(No Model.) 2 Sheets—Sheet 1.

# L. H. NASH.

## WATER METER.

No. 281,390. Patented July 17, 1883.

*Fig. 1.*

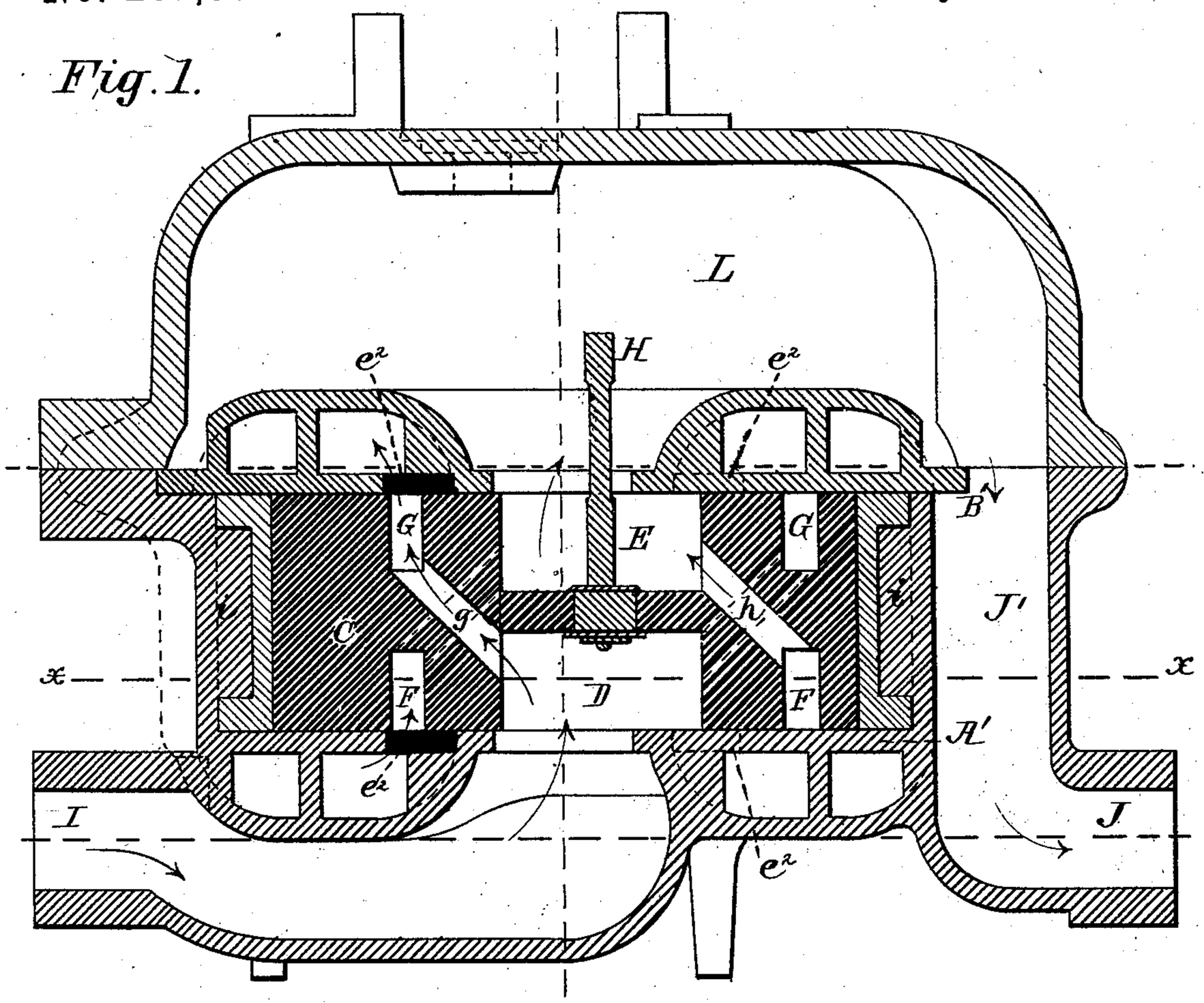
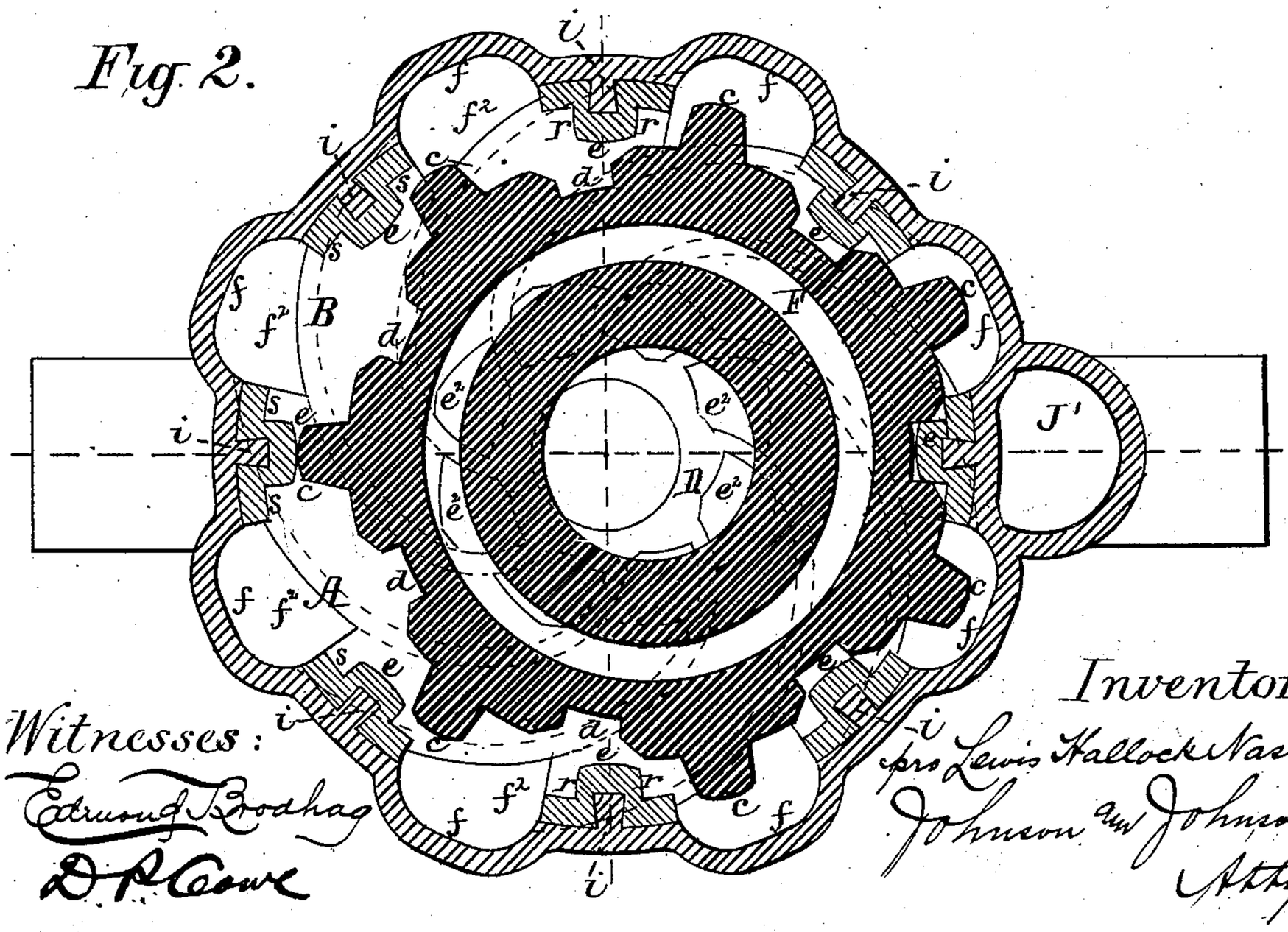



