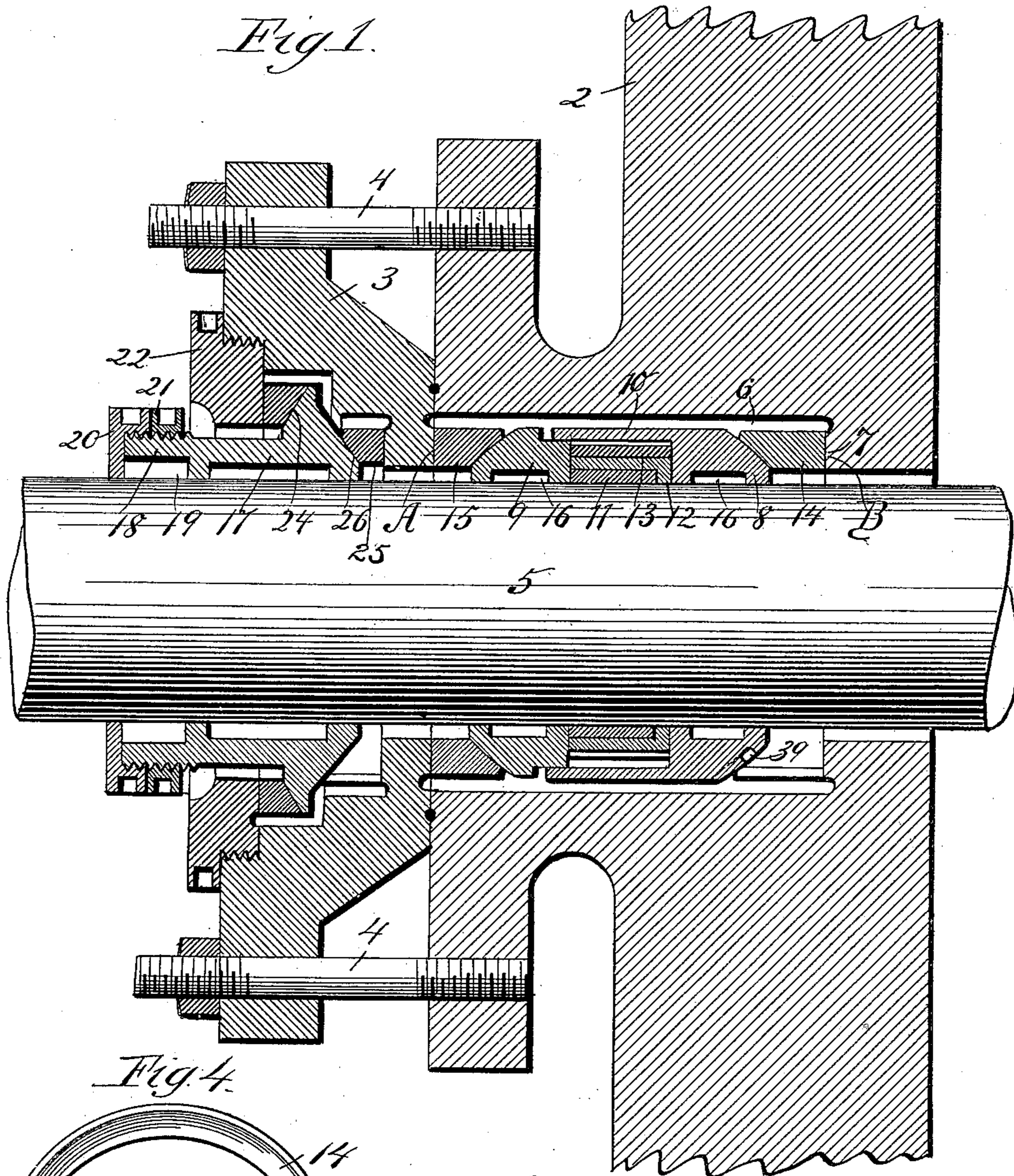
(No Model.)

3 Sheets—Sheet 1.

F. D. TOUCEY.
PISTON ROD PACKING.

No. 424,909.

Patented Apr. 1, 1890.



Witnesses:
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Fig. 6.

