No. 702,226. Patented June 10, 1902.

W. H. LARRABEE.

DISK WATER METER.

(Application filed Mar. 26, 1902.)

(No Model.)

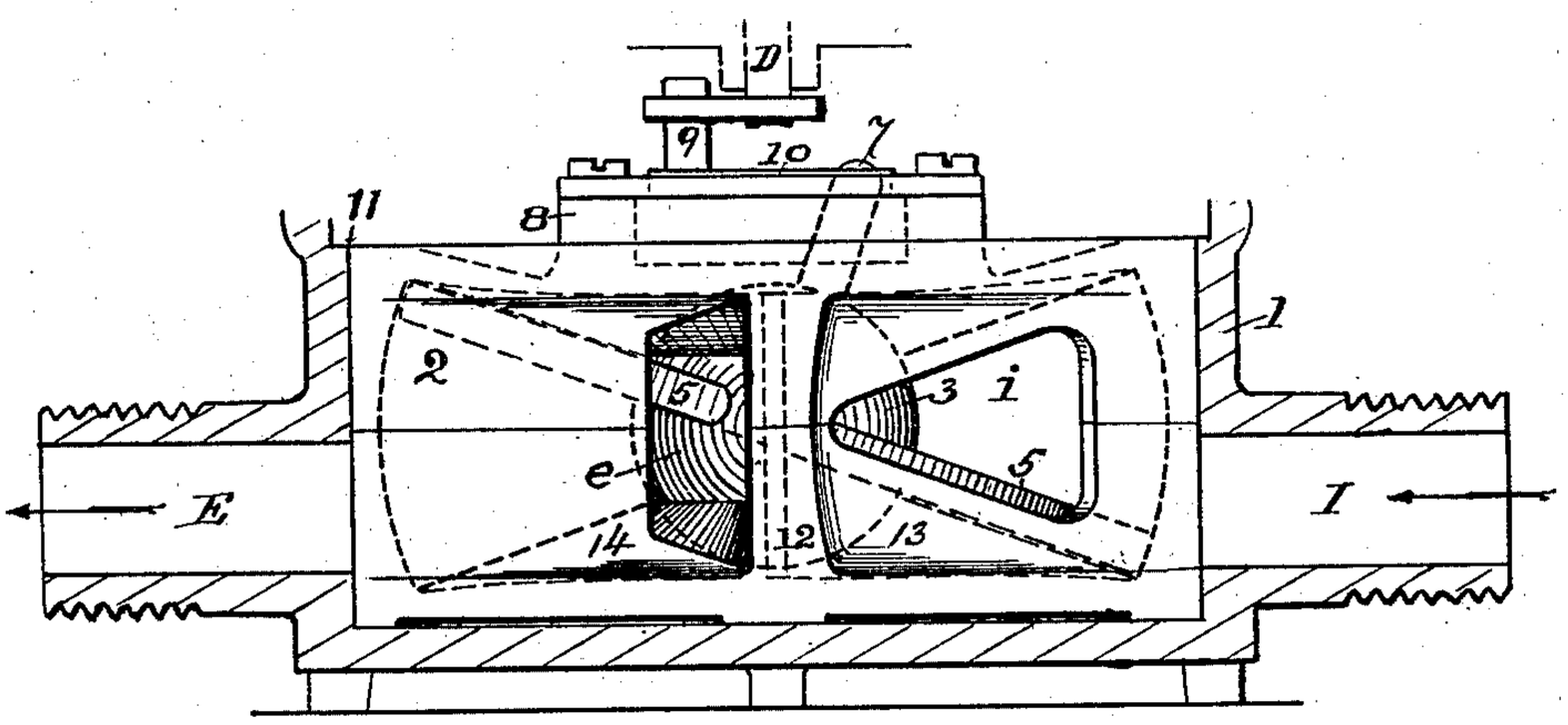

FIG. 1

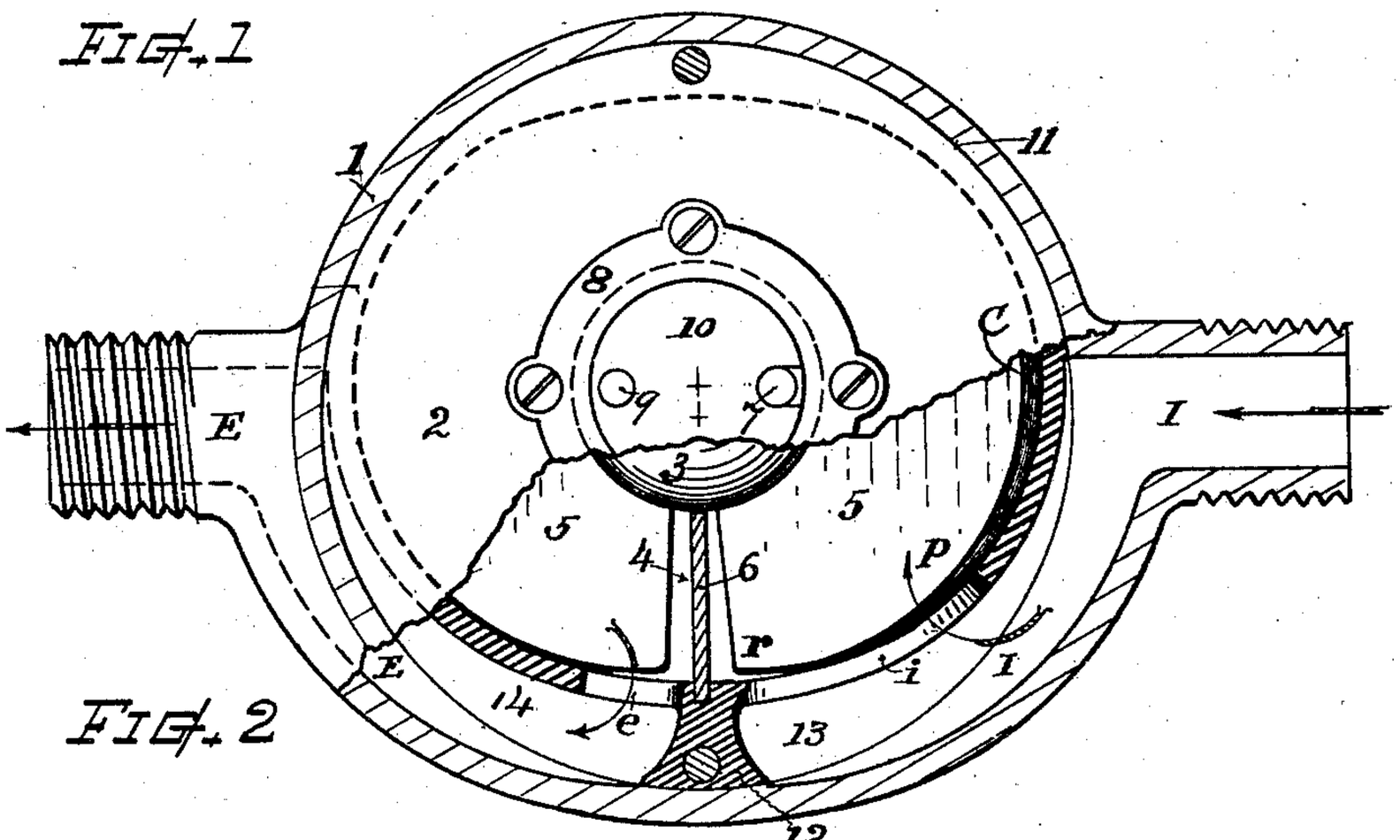

FIG. 2

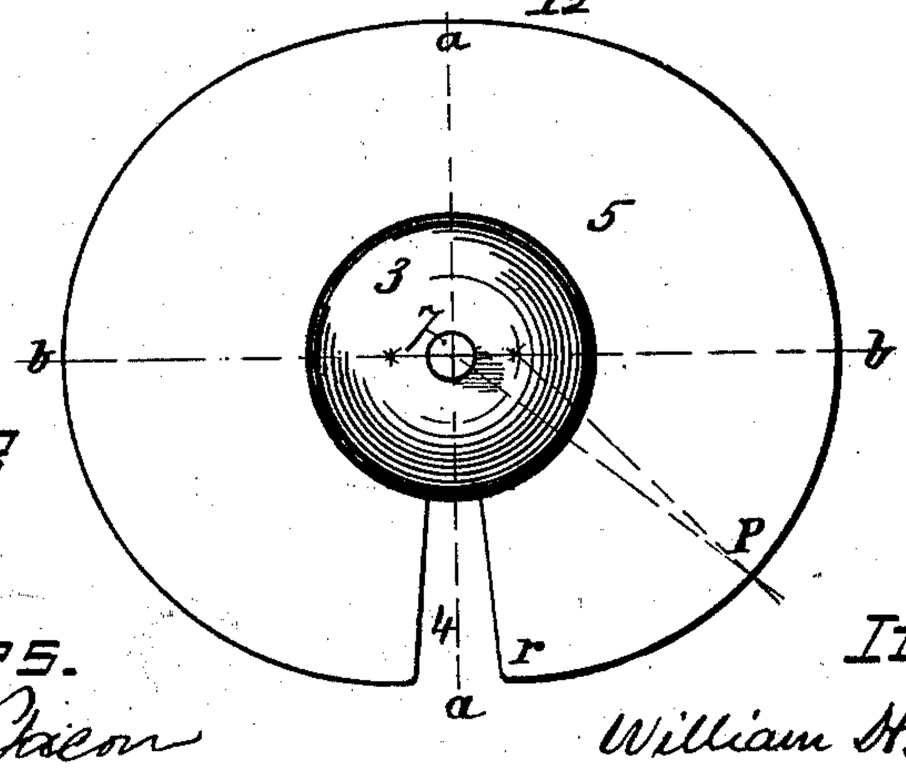

FIG. 3

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WILLIAM H. LARRABEE, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO UNION WATER METER COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

DISK WATER-METER.

SPECIFICATION forming part of Letters Patent No. 702,226, dated June 10, 1902.

Application filed March 26, 1902. Serial No. 100,077. (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.

The invention relates to a novel construction of the disk piston and chamber of a disk water-meter, also to the manner of introducing the flow of water upon the disk-piston, the objects being to provide a disk-piston having a greater proportional leverage at certain portions thereof than at others and