(No Model.) 2 Sheets—Sheet 1.

L. H. NASH.

WATER METER WITH REVOLVING NON ROTATING PISTON.

No. 353,703. Patented Dec. 7, 1886.

Fig. 1.

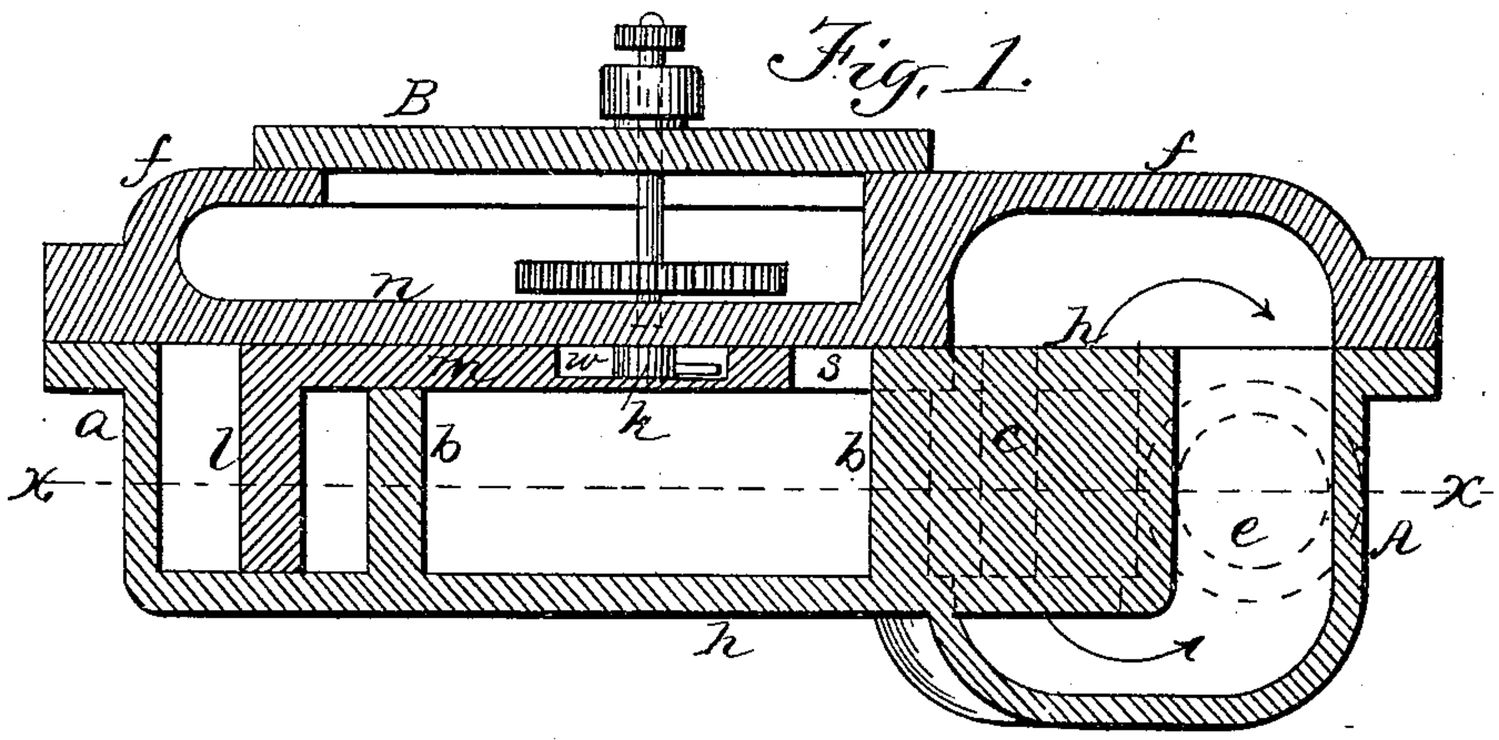

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

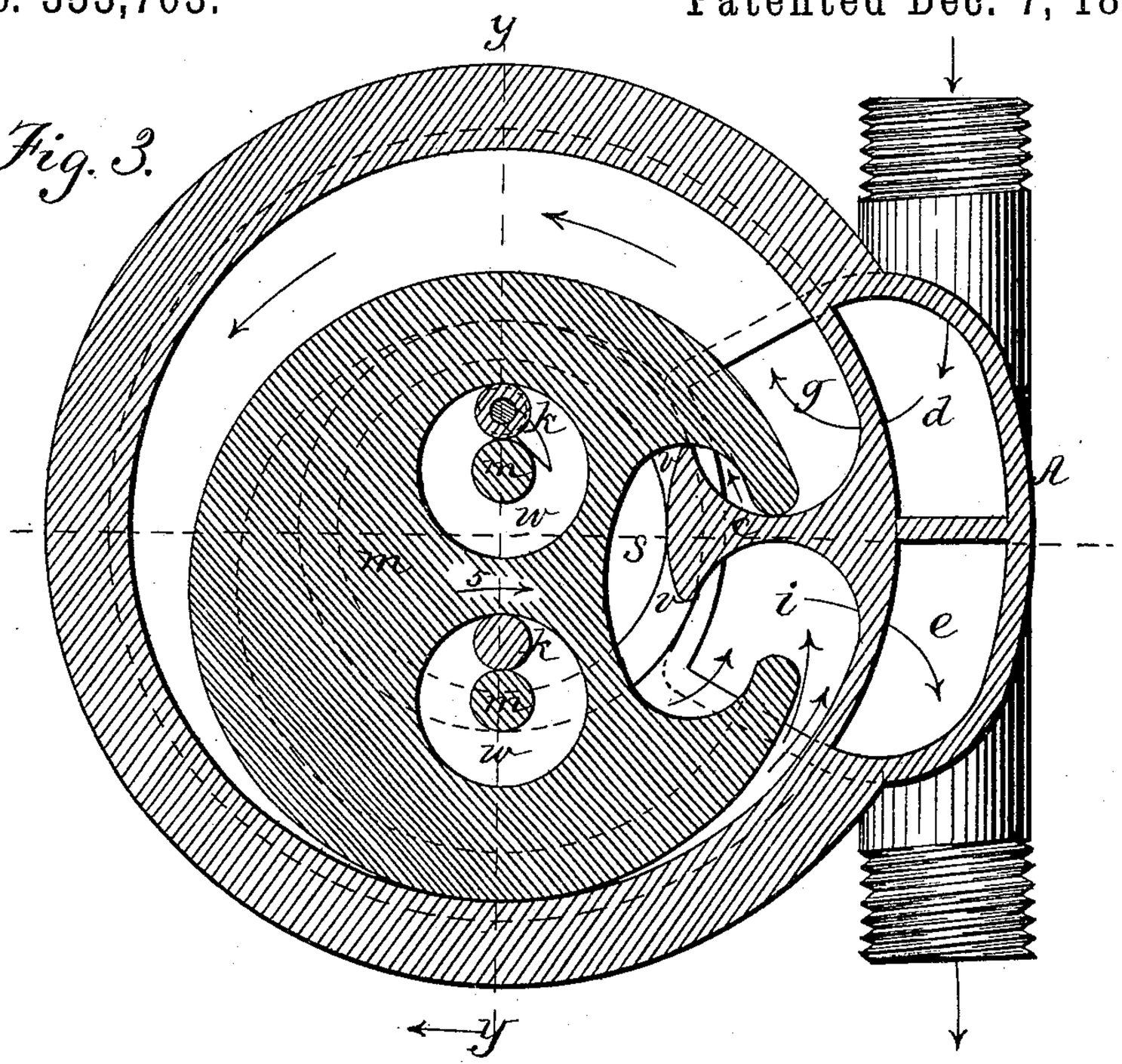


Fig. 4.