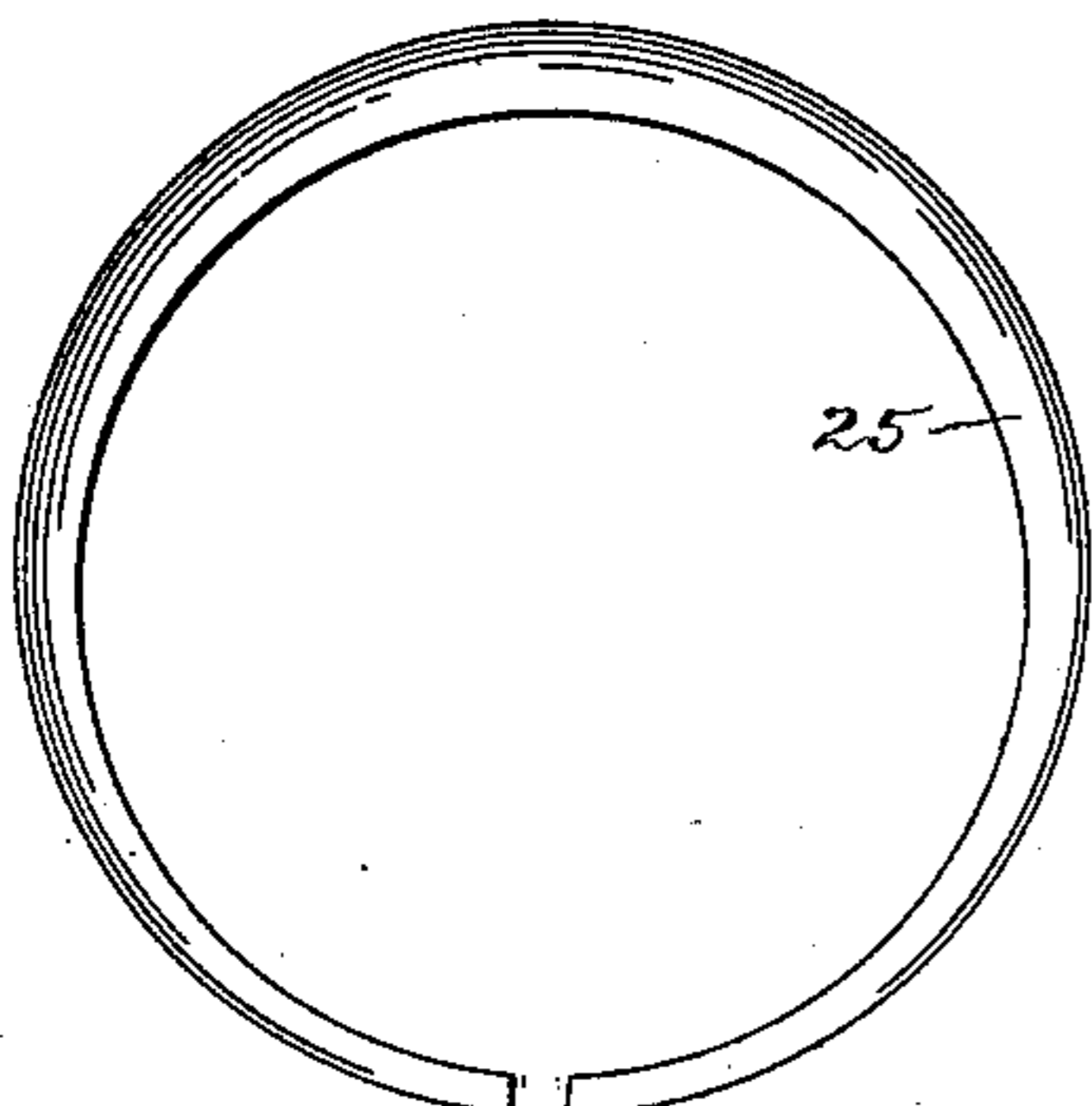


Fig. 3.

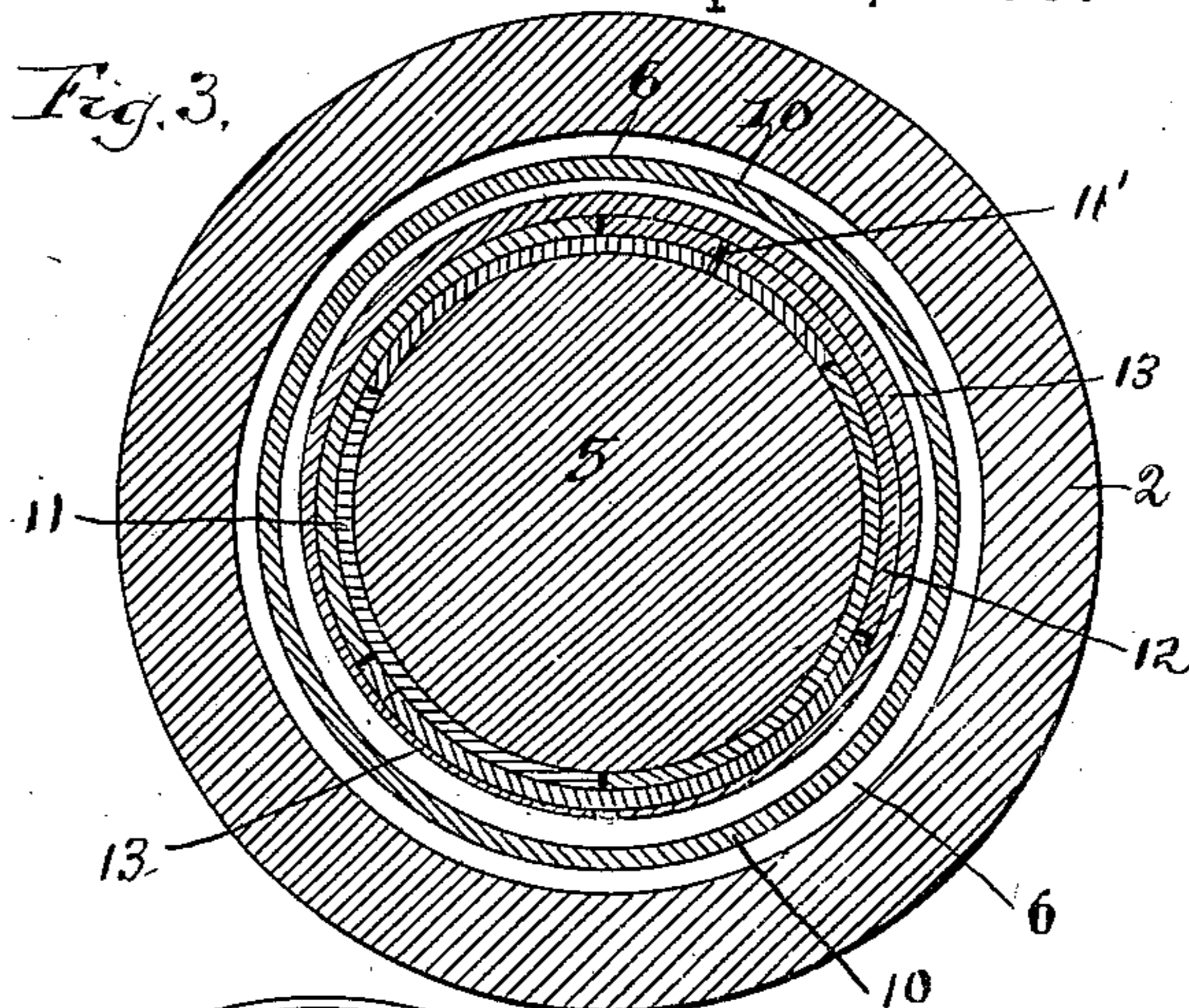


Fig. 7.

