

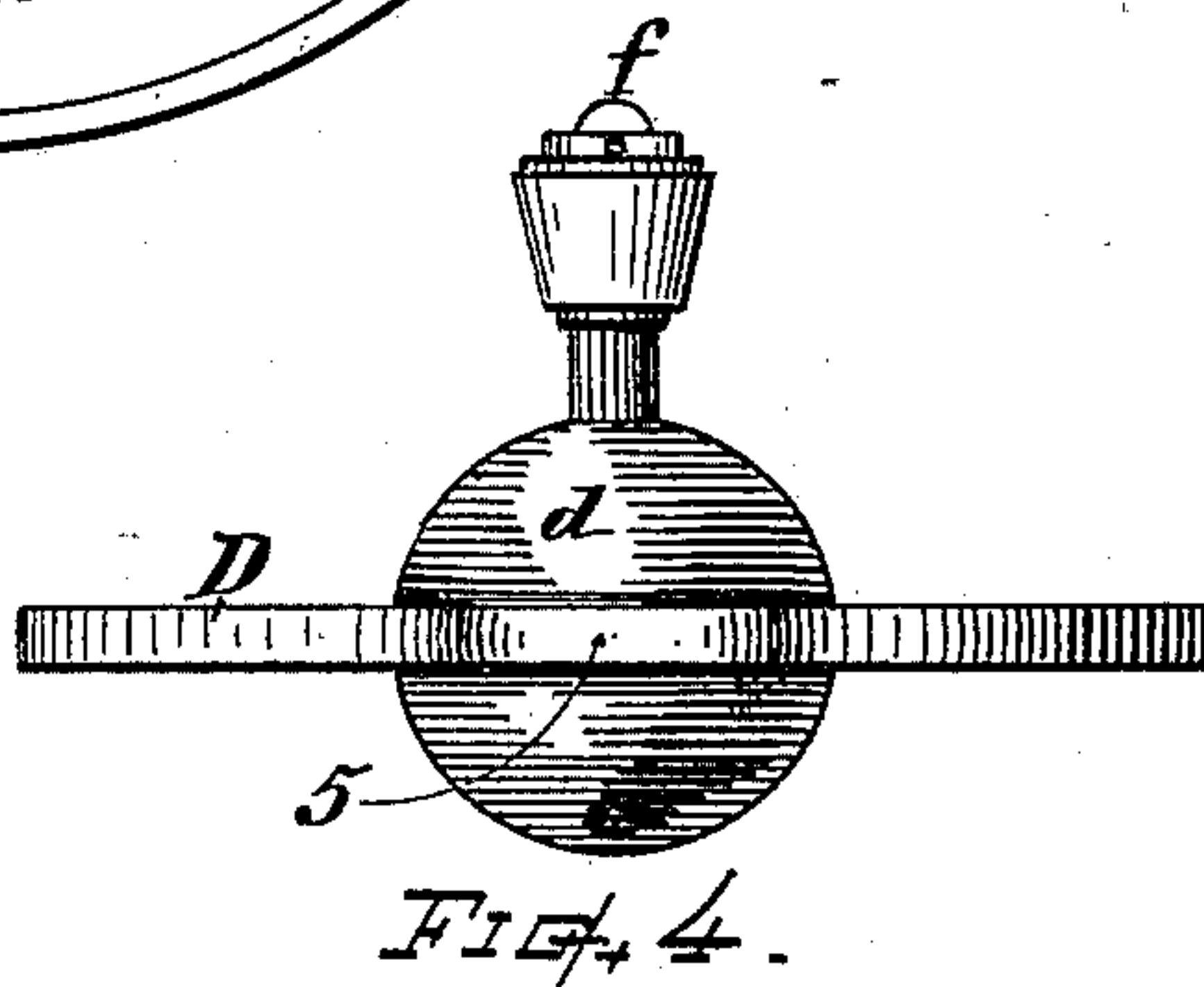