to render the action more sensitive and its operation more powerful for driving the register-actuating gearing; also, to provide for the inflow of water upon the disk-piston in a manner designed to avoid an excess of pressure being brought upon the point of the disk-piston adjacent to the diaphragm and the liability of breaking the disk-plate at the points. To attain these objects, I have devised the improvements in construction explained in the following detailed description and illustrated in the accompanying drawings, wherein—

Figure 1 is an elevation view of such portions of a disk-piston meter as embody my invention, the outer casing being shown in section. Fig. 2 is a horizontal part-sectional plan view. Fig. 3 is a plan view of the disk-piston separately.

Referring to the drawings, the numeral 1 indicates the outer casing of suitable construction, provided with waterways I and E for connection with the supply and delivery pipes. 2 indicates the disk-chamber casing, formed of upper and lower sections, inclosing the disk-chamber C, and provided with an inlet-port *i* and exit-port *e*. The bottom and top of the chamber are of conoidal shape, with the usual bearing-sockets for supporting the bearing-ball 3 of the disk-piston 5, and the chamber is provided with a radial upright partition or diaphragm 6, disposed between the ports *i* and *e* in well-known manner and accommodated by the slot 4 in one side of the disk-piston plate.

A prime feature of my improvement consists in making the disk-piston 5 and disk-chamber C elliptical in circumferential contour, the dimensions of the chamber and disk-piston plate being greater in one direction than in a direction transverse thereto. This elliptical contour is preferably disposed with the minor axis *a* or shorter diameter coincident with the position of the diaphragm 6, while the major axis *b* or longer diameter is transverse to the plane of the diaphragm or approximately in that relation.