*Fig. 2.*




Witnesses:
Edmund Rodhag
D. R. Cowe

Inventor.
per Lewis Hallock Nash
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(No Model.) 2 Sheets—Sheet 2.

# L. H. NASH.

## WATER METER.

No. 281,390. Patented July 17, 1883.

*Fig. 3*

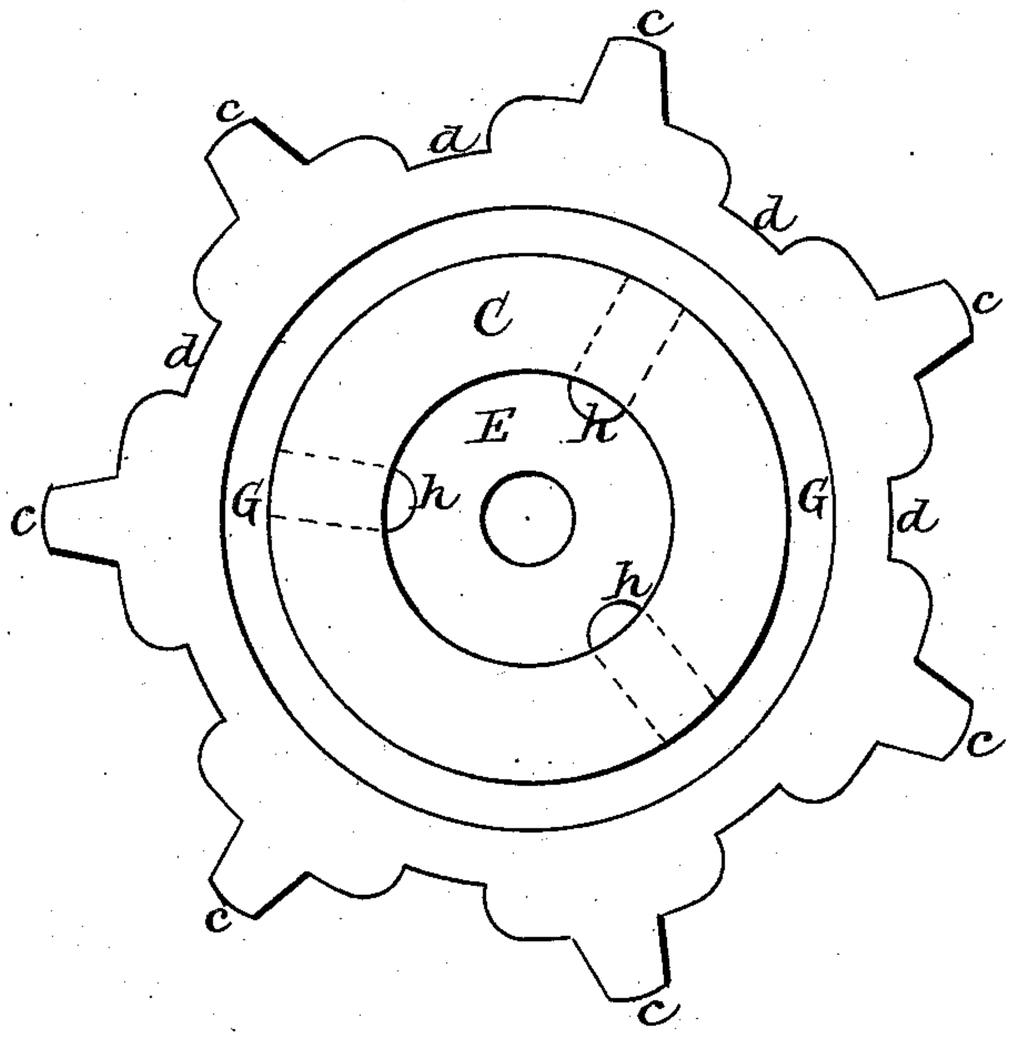
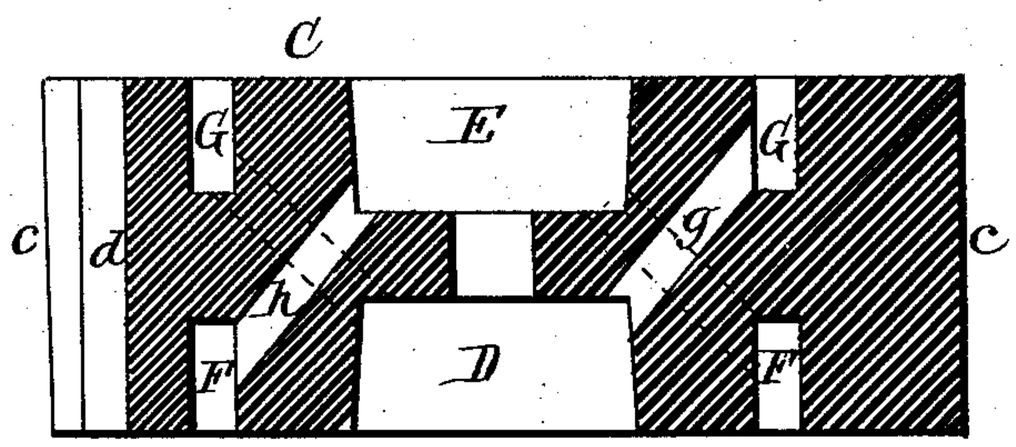



*Fig. 4.*

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N. PETERS. Photo-Lithographer, Washington, D. C.

# UNITED STATES PATENT OFFICE.

LEWIS H. NASH, OF BROOKLYN, ASSIGNOR TO THE NATIONAL METER COMPANY, OF NEW YORK, N. Y.