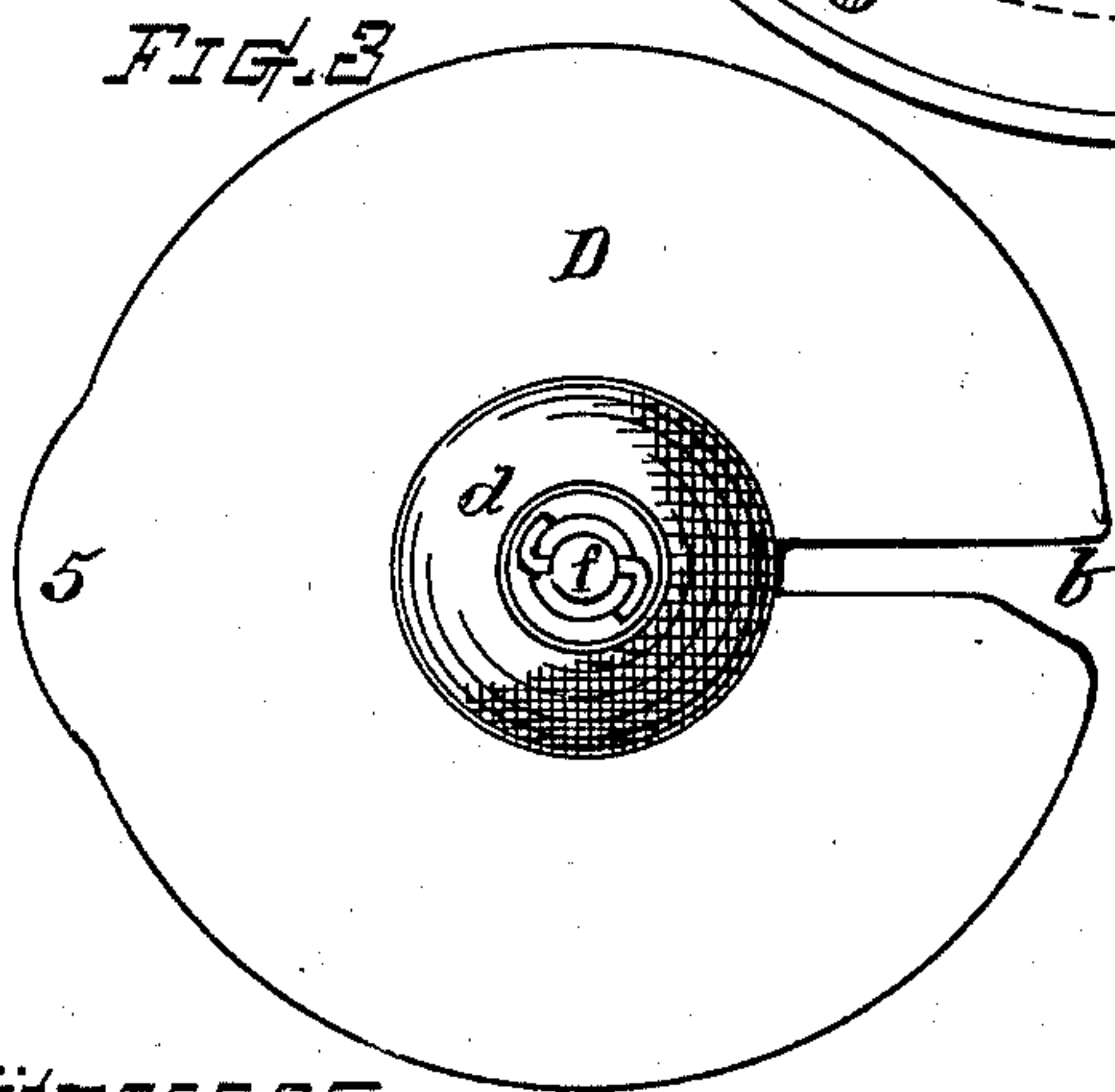
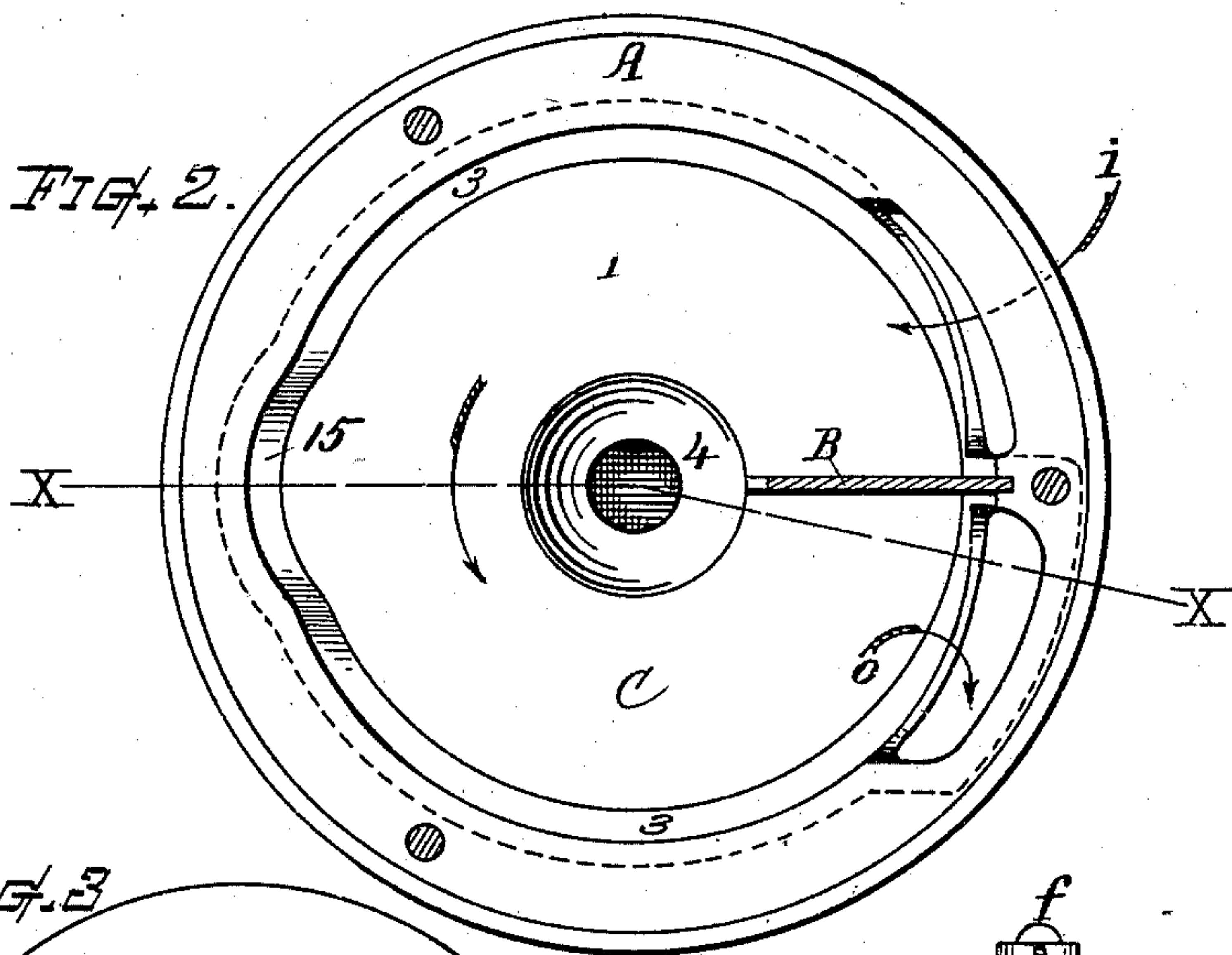
