No. 702,225. Patented June 10, 1902.

W. H. LARRABEE.

DISK WATER METER.

(Application filed Mar. 3, 1902.)

(No Model.)

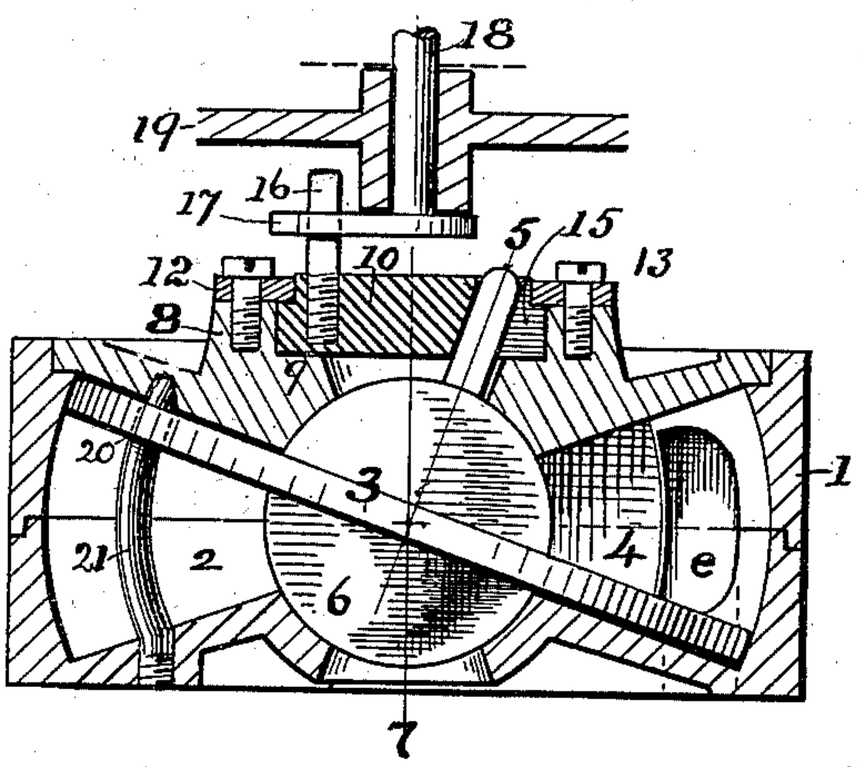

FIG. 1

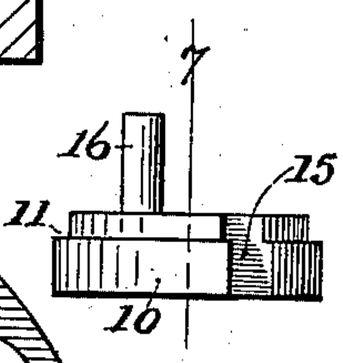

FIG. 4

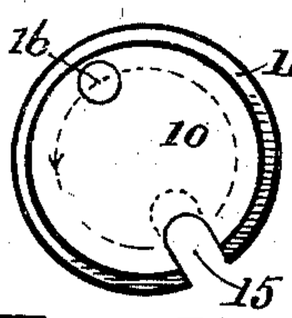

FIG. 3