## WATER-METER.

SPECIFICATION forming part of Letters Patent No. 281,390, dated July 17, 1833.

Application filed October 17, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS HALLOCK NASH, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Water-Meters, of which the following is a specification.

My invention relates to improvements in rotary water-meters of the kind known as the "crown-meter," for which Letters Patent were granted to me under dates of January 21 and January 28, 1879.

A distinctive characteristic of the crown-meter consists of a piston (which may also form a valve) adapted to have an eccentric or side rocking movement upon continually-changing lines of contact within and across the center of the circular chamber of the meter-case, to effect the division of said chamber at two or more continually-changing contact-points on its sides into receiving and discharging spaces, which communicate with the inlet and with the outlet, the continuous passage of the water through said chamber being effected by the revolving motion of the piston around its own center, the inflow and the outflow taking place at the opposite ends of the piston. This compound movement of the piston is effected by the relative shape of the piston and the inner walls of its case, and by the direct action of the water upon the piston, for as the piston rocks from one bearing-point to another directly across the center of the chamber it is at the same time revolved by the force of the flow to effect the measurement by suitable registering mechanism of the water passing into and from the chamber. The continually-changing points or lines of contact at different parts of the piston and of the chamber-walls, and of the continually-changing volumes of the receiving and discharging spaces formed thereby allow the water to flow through a valve or through the piston valve-ports into and from these spaces as they fill and discharge without impeding its flow or lessening its force.

The objects of my present improvements on the crown-meter are to produce a more uniform rolling movement of the piston upon its side bearing-points, to reduce the wear upon the bearing-points, to obtain the greatest accuracy of measurement, and to lessen the expense and labor in the manufacture of the meter.

The accompanying drawings illustrate my improvements, in which Figure 1 represents a vertical central section, and Fig. 2 a horizontal section taken on the line *x x* of Fig. 1, showing a piston which also constitutes the valve in the relation it occupies in dividing the chamber into receiving and discharging spaces; Fig. 3, a top view of the piston, showing its valve-ports, and Fig. 4 a vertical section of the same.

The piston C is made of hard rubber, which has nearly the specific gravity of water. I prefer the construction shown, with valve-ports formed within the piston and adapted to operate within a chamber having water-passages formed in its opposite inlet and outlet heads, so that, in whatever position the piston may be, the valve-ports at one end of the piston will always communicate with the inlet-passage and the valve-ports at the other end of the piston will always communicate with the outlet-passage of the chamber during the continually-changing points of division of said chamber made by the sidewise rolling movements of the piston. The piston has circumferential radial projections *c*, and recesses *d* between the said projections, while the interior wall of the chamber has radial projections *e* and intermediate recesses, *f*, the projections and recesses both of the piston and of the chamber-walls being equal to the depth of said chamber. The relative shape of these projections and recesses is such as to adapt the chamber projections to fit within the piston-recesses and form a bearing-joint on one side of the chamber, and at the other side to form such bearing-joint by the contact of the projections of the chamber and piston, as the piston is caused to revolve and to rock sidewise across the center of the chamber, thereby forming continually-changing lines of bearing or contact to divide said chamber into receiving and discharging spaces A and B, into and from which the water has an unobstructed flow and a positive displacement without loss of pressure in said flow.

In the presentation of my present improve-

ments I deem it unnecessary to fully describe the principle embraced in such construction and operation (as such matter is set forth in my said patents) further than is necessary to an understanding of my improvements.

The valve within the piston is formed by a central space, D and E, in each end, of equal depth and area, and an annular space, F and G, surrounding each central space, of equal depth and area. These annular spaces communicate with each other by means of interior diagonal passages crossing in opposite directions. The central space, D, at the inlet end of the piston communicates with the annular surrounding space G at the outlet end of the piston by the diagonal passages *g g g*, while the annular central space, E, at the outlet end of the piston communicates with the annular space F at the inlet end of the piston by the diagonal passages *h h h*, as shown.

Ports $e^2$ are arranged in the heads A′ B′ of the chamber, in communication with the inlet and the outlet central openings, D E, in the piston, and in the heads of the case. Each of the chamber-heads forms a shell, and the ports $e^2$ therein correspond in number with the recesses in the chamber-wall, and said ports $e^2$ communicate by curved passages with ports $f^2$, opening at said wall-recesses *f* within the chamber. This arrangement of the ports is the same in both the chamber-heads and doubles the capacity of the valve. The curved passages in the heads stand one way in the inlet-head and in the opposite direction in the outlet-head, so as to direct the water into the chamber on opposite sides of the piston and in the same direction with its revolving motion, so that both heads have corresponding ports in which some of one set communicate with the central valve-spaces in the piston during its movements, and the other set opening directly into the cylinder-chamber. Between and joining these heads the piston-valve works in its side rocking and rotary movements, so as to constantly change its communication with said head-ports $e^2$, but not with the inlet and the outlet central ports of said heads. This construction gives greater capacity to the valve, and serves to balance the pressure of the water on each side of the piston, because E and F are the outlet-spaces, communicating with each other, while D and G are inlet-spaces, and communicate with each other.