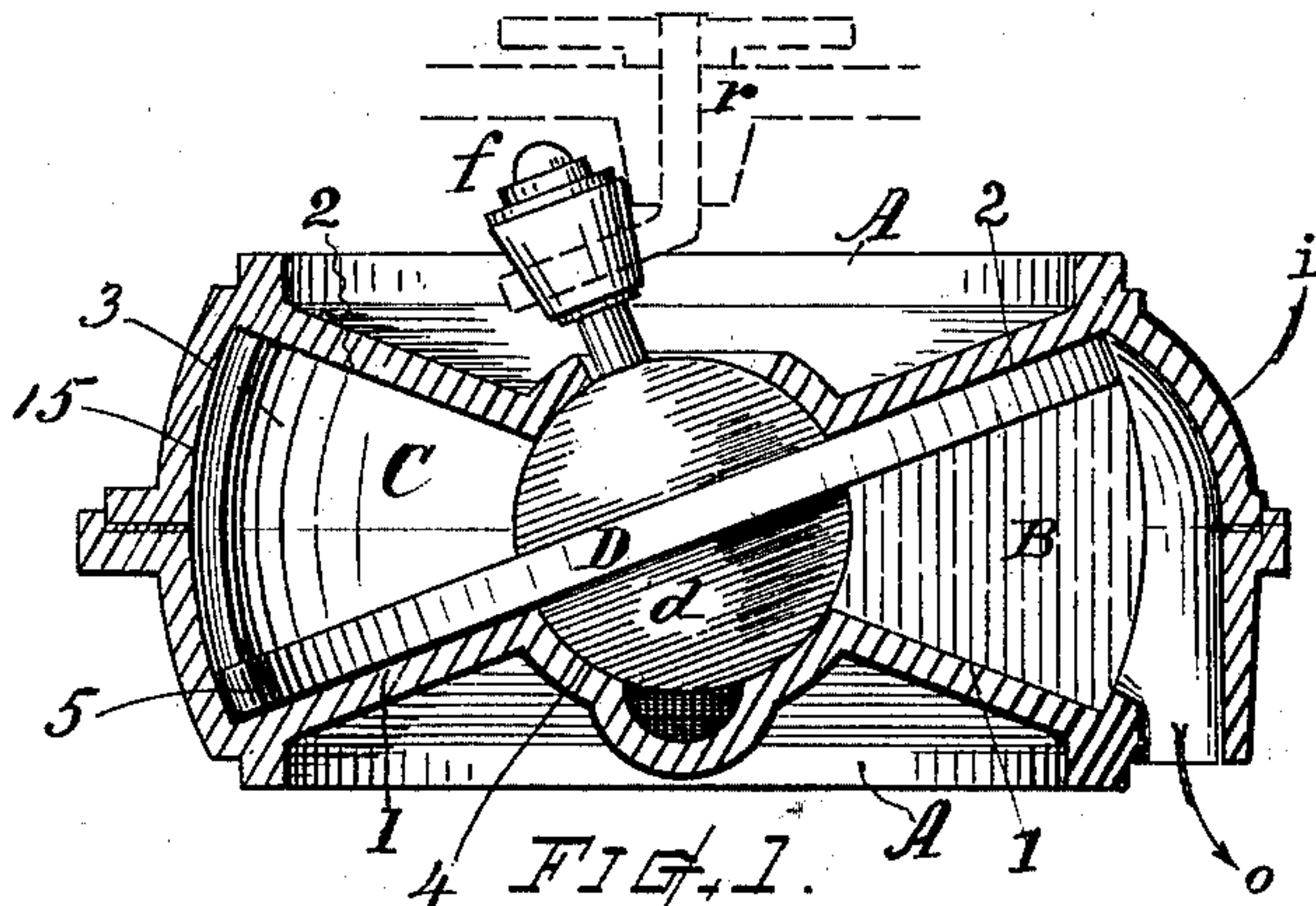
No. 702,241.