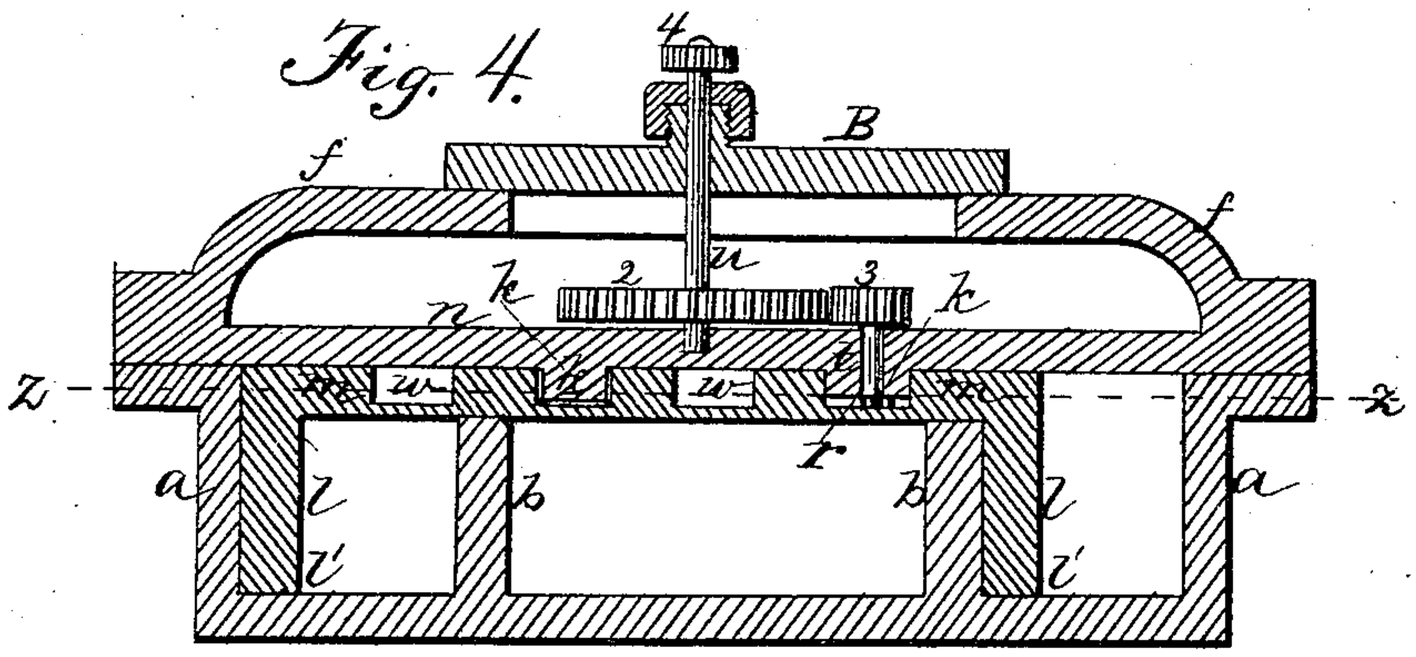
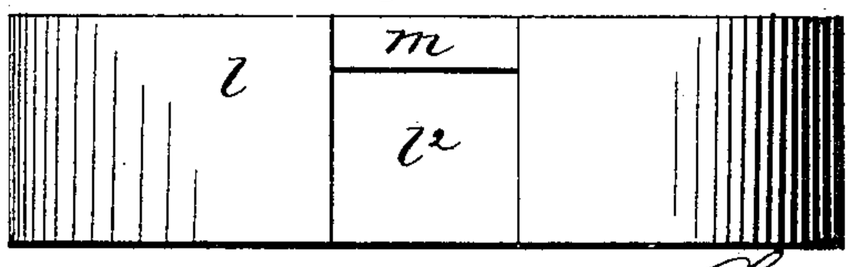


Fig. 5.



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UNITED STATES PATENT OFFICE.

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

WATER-METER WITH REVOLVING NON-ROTATING PISTON.

SPECIFICATION forming part of Letters Patent No. 353,703, dated December 7, 1886.

Application filed March 23, 1886. Serial No. 196,275. (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.

Water-meters having a chamber-forming case divided into receiving and discharging spaces by means of a hollow cylindrical piston, also having its interior divided into receiving and discharging spaces by means of a concentric case-abutment joined to the case-wall, are shown, described, and claimed in patents granted to me June 17, 1884, wherein the piston is guided upon a radial abutment division of said case by means of co-operating case and piston guides, so that said piston has a revolving motion around the center of the case and an oscillating motion upon its own axis to effect the chamber-divisions stated. In improving such construction of water-meter I cause the piston to describe a similar path around the center of the case, but without having any oscillating motion upon its own axis, so that every point of the piston is caused to move in a circular path, while dividing the case-chamber and its own chamber.