The piston has a shifting connection with the dial mechanism by means of a central stem, H, to accommodate the side rocking movement across the center of the chamber, as shown in my said patent of January 21, 1879, to which reference is made.

The important matter of my improvement is the reduction of wear upon the piston projections. In my said patents the division of the chamber is effected on one side by the bearing of the piston projection direct upon the wall of the chamber, between its projections, and on the other side by the bearing of the piston projection upon the chamber-wall projection, producing more or less slip or slide, and consequent wear, upon these bearing-points in the rolling rocking movement of the piston from one bearing-point to another.

I provide a new joint-forming construction whereby the piston is caused to roll in a uniform manner upon its bearings without wear or slipping. For this purpose I make the bearing projections of the chamber-wall of soft metal like that known as "Babbitt metal." These separate bearing-parts are cast upon ribs *i* on the inner side of the chamber-wall within a form which leaves the wearing-surfaces smooth and finished. These separately-cast bearing parts become, in being cast, rigidly fastened to the wall-ribs, which may be of dovetail or other form to make a lock for the soft metal. These bearing projections are formed with straight sides *r* and flat side projections, *s*, and the recesses *d* of the piston are of corresponding form, so as to effect an engagement with the piston projections similar to that of gear-teeth, at one side only of the piston. At this engaging side of the piston the bearing-rib does not make the engagement; but the separate wall projection *e*, of smooth soft metal, matches with the recess *d* in the piston by a close joining, so that the bearing parts at the opposite side of the piston will be caused to pass each other without producing the least slipping of the engaged bearing parts. The outer angles of the recesses of the piston are trimmed off, so as not to interfere with the proper movement of the piston. The smooth hard surface of the rubber of the piston and the smooth surface of the soft-metal bearings of the chamber produce very great advantage in easy movement and in the maintenance of a close joining action of the piston.

To lessen the cost of manufacture I cast the chamber-forming case with the lower chamber-head and with the inlet and the outlet passages I and J, the latter communicating by a passage, J′, outside the chamber-wall, with a separate top chamber, L, which forms an inclosing-case for the dial mechanism, and into which the outlet-ports of the valve open, as shown in Fig. 1. This construction saves metal and much labor in completing the meter.

The arrows show the direction of the flow of the water.

An important matter of this improvement is that the piston projection is relieved from making the bearing upon the chamber-wall at the interlocking side, and instead the bearing at this point is made by the separate smooth chamber-wall projection upon another part of the piston, so as to form a close holding of the piston at such point.

I have described the piston-recesses *d* as being of a corresponding form to the chamber-wall projections *e*, and it will be seen that the recess *d* is formed of a flat surface bounded by straight right-angle sides, corresponding to the flat sides *r r* of the soft-metal wall projections

of the case, the corners of said right-angle recess sides being beveled or rounded to prevent binding in the angles of the soft-metal projections.

I claim—

1. The combination, in a rotary water-meter, of a piston having circumferential projections and recesses, constructed, substantially as described, with a chamber having wall projections adapted to intermatch and form a division-joint with the piston on one side, the projections of the piston and of the chamber forming the division-joint on the opposite side of the piston, substantially as described.

2. The combination, in a rotary meter, of a piston having circumferential projections and recesses, substantially such as described, with a chamber having separate wall projections of soft metal, corresponding with the said piston-recesses, for operation as described.

3. The combination of the chamber-forming case, having interior wall-ribs upon which bearing projections of soft metal are cast, with the piston adapted to operate upon said separately cast chamber-bearings, for the purpose specified.

4. The water-meter case herein described, formed with the lower head having ports, and the inlet and the outlet passages, as shown and described, combined with a separate top head and a separate top inclosing-case, as described.

5. In a water-meter, the combination of the hard-rubber piston, having circumferential projections and recesses, with a chamber-forming case having wall projections of soft metal corresponding with the recesses of said piston, for the purpose specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LEWIS HALLOCK NASH.

Witnesses:

CHRISTOPHER C. WHITTEMORE,

WILLIAM C. WESTERVELT.