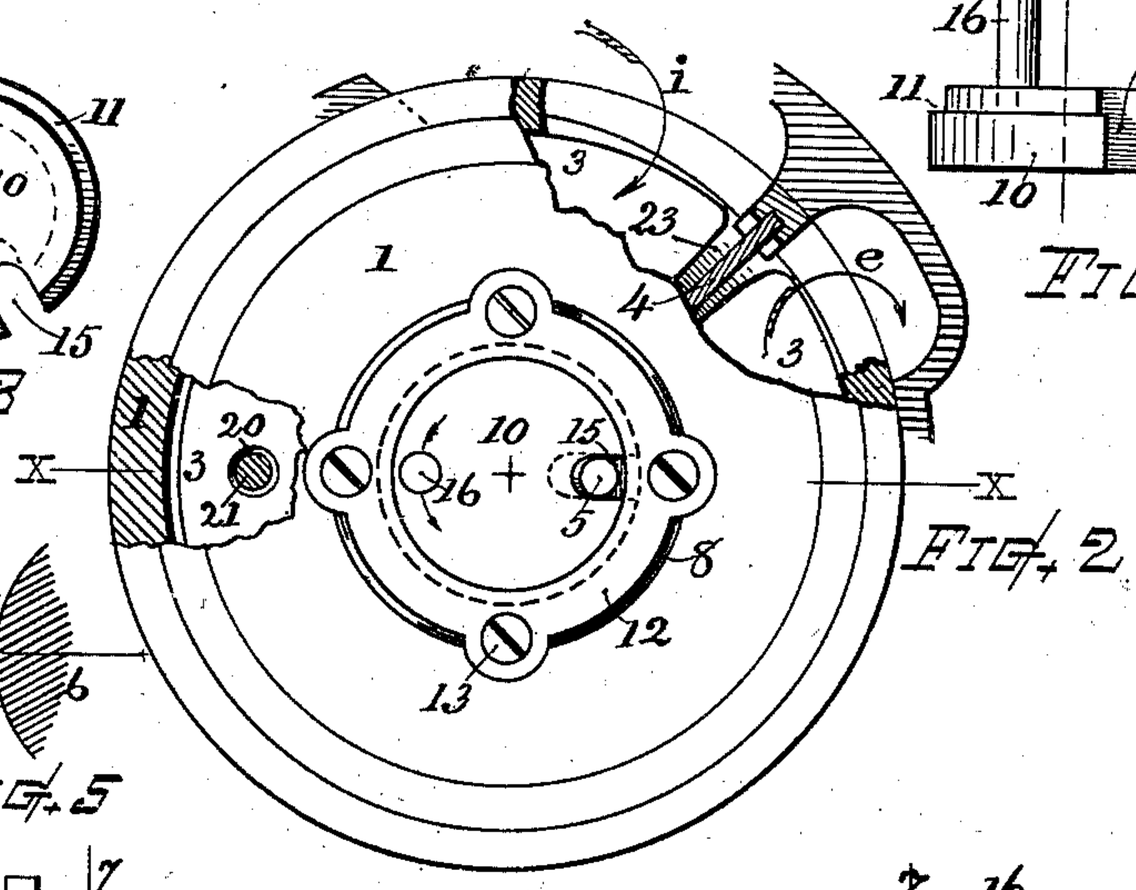

FIG. 2

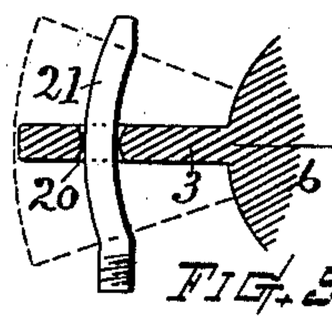

FIG. 5

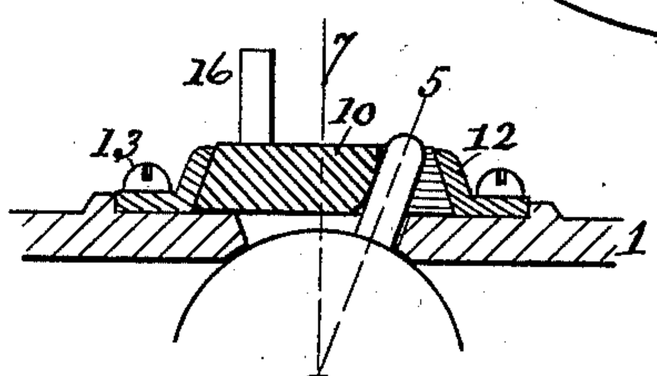

FIG. 6

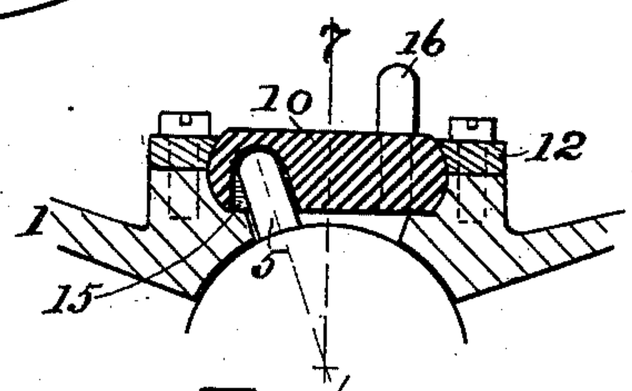

FIG. 7

Witnesses
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UNITED STATES PATENT OFFICE.