The differences between the length of the major axis *b* and minor axis *a* of the disk-piston is preferably about one-sixth of the average diameter, more or less, and the peripheral contour can be a true ellipse or formed on circular arcs struck from different centers to approximate elliptical form, as best shown in Fig. 3. The disk piston may be of the usual hard rubber or other suitable material, with a plain diaphragm-receiving slot and mounted by its central bearing-ball for nutating action within the chamber. The stem or shaft 7 of the piston is journaled in its oblique relation in a rotatable member 10, that turns in a bearing rim or flange 8 upon the top of the disk-chamber casing, said member being adapted for maintaining the shaft 7 and disk-piston at the proper degree of inclination and by means of a pin or detent 9 thereon for transmitting the power and motion to the register-actuating devices at D, which may be of well-known construction.

The elliptical disk-piston and corresponding chamber afford a greater area and leverage in the piston for the quarters bordering on the major axis *b* than for the quarters bordering on the minor axis *a*, and it is designed that the inflow movement of the fluid or water shall thus be principally exerted at the increased quarter or a position on the disk at about P and its following area, while the point *r* is relieved, in a measure, from an excess of the flowage force. Hence the liability of fracture of the disk-plate by any quick pressure on point *r* is accordingly obviated.

To further provide for the induction of the

fluid more forcefully at the quarter P than at the point *r*, the inlet-port *i* is formed as an approximately triangular opening or with a space that is broadest at its leading end and thence tapers or converges toward the position of the diaphragm, the metal along the convergent edges serving as a guard for checking somewhat the force of inflow at the point *r*, while the broader part of the port-opening delivers the inflow in its fullest force at the quarter P and to immediately act on the portion of the disk-piston having the longer leverage by reason of its elliptical form.

The exit-port *e* is preferably formed with an opening that is broadest adjacent to the diaphragm and tapering somewhat toward its opposite limit. The length of the port *e* is shown as about half of its vertical breadth, while the length of the port *i* exceeds its vertical breadth. (See Fig. 1.)

In the present instance the casing 2 is formed externally circular to fit a cylindrical opening 11 in the outer casing 1 and is provided with an upright barrier 12 between the ports *i* and *e* and outside recesses 13 and 14, that combine with and form portions of the waterways when the casings are assembled.

It will be understood that I do not confine my invention of an elliptical piston-disk to the particular construction of casings and waterways herein shown, as that feature may be employed in other outer form of casing without departure from the spirit thereof.

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

1. In a disk water-meter, a disk-piston of elliptical shape on its peripheral contour in combination with a casing provided with a corresponding elliptical disk-chamber, for the purpose set forth.

2. In a disk action for water-meters and the like, a disk-piston of elliptical circumferential shape, and having the diaphragm-slot therein coincident with the minor axis; in combination with a disk-chamber casing having a chamber of corresponding elliptical shape on plan.

3. The disk-chamber casing having an inlet-port consisting of a substantially triangular opening disposed with its broader space farthest from the diaphragm, and said opening tapering toward the diaphragm; in combination with the diaphragm, the nutating disk-piston having a central bearing-ball, and a waterway leading to said inlet-port.

4. The disk-chamber casing having an inlet-port *i* the opening of which is widest near its forward end and converging toward the diaphragm, and an exit-port *e* the opening of which is widest adjacent to the diaphragm; in combination, with a disk-piston of approximately elliptical peripheral contour, with the diaphragm-receiving slot at its minor axis.

5. The combination in a disk water-meter, of a casing having a chamber the dimension of which is greater on a diameter transverse to the diaphragm than on the diameter coincident with the diaphragm, a diaphragm radially disposed in said chamber with inlet and outlet ports at the respective sides thereof, a disk-piston comprising a disk-plate of approximately elliptical peripheral contour, with a radial slot and axial bearing-ball, a rotatable controlling member mounted in a bearing upon the casing, and the piston-shaft obliquely journaled in said member, and means for connecting said rotatable member with the register-actuating devices.

6. The combination in a disk water-meter, of a disk-chamber casing internally provided with a disk-chamber of elliptical or approximately elliptical shape on plan, the exterior of said casing being circular and provided with recessed spaces and inlet and outlet ports, a disk-piston of elliptical shape mounted for nutating action within said chamber, and an outer casing having a circular opening in which said disk-chamber casing fits, and provided with waterways that communicate with said recessed spaces, substantially as set forth.

Witness my hand this 22d day of March, 1902.

WILLIAM H. LARRABEE.

Witnesses:
CHAS. H. BURLEIGH,
SIMEON E. KING.