Patented June 10, 1902.

F. L. NORTHROP.  
DISK WATER METER.

(Application filed Feb. 3, 1902.)

(No Model.)



Witnesses—  
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# UNITED STATES PATENT OFFICE.

FRANK L. NORTHROP, OF SACO, MAINE, ASSIGNOR TO UNION WATER METER COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

## DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 702,241, dated June 10, 1902.

Application filed February 3, 1902. Serial No. 92,309. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK L. NORTHROP, a citizen of the United States, residing at Saco, in the county of York and State of Maine, have  
5 invented a new and useful Improvement in Disk Water-Meters, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to  
10 which this invention appertains to make and use the same.

My present invention relates to an improved construction of the disk-piston and disk-chamber casing and to the combination  
15 of such parts in a manner to afford a non-interfering peripheral engagement of the disk and casing and to enhance the strength and working balance of the disk-piston within the chamber, the principal objects being to obviate friction and tendencies toward the cramping and fracture of the disk-piston and to render the action of said disk free, smooth, and  
20 easy within the chamber; to prevent interrupting influences in the proper passage of the liquid through the meter and the accumulation of sediment within the meter at any part that might interfere with the operation of the disk-piston; also, to afford a construction that can be manufactured with practical  
25 facility and economy. These objects I attain by the construction particularly defined in the following detailed description and summary and illustrated in the accompanying drawings, which show such parts of a disk  
30 water-meter as will disclose the nature of my invention, and wherein—

Figure 1 represents a vertical section through the casing at line X X on Fig. 2 and showing the disk-piston in side view. Fig. 2  
40 is a plan view of one-half of the disk-chamber casing with the disk-piston removed therefrom. Fig. 3 is a separate plan view of the disk-piston corresponding with Fig. 2, and Fig. 4 represents an edge view of the disk-  
45 piston.

The general construction of disk-meters being well known, it is deemed sufficient to herein illustrate and particularly describe such parts only as relate to and materially embody

my improvements; but it will be understood 50 that in practice these parts are associated with such other well-known parts as are usually employed in water-meters of this class and necessary for the conducting of the liquid to and from the disk piston chamber and for the 55 registering of the flow in accordance with the nutating movements of the disk-piston, and said accompanying parts may be of any suitable construction.

