(No Model.) 2 Sheets—Sheet 1.

L. H. NASH.

FLUID PRESSURE DEVICE FOR ROTARY METERS.

No. 449,820. Patented Apr. 7, 1891.

Fig. 1

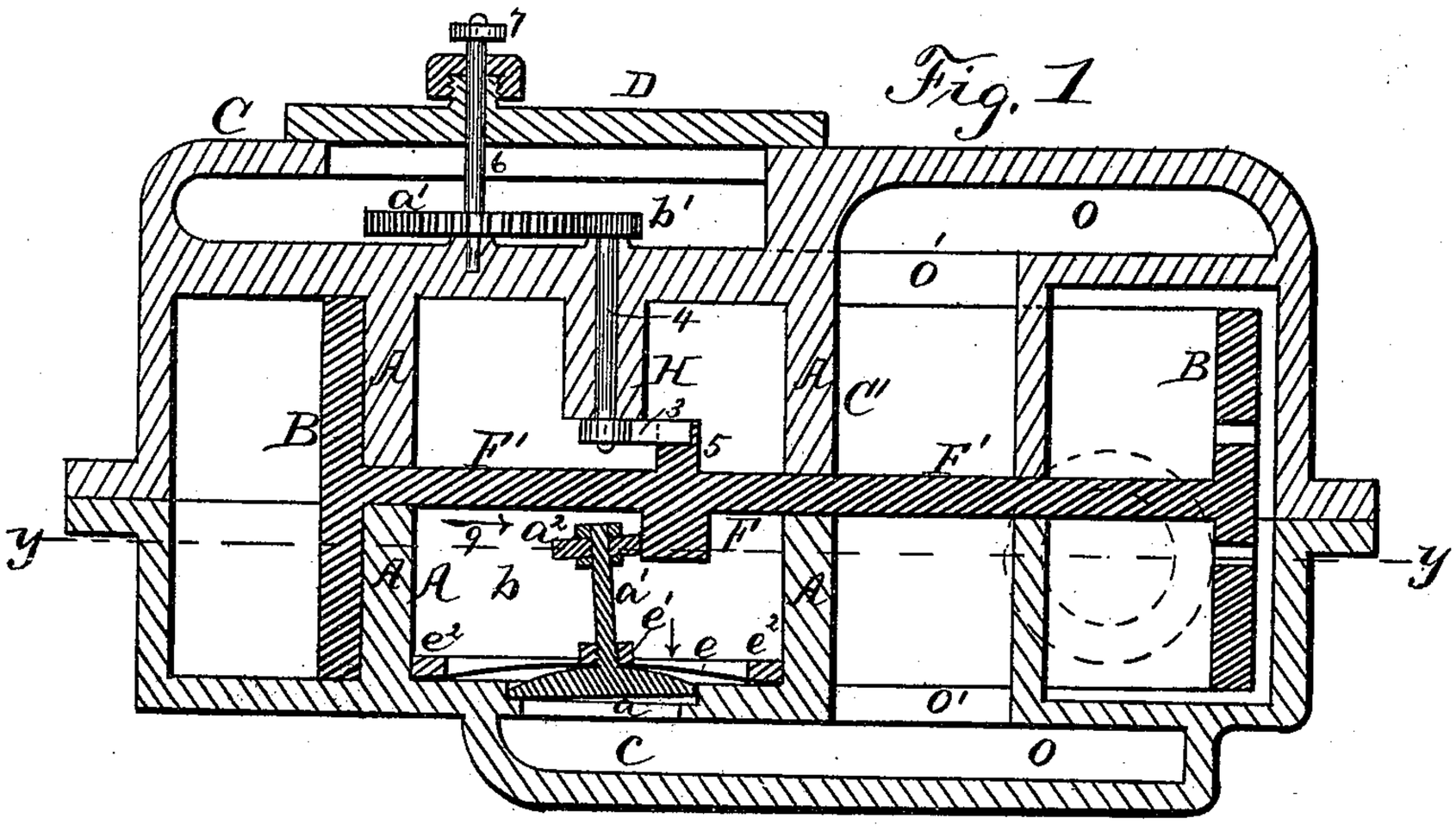
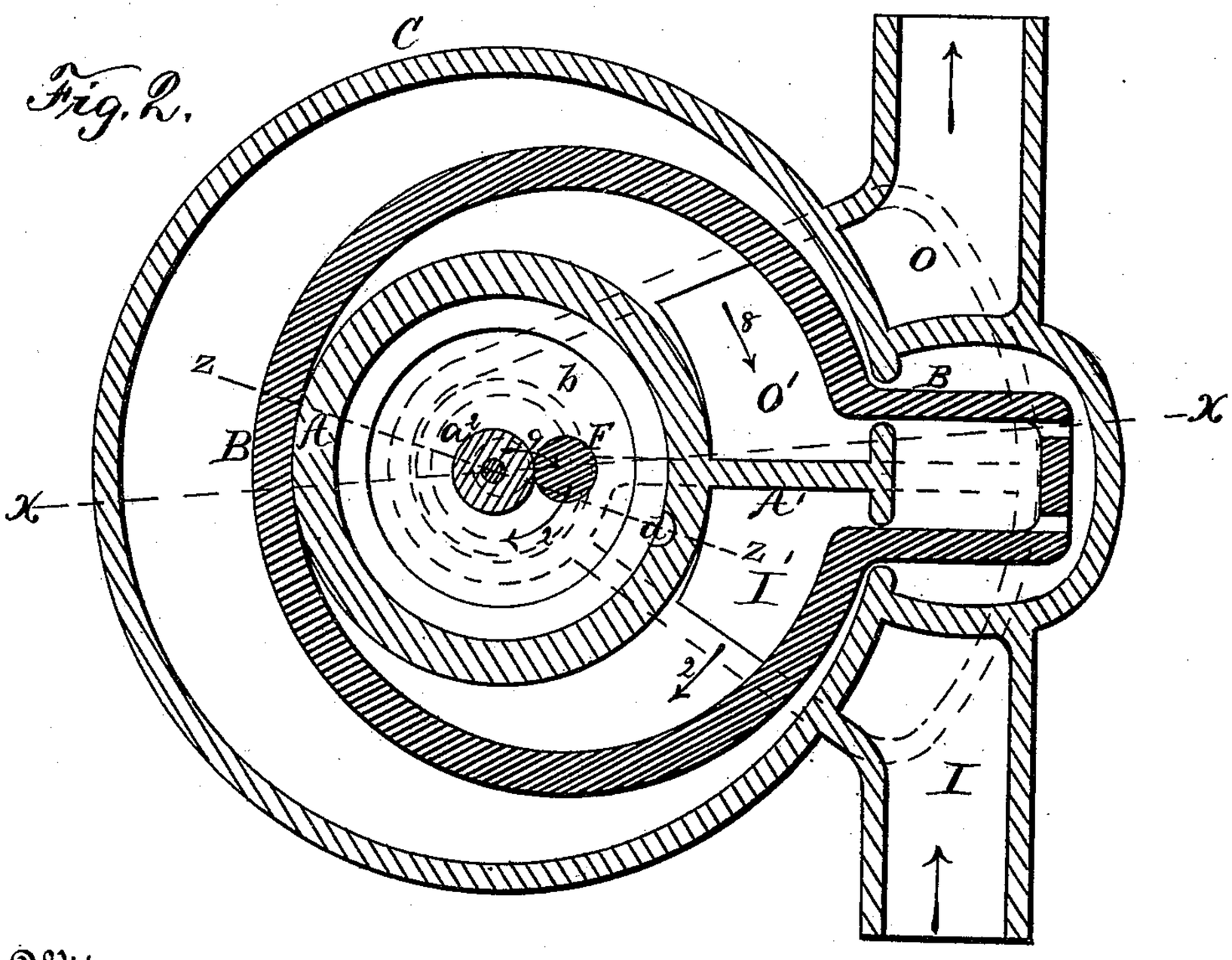