The objects of my said improvements are to give an easier movement to the piston, to allow for greater rapidity of movement of the piston with less wear upon the joint-forming parts, and to provide for guiding the piston in the described movement.

Now, so far as the piston has a revolving non-rotating movement, so that every part thereof will describe a circle, in a meter in which the case and piston has co-operating wall projections and recesses, I do not claim; but my present improvement embraces a hollow cylindrical piston having the specified movement in connection with a co-operating central case-abutment and a radial abutment division, as I will now proceed to describe in connection with the accompanying drawings.

Figure 1 represents in vertical section my improved meter; Fig. 2, a horizontal section taken on the line *x x* of Fig. 1; Fig. 3, a similar section taken on the line *z z* of Fig. 4, which is a vertical section taken on the line *y* of Fig. 3; and Fig. 5 shows a side view of the piston.

The meter-case *a* is preferably of cylindrical form, and its lower part or section has an interior concentric case-abutment, *b*, extending inward from the lower case-head and joined at one side with the inclosing-case wall by a radial division, *c*, which separates the inlet from the outlet ports *g i*, and extends from head to head of the case. The upper case part or section, *f*, which is hollow, carries the mechanism which connects the piston with the dial mechanism, as hereinafter described.

At one side of the case, outside of its chamber-wall and on one side of the chamber-division abutment, is the inlet-passage *d*, which communicates with the inlet-ports *g* in the case-heads *h*, arranged one above the other and opening into the case-chamber at its top and at its bottom, as in Fig. 1. On the other side of the radial abutment *c* is the outlet-passage *e*, which communicates with the discharge-ports *i*, also formed in the case-heads, one above the other, and opening into the case-chamber at its top and at its bottom. These inlet and discharge ports *g i* open into the inlet and outlet passages *d e* under the bottom head, *h*, and at the top of the lower chamber-forming section *a*, within a side projection, A, of the case, as shown in Fig. 1, so that the water from the inlet-passage *d* passes into the case-chamber at its top and bottom on one side of the radial abutment, and passes out at the top and bottom of said chamber on the other side of said abutment, and in its flow operates the piston to effect the measurement of the water, as I shall presently describe.

The piston consists of an inverted cylindrical cup, *l*, its upper end being closed by a head or web, *m*, the inner side of which forms a joint with the upper edge of the concentric case-abutment *b*, while the lower open cup-edge, *l'*, of the piston forms a joint with the bottom of the chamber. The piston also forms a joint with the under side, *n*, of the upper case-section, *f*, while at one side the piston has a slot, l^2, in its vertical wall, below its web *m*, as seen in Figs. 2, 3, and 5, which opens at the bottom of the piston-cup, and also into its top web, *m*, where it is enlarged into an oval-

shaped opening, *s*, Fig. 3. The width of the vertical wall-slot of the piston is such as to allow the latter to describe a circle around the center of the case without having an oscillating movement upon its own axis, while maintaining a joint at all times with the abutment and the chamber-case wall. For this purpose each side of the radial abutment *c* has a form to make contact at both walls of the piston slot at once in certain positions of the piston in its revolving around the center of the case.

In the same horizontal plane with the piston-web *m* the radial abutment *c* terminates in an enlargement, forming side horns, *v v*, which stand within the web oval opening *s*, and form a joint with the web of the piston in its said movement, while one of the walls of the piston-slot forms a joint with the radial abutment below its horned top end. This horned end of the abutment is adapted to form a joint with the piston-web in every position of the piston as the web of the latter moves over and in contact with one of said horns and the curved part between said horns, the circular path described by the piston making such contact within the oval opening of its web. By this construction the piston is caused, in its movement with the flow through the measuring-chamber, to divide the latter by the web of the piston, and by its inner and its outer walls upon the outer wall of the annular abutment *b*, and upon the inner wall of the chamber of the case, as shown in Figs. 2 and 3. In this movement of the piston each of its slot-walls must have freedom to describe a circle, while the horned end of the latter will maintain a perpetual joint with the web of the piston, and thus divide the inflow from the outflow in every position of the piston.