Referring to the drawings, the part marked 60 A represents the disk-chamber casing, which is composed of separable upper and lower half-sections and provided with inlet and exit ports *i* and *o*, respectively. The casing A when its two parts are assembled incloses a 65 chamber C, having conical upper and lower internal surfaces 1 and 2 and a spherical wall-surface 3. The casing is furnished with a central bearing 4 for the ball *d* of the disk-piston D and is also provided with the usual 70 upright radial partition or diaphragm B between the inlet and outlet ports. The disk-piston D, which is best made of hard vulcanized rubber or other suitable material, is furnished, as usual, with a bearing-ball *d* for 75 giving a central support in the casing and with a stem or finger *f* for moving the register-gearing at *r*, and a radial incision *b* is formed in one side of the disk to accommodate the partition B in well-known manner. 80 In accordance with my invention the disk-piston is made with an irregular curved peripheral outline, its plate being provided with a boss, prominence, or bulge 5 upon the edge thereof, extending beyond the regular circle 85 of the general outline and forming an eccentric protuberance of outwardly-rounded shape on the outer edge of the disk, but presenting no sharp or abrupt inward or outward angles in the peripheral outline con- 90 tour. Said prominence 5 is disposed at a convenient position of the circumference, preferably diametrically opposite to the position of the incision *b*, where the extension of material will best serve to balance the disk. 95 The edge of the protuberant portion is similar in cross-sectional shape to and in continuation of the general edge of the disk, but



imparts to the disk a somewhat extended or elliptical form at the place of its location.

Within the wall of the disk-chamber casing I provide a rounded enlargement, recess, 5 or lateral concave excavation 15, corresponding in horizontal cross-section to the outline contour of the bulged edge of the disk and in vertical cross-section with the general curvature of the chamber-wall 3, which conforms 10 to the spherical shape developed by the movement of the disk edge in its nutating action. The inner face of the concavity 15 is approximately an internal spheroidal surface and can be formed in the casing at the 15 same operation as the dressing out of the walls of the chamber or at separate operation by means of a cam-controlled tool or appliance that directs the milling-cutter outward and inward to give the desired action for producing the eccentricity, offset, or deviation 20 from a true circle in the horizontal curvature of the inner face of the casing with a continuous undulating but smooth surface. The bottom and top surfaces at the concavity 15 are in continuation of the conoidal top 25 2 and bottom 1 of the chamber. When the parts are assembled, the protuberant extension 5 of the disk D countermatches with the eccentric enlargement curvature 15 of the interior of the casing, which serves as a non-frictional engagement for overcoming any 30 rotative tendency of the disk under the influence of the flow of water through the chamber, while at the same time avoiding interrupting influences due to any abrupt or sharp angles in the surfaces against which the water flows; also, balancing the disk-piston, so that it smoothly and easily assumes its various positions in the nutating action without 35 permitting the corners at the incision to cramp against the diaphragm, with a consequent tendency of fracturing the disk-plate. The construction also affords a disk of uniform strength and unweakened by the re-

moval of any portion of the thickness of its 45 material.

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

1. In a disk-meter, a disk-piston having its peripheral edge formed with an eccentric 50 outwardly-curved protuberance beyond the regular circle curvature; in combination with a disk-chamber casing having a lateral enlargement of its chamber, the inner surface of which enlargement is approximately of 55 spheroidal curvature and in conformation to the surface developed by the protuberant extension of the nutating disk-piston in its motion.

2. A disk-meter comprising a disk-piston 60 having at one side an incision to accommodate the diaphragm, and at an approximately opposite position provided with a rounded peripheral bulge in the outline of its edge; in combination with a disk-chamber casing 65 having an inlet and outlet port, a partition-diaphragm, and a lateral concaved enlargement or recess of substantially similar rounded contour, countermatching said disk, and within which said peripheral enlargement en- 70 gages and has nutating motion with the movement of the disk-piston.

3. In a disk water-meter, a disk-piston having a regularly-curved prominence on its peripheral outline, in combination with a 75 disk-chamber casing having on its interior face a deviating curve of the wall surface corresponding in vertical section to the vertical contour of the chamber-wall surface, and in horizontal section to the contour of the curve 80 of the disk periphery.

Witness my hand this 30th day of January, 1902.

FRANK L. NORTHROP.

Witnesses:

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CHARLES S. BACON.