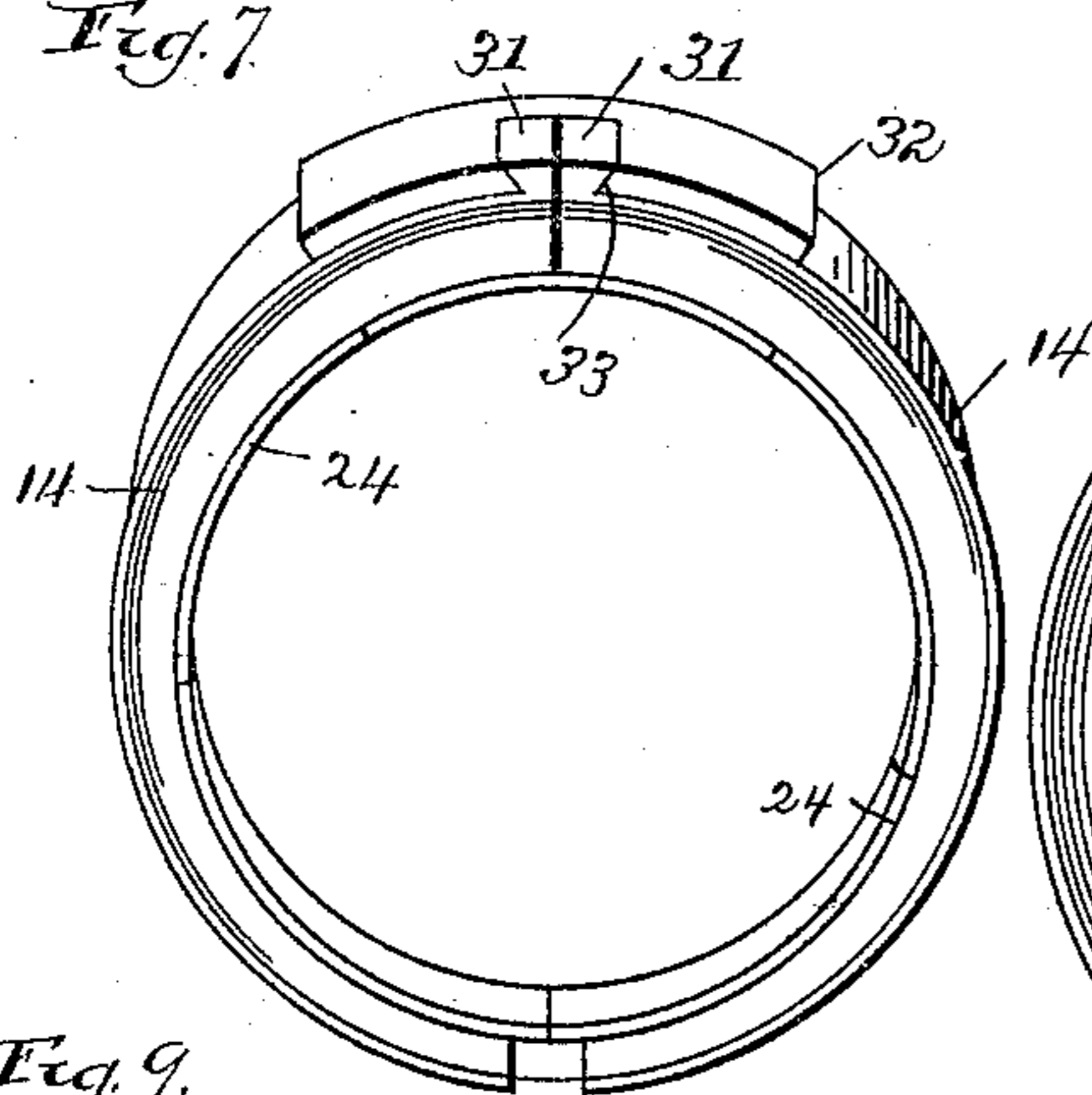


Fig. 8.