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DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 702,225, dated June 10, 1902.

Application filed March 3, 1902. Serial No. 96,463. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. LARRABEE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented new and useful Improvements 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 which this invention appertains to make and use the same.

This invention relates to an improved construction of means for controlling the movement of the disk-piston and for actuating the registering mechanism, the objects thereof being to provide a simple, free-operating, and efficient means for maintaining the disk-piston in proper relation to the interior surfaces of the disk-chamber casing and to prevent said piston from assuming a position that would allow the liquid to go through the chamber without operating the register, also to afford an easily-running and efficient means for transmitting the motion between the disk-piston and registering mechanism and to avoid side strains or pressures upon the supporting-frame for the intermediate gearing and to render the register-driving appliances freely and practically operative irrespective of any exact alinement in the axial relation of the connecting parts. These objects I attain by the mechanism illustrated in the drawings, wherein—

Figure 1 represents a vertical sectional elevation of a water-meter or similar mechanism at line X X on Fig. 2, embodying such parts as will show the nature of my invention. Fig. 2 is a plan view of the same, portions being shown in section. Fig. 3 is a top view of my rotatable top disk separately. Fig. 4 is a side view of the same. Fig. 5 is a section of the disk-piston shown in relation to the guide-rod, and Figs. 6 and 7 are vertical sectional views showing modifications in the form of the bearing for the rotating top disk.

On the drawings the numeral 1 denotes the disk-chamber casing, which in practice is fitted within the body-casing (not shown) of the meter in well-known manner. The disk-chamber 2 may be of the usual form or suitable for containing the nutating disk-piston 3 and is provided at one side with an upright partition or diaphragm 4 and with a suitable inlet-port *i* and exit-port *e* at either side of the diaphragm for directing the flow of liquid around the interior of the chamber for moving the disk-piston in the customary manner.

The disk-piston 3 is supported within the casing by a central ball 6 and spherical bearing-seats and has a stem or shaft 5, that projects upward perpendicular to the plane of the piston through the opening at the top of the casing, with its axis disposed at about twenty degrees, more or less, inclination to the vertical central axis 7 of the casing, the top end of said shaft traversing around said central axis when in operation, as will be fully understood by persons conversant with disk-piston actions.

The top of the disk-chamber casing is provided with a circular recess or bearing 8, having an annular horizontal ledge 9, surrounding the conoidal central opening. Within said bearing I arrange a flat circular rotatable disk or plate 10, preferably made of hard vulcanized rubber or other suitable material and disposed with its plane perpendicular to the vertical axis of the casing. This disk-plate 10 has no axial spindle or center bearing, but is supported at its periphery within the bearing 8 and seated on the ledge, the peripheral edge fitting the upright wall or bearing-rim with an easy-running fit, so that it can rotate smoothly, with little or no friction within the bearing-recess. Said disk is retained within its bearing by a thin guard plate or ring 12 of suitable internal diameter to extend over the edge or shoulder 11 thereof and secured to the bearing rim or casing by screws 13 or in other suitable manner. This ring prevents the disk 10 rising from its seat or falling out of place when the mechanism is inverted.

In the edge of the rotating disk at one side there is formed a radial slot 15 of sufficient and proper size for embracing the piston-shaft 5. The inner end of said slot termi-

nates at such position and is of such form as will maintain the normal angular relation of the piston-shaft in respect to the vertical central axis 7, thereby preventing the disk-piston from assuming or approaching a position of horizontality within the casing.

The rotating disk is provided with an upwardly-projecting stud or wrist-pin 16, fixed thereon in any efficient manner, as by threading or riveting it into the substance thereof. Said pin is disposed near the edge of the disk or eccentric in relation to the center axis and is adapted for engagement or contact with a laterally-projecting arm 17, attached to the shaft 18 or operating member of the register-actuating gearing for driving the register mechanism. The operation of registering mechanism for meters being well known, only the shaft and engaging arm are herein shown.

The nutating movement of the disk-piston causing the top end of the shaft 5 to revolve about the central axis rotates the disk 10, and the eccentrically-disposed pin 16 travels around the axis of the register-shaft 18 and imparts movement thereto by the pin pressing against the side of the arm. With this means of driving the operation will be free and efficient, even though the axes of the rotating disk and register-shaft may be considerably out of alinement with each other.