The piston is controlled in its circular path by means of two studs, *k k*, fixed in the plate *n* of the upper case-section, one on each side of a radial line drawn through the radial abutment *c*, which project into circular grooves *w*, formed in the upper side of the piston-web *m* on each side of its center. These piston-grooves are of equal diameter, and in the movements of the piston it must describe a circular orbit around the fixed studs, so that each of its vertical slot-walls will describe a precisely like orbit in relation to the vertical sides of the abutment, and the walls of the piston-web opening *s* will describe a like circle in relation to the abutment-horns *v v*. These controlled movements will at all times cause the piston to divide the chamber of the case, and the chamber of the piston to be divided by the annular abutment, so that there will always be an inflow into both the chambers of the case and of the piston to operate the latter. In one of these fixed studs a short gear-spindle, *t*, is journaled, having at its lower end a crank-arm, *r*, adapted to bear upon the inner wall of the groove *w*, so that the circular path described by the piston will also cause said gear-spindle to be revolved. The dial mechanism (not shown) is connected to this crank gear-spindle *t* by a gear-spindle, *u*, which is stepped in the plate *n*, and passes through a stuffing-box of the covering-plate B, and is geared with the crank-spindle by the gear 2 and 3, and to the dial mechanism by the outside gear, 4, so that the revolutions of the piston are communicated to the registering mechanism.

In the operation of the meter, the piston being in the position shown in Fig. 3, the water enters the case-chamber at the inlet-ports *g*, driving the piston in the direction of the arrow 5, the water meanwhile passing out through the discharge-ports *i*, moving the piston to the position shown in Fig. 2, in which position the water enters at the inlet-ports *g* into the interior of the piston and escapes at the outlet-ports *i*, continuing the movement of the piston to its point of starting, as shown by the arrow 3 in Fig. 2. In this movement the piston is guided by the fixed case-studs *k*, which operate in circular grooves *w* in the piston-head, said studs being so placed as to cause the piston to travel in a circular orbit around the center of the case, so as to maintain a joint with the case-walls and with the central fixed abutment in all positions of its movement, while the piston-web maintains a perpetual contact upon the end of the radial abutment.

As before stated, the important matter of my present improvement is the control of the piston by fixed guides, so that it shall have no motion of oscillation upon its own axis, but only a movement in which it will describe a circle at every point in relation to the abutment over and upon which the piston forms joint contact only, and upon which it does not swing as a bearing, as in my said patents. For this purpose the wall-slot in the piston must be wide enough to allow it to describe a circle on each side of said radial abutment division, so that I obtain a perfect division between the inflow and the outflow by a piston having only the single circular movement described over fixed interior abutments.

I claim—

1. The meter-case having a central annular abutment and a radial division separating the inlet from the outlet, in combination with a hollow cylindrical piston having a transverse web, *m*, and a side opening and means connecting the piston with the case for guiding the piston in an orbit in which every point describes a circle, substantially as described.

2. The combination, with a water-meter having a central annular abutment and a radial division separating the inlet from the outlet, of a hollow cylindrical piston having a side opening and a transverse web, *m*, provided with two or more circular grooves, *w*, and two or more fixed studs, *k*, coacting with said piston-grooves, whereby to cause each wall of the side opening of the piston to describe a circle in its motion, for the purpose stated.

3. The combination, with a water-meter having an interior abutment dividing the inflow

from the outflow, as described, of a hollow cylindrical piston, means for guiding it over said abutment in an orbit, whereby every point of said piston is caused to describe a circle, and suitable registering mechanism operated by said piston.

4. In a water-meter case having an annular dividing-abutment joined to the case by a radial abutment, a hollow cylindrical piston having a closed top, an open bottom, and a side opening extending into its top, the piston-grooves *w*, and the fixed studs, all constructed and arranged to co-operate to control the circular path of the piston around the center of the case and upon the walls of that part of the abutment which divides the inflow from the outflow, as shown and described.

5. The combination of a meter-case having a central fixed abutment joined to the case-walls by a radial abutment with a revolving non-rotating hollow cylindrical piston having a slot bestriding the radial abutment wide enough to permit of the circular movement of the piston, and means for controlling the piston in its described orbit, substantially as described.

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

LEWIS HALLOCK NASH.

Witnesses:
A. E. H. JOHNSON,
J. W. HAMILTON JOHNSON.