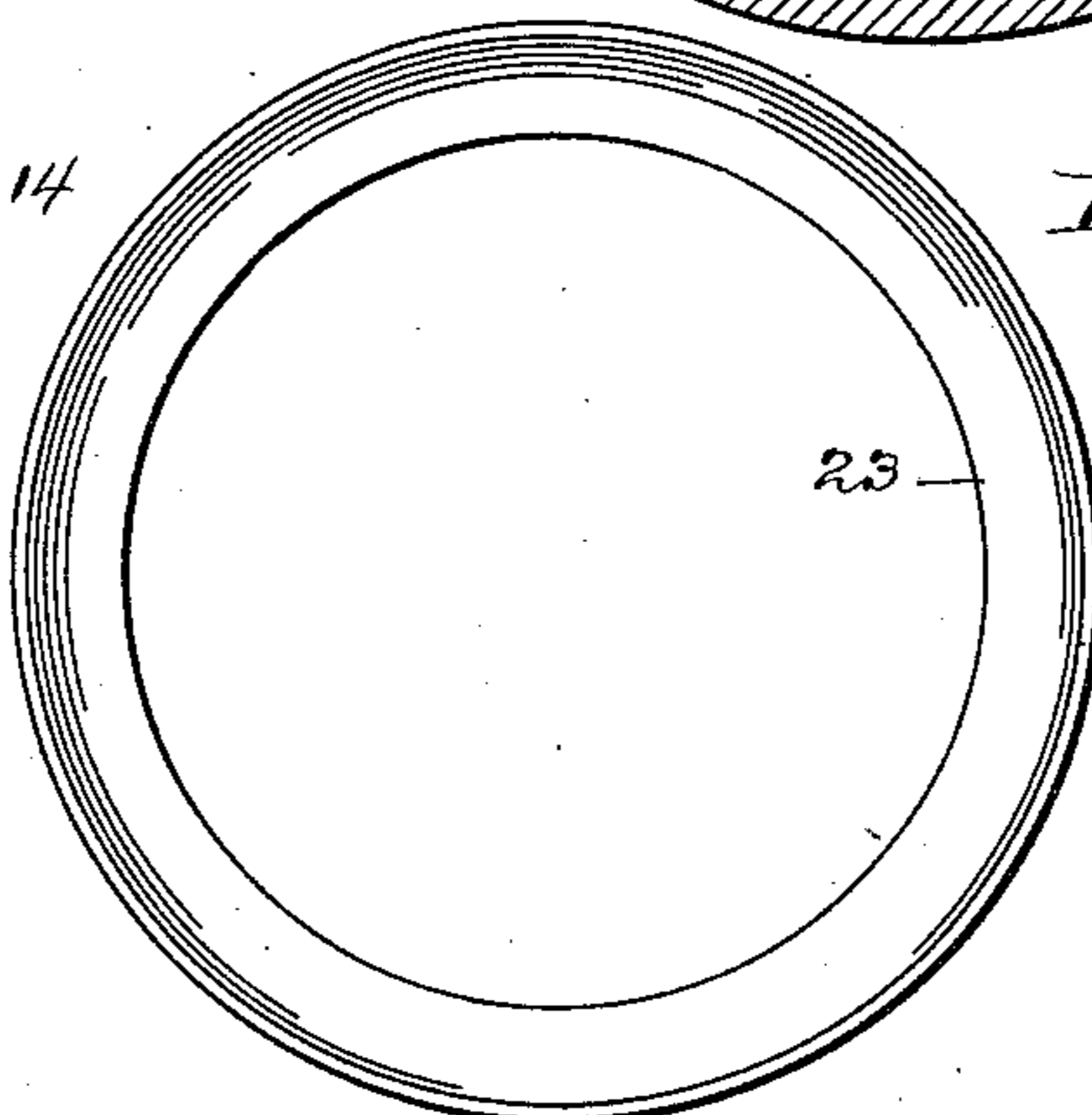


Fig. 9.