The action of the mechanism brings no side strains and lateral pressure upon the frame 19 of the register-gearing, and all strains from the disk-piston in its working are taken and supported by the casing of the piston-chamber and rotating-disk bearing.

For overcoming the rotatory tendency in a disk-piston induced by the circuitous flow of the liquid in the chamber I provide a piston-disk having a hole 20 formed therethrough at an intermediate position between the bearing-ball 6 and the peripheral edge of the piston, and I arrange within the chamber 2 a stationary curved wire guide rod or pin 21, extending through said disk-piston, as indicated, and having its ends supported in the metal of the casing at bottom and top of the chamber, one end of said guide-rod being rigidly fixed in position in one part of the casing and the other end thereof seated in an opening or recess in the other part of the casing, so that the latter can be removed when desired. The curvature of the guide-rod 21 is made to correspond with the tipping swing of the disk-piston, and the edges of the hole 20 are properly rounded, so that the piston can rock and slide freely on said rod without cramping or undue friction, the rod fitting in the hole with a close but free-running fit, as indicated. This guide-rod 21 retains the disk-piston so that its edges at the slit 23 will not contact with the surfaces of the diaphragm.

In Fig. 6 a modification is shown wherein the disk-plate 10 is shaped with an inclined peripheral surface, and the bearing is formed by the guard plate or ring, which is made of conical form to fit the incline of the periphery of the disk-plate and is arranged to seat upon the casing by a flange or base surface on a plane with the lower face of the rotatable plate.

In Fig. 7 the modification shown provides for a disk-plate 10, having a spherical peripheral surface, with a bearing partially within an integral rim on the casing and partially within the guard-ring. It also shows the disk-plate as made with a slot for the disk-piston shaft extending only partially through the disk-plate, thereby inclosing the top end of the disk-piston shaft.

I claim as of my invention and desire to secure by Letters Patent—

1. In a fluid-meter, the combination, of the nutating disk-piston provided with a projecting stem or shaft, a rotatable disk or plate supported in a circular bearing-rim perpendicular to the vertical axis of the disk-chamber casing, said disk or plate having a side slot embracing the disk-piston shaft, and a pin or projecting member disposed on said disk near the edge thereof, and adapted for traveling in a circle about the central axis, and for contact with the register-actuating member, for the purpose set forth.

2. The rotating top disk carrying an upwardly-projecting, eccentrically-disposed pin, and having a radial slot terminating at a position corresponding to the angular relation of the disk-piston shaft; in combination with the disk-chamber casing having a top bearing within which said rotating disk is peripherally mounted, the nutating disk-piston within said casing, the disk-piston shaft, its end movably engaged in the slot in said rotating disk, and the register-operating crank or member adapted for actuation by said disk-carried pin.

3. The combination, of the disk-chamber casing provided with a top bearing-rim, a revoluble disk-plate mounted in said bearing, said disk-plate having a radial slot, an eccentrically-disposed wrist-pin fixed in said disk, a guard-plate or ring confining said disk to its bearing, the disk-piston within the chamber, its shaft projecting into the slot in said disk-plate, means for preventing rotary movement of the disk-piston, the register-operating shaft and an arm attached to said shaft and extending into the path of said wrist-pin.

4. In a disk water-meter, the combination of a nutating or rocking disk-piston having a hole through its plate at an intermediate position between the bearing-ball and the peripheral edge, and a curved pin or guide-rod supported at its respective ends only, within the disk-chamber casing and extending through said hole in the disk-piston plate, for the purposes set forth.

5. In a disk water-meter, in combination, the separable disk-chamber casing having the partition-diaphragm, the disk-piston hav-

ing its plate slotted to receive said diaphragm, and provided with a guide-hole, and a stationary guide rod or pin disposed in the disk-chamber intermediate to the center bearing and peripheral wall, one end of said guide-rod rigidly fixed in one section of the casing, and its other end removably retained in connection with the other section of the casing, said guide-rod passing through the hole or opening in the disk-piston plate.

Witness my hand this 1st day of March, 1902.

WILLIAM H. LARRABEE.

Witnesses:

CHAS. H. BURLEIGH,

CHARLES S. BACON.