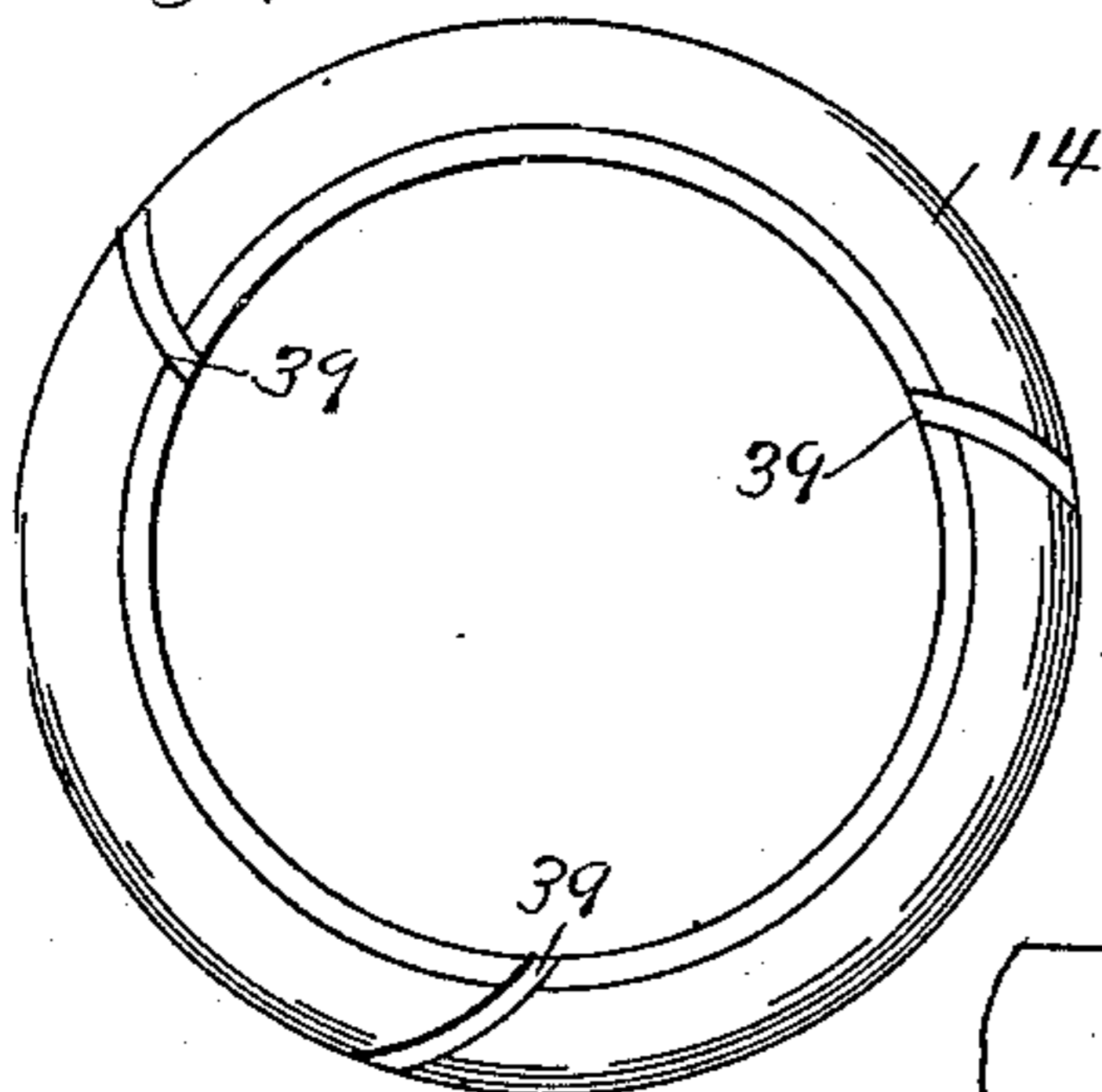
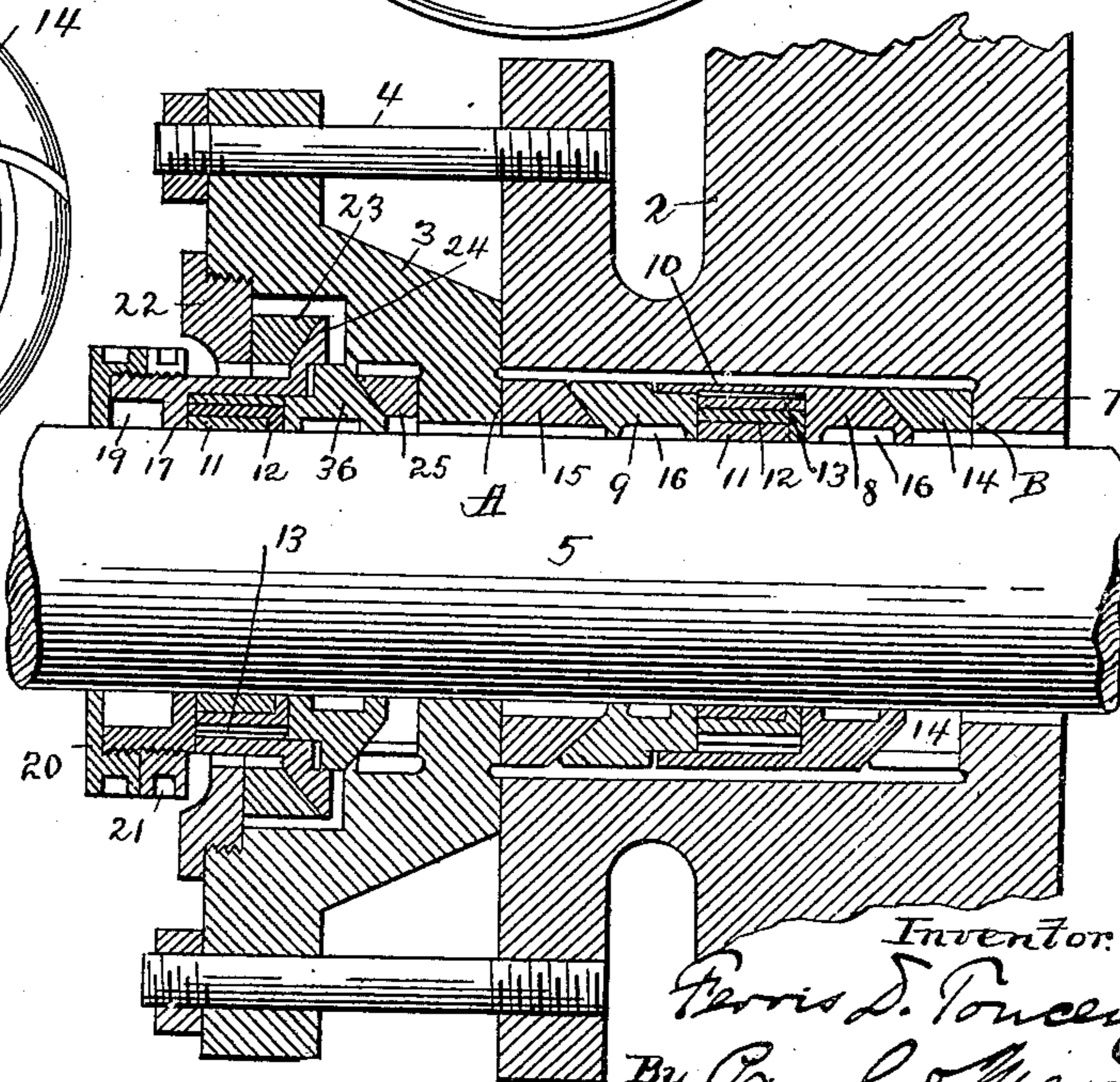


Fig. 2.



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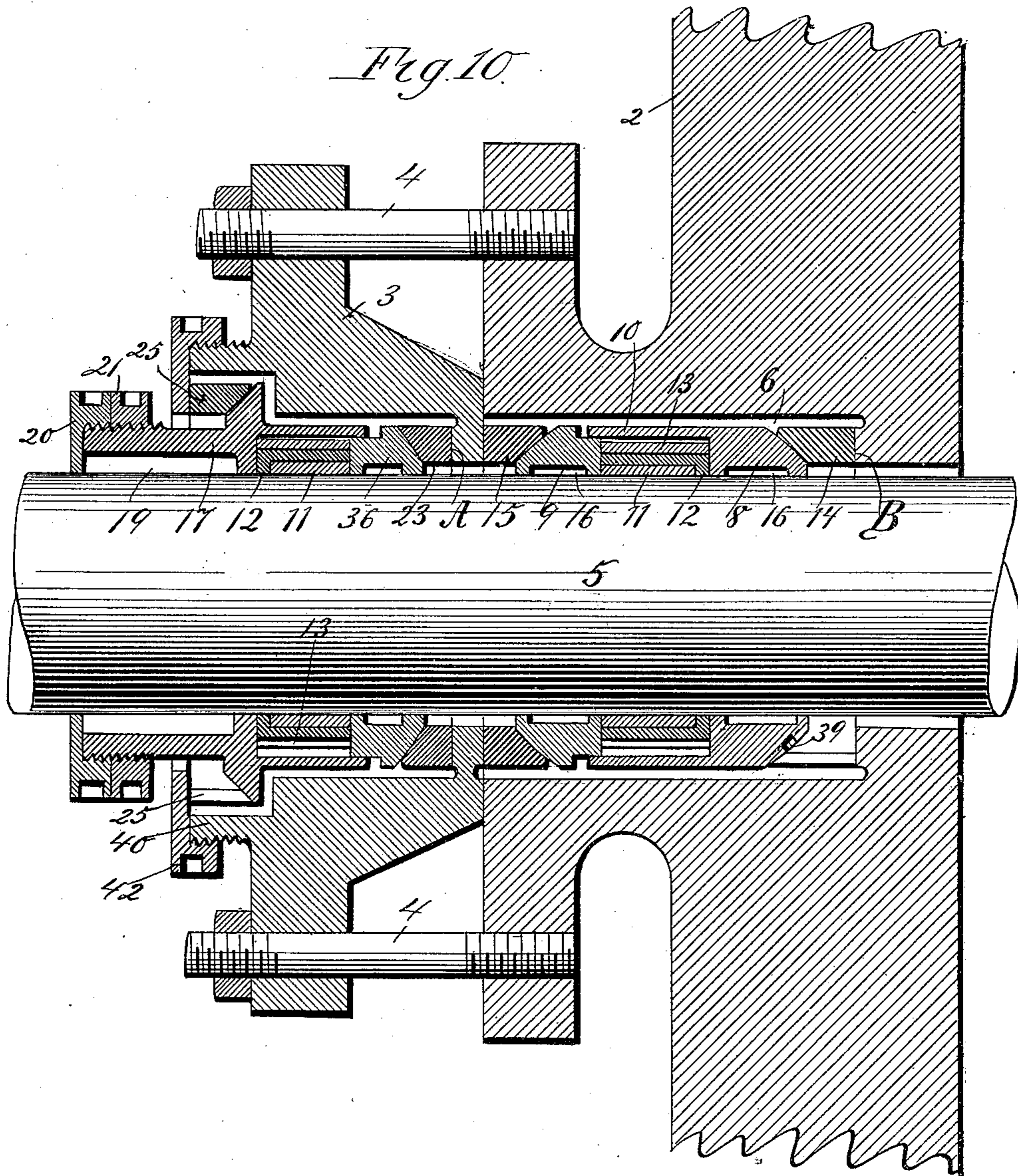
(No Model.)

3 Sheets—Sheet 3.

F. D. TOUCEY.
PISTON ROD PACKING.

No. 424,909.

Patented Apr. 1, 1890.



Witnesses:
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UNITED STATES PATENT OFFICE.

FERRIS D. TOUCEY, OF MINNEAPOLIS, MINNESOTA.

PISTON-ROD PACKING.

SPECIFICATION forming part of Letters Patent No. 424,909, dated April 1, 1890.

Application filed November 23, 1889. Serial No. 331,402. (No model.)

To all whom it may concern:

Be it known that I, FERRIS D. TOUCEY, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Piston-Rod Packing, of which the following is a specification.

My invention relates to the packing of valve and piston rods or other reciprocating, rotary, or oscillatory rods; and its object is to provide improved means in the arrangement of said packing, whereby it bears with uniform and unvarying pressure upon the rod, notwithstanding the change of position of the rod or any lateral or oscillating movement thereof, and is an improvement upon the invention described in my application filed June 27, 1889, Serial No. 315,823, allowed September 9, 1889.

My invention further consists in the construction and combination hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming a part of this specification, Figure 1 is a vertical section of my improved packing, showing its arrangement in the stuffing-box of the cylinder-head. Fig. 2 is a modified construction of the same. Fig. 3 is a cross-section on line *xx* of Fig. 1, and Figs. 4, 5, 6, 7, and 8 are details. Fig. 9 is a view of the rear end of the cage, showing the grooves therein. Fig. 10 is a section showing a modification.

In the drawings, 2 represents the cylinder-head; 3, the gland, secured to the same in any suitable manner—as by means of the bolts 4—and 5 is the piston-rod passing through the gland and cylinder-head. Arranged in the bottom of the stuffing-box 6 in the cylinder-head is a suitable bushing 7, having an outer plane surface B, against which the packing devices bear. The inner face of the gland presents also a plane surface A, against which the packing devices bear, and by means of which they are held in place in the stuffing-box. The plane surfaces A and B, instead of being in the gland and stuffing-box, may be on any other part of the device through which the rod to be packed passes, and they are substantially at right angles to the axis of the rod. These packing devices consist of a packing-cage fitted upon the rod and formed, pref-

erably, of rings or collars 8 and 9, overlapping each other, as by a flange 10 on one extending slightly over the other, and thus forming a packing-chamber under the flange between the rings. Within this chamber are arranged suitable metallic packing-rings 11 and 12, which are preferably clasped into bearing contact with the rod by means of a spring-clasp or tension-ring 13. The ring 11 is rectangular and the ring 12 L-shaped in cross-section, and each ring is preferably made in several sections, and the rings are arranged to break joints with each other, and the sections are secured together by means of a dowel-pin 11', as shown in Fig. 3. The ring 9 has a curved outer face, forming the ball of a ball-and-socket joint, whose center is the center of the rod. Arranged between the ring 9 and the surface A, which, as here shown, is on the gland, is the solid ring 15, having an outer plane surface bearing upon the surface A and a concave inner face bearing upon the convex face of the ring 9 and forming the socket of said ball-and-socket joint. The surface of the ring 9, bearing upon the rod, is preferably provided with an annular groove 16, so as to present as little surface as possible to the rod.

A tension device is provided, which holds the two parts of the packing-cage together and also the ring 9 against the ring 15 and the plane surface of the ring 15 against the surface A. For this purpose the rear side of the ring 8 is preferably formed with a ball-surface, whose center coincides with the center of the ball-surface of the ring 9, and a tension-ring 14 is arranged between the ring 8 and the surface B. This ring has, preferably, one concave surface fitting the ball-surface and a plane surface bearing against the surface B. The ring 14, being a spring-clasp, is capable of yielding to pressure, and therefore holds the parts firmly together.

The parts above described are so fitted to the stuffing-box that when the gland is tightly secured to the cylinder-head it will bear with some pressure upon the ring 15, thus causing a spring tension upon the inclosed fittings.

It will be seen that the clasp or tension-ring 14, which is preferably cut once or twice, is concaved on one side to hold the ball or

convex end of the packing-holding ring or cage, and is placed at the bottom of the packing-box, or at the rear of all of the parts of the packing, to cause an equal and even tension on all surface or concave or convex bearings. These bearings or joints are movable or "live" joints, and the tension-ring allows the surface or flat joints to move laterally and the ball-joints to oscillate while under pressure without opening and causing a leak of steam to the atmosphere or a leak of air into a vacuum. It also creates an end friction on the stationary parts--to wit, the cylinder-head and gland or the surfaces B and A--thereby sustaining the parts and taking the weight off the piston-rod, where it would otherwise rest in horizontal engines, causing the rod to wear oval or flat.

The rear ring 8, forming the female part of the packing-cage, has, preferably, a series of grooves 39 cut diagonally in its convex face, and the pressure of the steam on this face and the velocity of steam passing through the grooves causes the packing to revolve with a slow movement around the rod, thereby changing its bearings, and should there be a hard spot in the packing-rings it will wear the rings and rod smoother, and is less liable to wear a channel in the rod and less liable to break than if it remained in one position. As the steam enters the cylinder it comes suddenly and with considerable force against the ring 8 and passes through the grooves in its face into the space in the cylinder-head around the packing. The tendency is to give the packing a slight rotary movement, thereby changing its position on the rod. The upper or foremost ring 9, forming the male part of the packing-cage, telescopes into the female part, making a close fit. These parts of the packing-cage should have no end bearing between themselves, or the annular flange on one should not bear against the shoulder on the other; but, instead, all of the end bearing from the inner or flat surfaces should be on the inclosed packing-rings.

The means described form a perfectly-tight packing for any kind of valve, piston, or other rod where it is desirable to form a steam or air tight joint, while permitting considerable freedom of movement of the rod.

The plane or surface joint between the plane surface of the ring 15 and the surface A permits a free lateral motion, said joint being in a plane substantially at right angles to the axis of the rod, and the ball-joint between this ring and the forward or upper ring 9 of the cage permits a vibrating or oscillating movement of the rod, and both of these movements can take place without opening the joints, and where there is a similar ball-joint between the rear or lower ring 8 of the cage and the tension-ring 14 and a plane joint between this ring 14 and the fixed surface B, these latter joints, while they are not intended to be steam or air tight, permit the tension-ring to maintain a uniform tension

upon the parts of the packing, while at the same time offering no resistance to the movements of the rod. I do not confine myself, however, to the use of a ball-joint between the packing-cage and the tension-ring and a plane joint between the tension-ring and the fixed surface B, or to the use of the described tension-ring, as any suitable tension device may be used between the packing-cage and the surface B without departing from my invention. I prefer, also, to arrange a second cage, in which may be arranged in contact with the rod any suitable material to form a second packing or to form an air-packing to exclude air from a cylinder in which a vacuum is formed. For this purpose I provide a cage 17, fitted upon the rod, and having, preferably, a screw-threaded flange 18 at its outer end, forming a cup or socket 19, which is closed by means of a cap-nut 20, and which is adapted to retain a packing to exclude dust. A jam-nut 21 may also be threaded upon the cage and screwed against the cap-nut to firmly secure the same. The cage 17 is preferably held in place by means of a nut 22, threaded into or onto the gland and having a ground plane inner face. The inner portion of the cage is provided with a convex shoulder 24, the curve of which may be concentric with the ball-and-socket joint of the cage already described. Arranged between the shoulder and the nut is the ring 23, having a plane surface bearing against the nut and a convex surface bearing against the shoulder 24 and forming with it a ball-and-socket joint. The inner end of the cage has a bevel 26, and between it and the gland is arranged the bevel tension ring or clasp 25 in bearing contact with each. The nut 22 thus holds the cage in place with an elastic tension or pressure. The diameter of the stuffing-box and of the opening through the gland and nut 22 are in each case greater than the outer diameter of the fittings arranged therein, whereby lateral movement of the rod is permitted. The joints between the nut 22 and the ring 23 and between the ring 23 and the shoulder 24 are steam-tight surface joints, permitting the adjacent parts to slide upon each other with the lateral movement of the rod without opening the joints. I may also provide a second series of packing-rings 11 and 12, arranged within the cage 17. A ring 36, having an inner beveled end, is then arranged at the inner end of the cage 17, and is overlapped by the flanged cage. The tension-ring 25 is held between the outer face of the gland and the beveled face of this ring. By this means I form a second or supplemental packing, so that if any steam by any possibility passes the first set of packing-rings it will be prevented from escaping by the second series of rings, and the outer end of the cage may carry any suitable material for excluding the dust.

In case of breakage of one of the clasps or tension-rings, I prefer to provide sectional

rings, as shown in detail in Fig. 7. The ring is formed in two sections having dovetailed shoulders 31. These sections are held closely together in proper position by means of the grooved holder 32, having a notch 33 through its outer flange, in which the shoulders of the sections fit. The space between the members of the clasp and the rod is filled by loose sections 24, lying upon the rod.

In Fig. 10 I have shown a construction in which the main packing is similar to that already described; but the packing arranged outside the gland is designed to act in the opposite direction, and thereby to prevent a leakage of air to the cylinder. In this instance the arrangement of the cage 17 and the ring 36 is the same as in Fig. 2, except that the convex surface is on the ring 36 and the solid ring 23 is between this ring and the outer surface of the gland. The gland is provided with an annular projection 40, which is screw-threaded. A cap-nut 42 is screwed on this projection and forms a surface-joint with the tension-ring 25, and also prevents the gland from spreading.

The packing-cage formed of the two sections and fitting together and inclosing the packing-rings is an important feature of the invention. By its use I prevent the packing-rings from getting out of position, which they might otherwise do, and thereby wearing grooves or channels in the rod.

This packing may be used upon all piston, pump, or valve rods whenever it is desired to form a steam or air tight joint, and whether said rods have a reciprocating, rotary, or oscillatory movement.

I claim as my invention—

1. The combination, with the piston-rod, cylinder-head, and gland, of the rings 8 and 9, forming a packing-holding cage and having ball-surfaces with their center at the center of the rod, the inclosed packing-rings, and the rings 14 and 15, having concave surfaces fitting upon the convex surfaces of said rings 8 and 9, and plane surfaces fitting, respectively, against the cylinder-head and gland, substantially as described.

2. The combination, with a cylinder, its gland, and the piston-rod, of packing rings or collars arranged upon said rod and forming two or more sliding plane or surface joints with said cylinder or its attachments, and a ball-joint, the center of which is at the center of the rod and between said surface-joints, substantially as set forth.

3. In a device of the class described, the combination, with the cylinder, its piston-rod and gland, of a metallic packing arranged upon said rod, convex rings arranged upon said rod, inclosing said packing, and forming the ball member of a ball-and-socket joint having its center at the center of the rod, and socketed rings upon said rod, bearing upon said ball-rings and forming the socket of said ball-and-socket joint, and also forming sliding

plane joints, respectively, with the gland and cylinder-head, substantially as described.

4. In a piston-rod packing, the combination of socketed rings arranged upon the rod, making steam-tight sliding plane or surface joints with the cylinder-head and glands, convex packing-holding rings arranged between said socketed rings upon said rod and forming a tight ball-and-socket joint therewith, having its center at the center of said rod, and a cage upon said rod having a sliding plane joint, and a partial ball-and-socket joint concentric with the other ball-and-socket joint, substantially as described.

5. The combination, with the piston-rod, cylinder-head, and gland, of the tension-ring having a plane and a concave surface, rings 8 and 9, having a convex surface whose center is at the center of the rod, and inclosing packing-rings, and a ring having a concave surface bearing on the convex surface of said ring 8, and a plane surface bearing against the gland, substantially as set forth.

6. The combination, with the cylinder-head, piston-rod, and gland, of the rings 8 and 9, having ball-surfaces whose centers are at the centers of the rod, packing-rings inclosed by said rings 8 and 9, a solid ring and a tension-ring arranged upon opposite sides of said rings 8 and 9, and each having a concave surface and a plane surface and forming joints with said rings.

7. The combination, with the gland and the packing arranged within the gland, of the cage 17, arranged outside of said gland and provided with a convex surface, a solid ring having a concave surface, and a tension-ring engaging said cage, substantially as described.

8. In a packing, a ring having in its surface a series of diagonal grooves, so that the pressure of the steam on this surface and the velocity of steam passing through the grooves may cause the packing to revolve with a slow movement around the rod, for the purpose set forth.

9. The combination, with the rod and the plane surface A, of the ring 15, having a plane surface bearing on said surface A, and a concave surface, a packing-cage having a ball-surface engaging the concave on said ring 15 and inclosing a series of packing-rings, and a suitable tension device, substantially as described.

10. The combination, with the rod and the plane surface A, of the ring 15, having a plane surface bearing on said surface A, and a concave surface, and a packing-cage on said rod, having a ball-surface engaging said concave surface on the ring 15, substantially as described.

11. The combination, with the rod and the plane surface A, of the ring 15, having a plane surface bearing on said surface A, and a concave surface, a packing-cage having a convex surface bearing on said concave sur-

face on the ring 15 and inclosing suitable packing-rings, and a tension-ring engaging said packing-cage.

12. The combination, with the piston-rod, of the packing-cage formed of rings overlapping each other, the sectional ring 11, the sectional L-shaped ring 12, and the tension-ring 13, inclosed thereby, substantially as described.

13. The combination, with the piston-rod and the fixed surface A, of the packing-rings 15 and 23, arranged upon opposite sides of said surface and forming tight joints therewith, rings upon said rod, forming tight joints

with said rings 15 and 23, and oppositely-acting tension devices engaging said rings on the rod, substantially as described. 15

14. The combination, with the piston-rod and gland, of packing-rings upon opposite sides of the gland, forming tight joints therewith, and oppositely-acting tension devices, substantially as set forth. 20

In testimony whereof I have hereunto set my hand this 15th day of November, 1889.

FERRIS D. TOUCEY.

In presence of—

A. C. PAUL,

A. M. GASKILL.