Fig. 2.



Witnesses

Ella S. Johnson.
E. W. B. Phillips

Inventor

Lewis Hallock Nash

By his Attorneys

Johnson & Johnson

(No Model.) 2 Sheets—Sheet 2.

L. H. NASH.

FLUID PRESSURE DEVICE FOR ROTARY METERS.

No. 449,820. Patented Apr. 7, 1891.

Fig. 4.

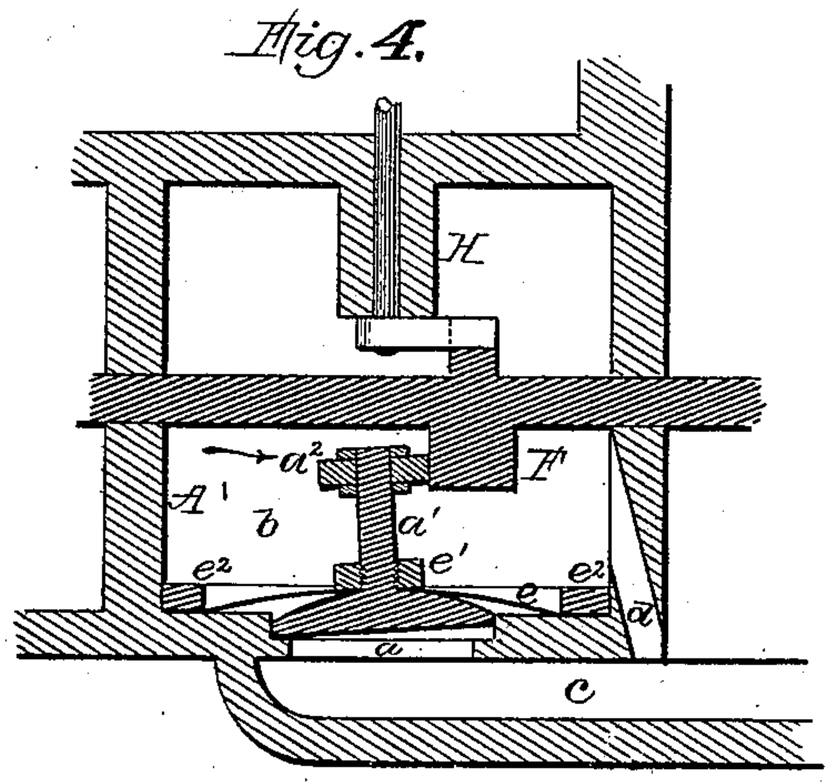
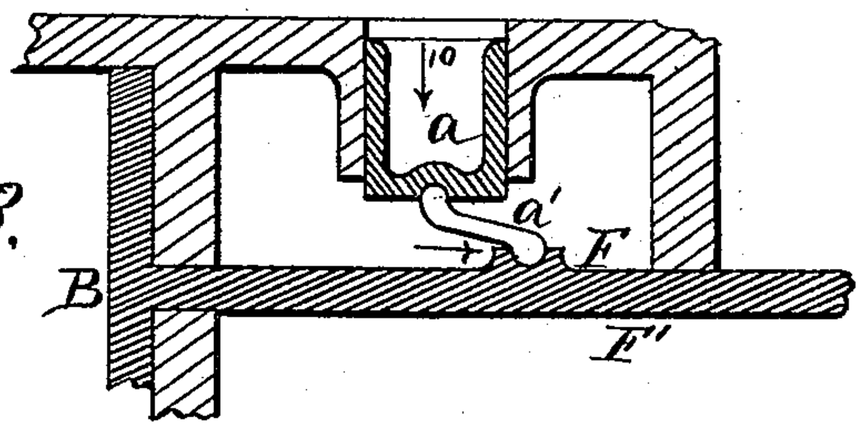


Fig. 3.



Witnesses

Ellen S. Johnson.
E. W. D. Phillips

Inventor

Lewis Hallock Nash

By his Attorneys

Johnson and Johnson

UNITED STATES PATENT OFFICE.

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

FLUID-PRESSURE DEVICE FOR ROTARY METERS.

SPECIFICATION forming part of Letters Patent No. 449,820, dated April 7, 1891.

Application filed June 30, 1887. Serial No. 242,973. (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 Fluid-Pressure Devices for Water-Meters, of which the following is a specification.

My invention, broadly stated, consists of a device for utilizing the water-pressure in a meter to perform various useful functions.

Among other useful objects attained by my present invention a water-pressure in one direction may be transferred or transformed into a working pressure in another direction, and the device which I prefer to employ in the practice of my invention consists of a moving part or piston which by the pressure of the water or other fluid is forced or is endowed with a tendency to move in a given direction or to assume a given position and another moving part which constantly or intermittently interferes with the freedom of said motion or tendency, thereby giving rise to a motion or a force which may be applied for various useful purposes—such, for instance, as controlling the movements of a water-meter piston, holding it in joint-forming contact with its case.

In the accompanying drawings I have illustrated some of the many forms in which my invention may be embodied, and in which—

Figure 1 represents a vertical section of a water-meter having my improvement, taken on the line *x* of Fig. 2, which represents a horizontal section taken on the line *y* of Fig. 1. Fig. 3 shows a modified construction of the fluid-pressure device. Fig. 4 represents so much of a vertical section of the meter as contains the pressure-operating device and shows the communication between its chamber and the inlet-passage, said section being taken on the line *z z* of Fig. 2.

In the practice of my invention I use a movable piston of any convenient shape, which is placed within the case so as to receive a water-pressure. The joint of this piston with the case may be secured or made by a flexible diaphragm or otherwise. This piston is suitably connected with that part of the meter against which it is desired to have the pressure act.

The following is a detail description of said drawings: The meter-case C has a central ring-formed abutment A, from which the radial abutment A′ extends to that side of the case having the inlet and the outlet ports for the water, but does not join the vertical wall of the case. The piston B entirely surrounds this abutment, works between the heads of the case, and has a web F′, which divides the ring-abutment and its radial-arm part into upper and lower chamber-spaces, of which the case-heads form the top and bottom, so that while the inner walls of the ring-piston form joint contact with the outer walls of the ring-abutment, the piston-web forms joint contact with the inner ends of said abutment, which for this purpose extends from the heads of the case inward to the piston-web, and thus divides the piston into top and bottom chambers, while the vertical ring-walls of the piston divide the case-chamber. The chambers of the piston and the chamber of the meter-case are thus divided into inflow and outflow measuring-spaces. The radial abutment divides the case-inlet port I′ from the outlet-port O′, and as each head of the case has these inlet and outlet ports the water will flow into the measuring-chambers of the piston and case through ports I′ in the top and bottom heads, on one side of the abutment and out of the measuring-chambers through ports O′ in the top and bottom heads on the other side of the abutment. The inlet-ports communicate with the inlet-passage I, and the outlet-ports communicate with the outlet-passage O. The pressure of the water entering the inlet-ports I′ causes the piston to revolve in the direction of the arrow 2, and the water escapes through the ports O′ in the direction of the arrow 8. This motion of the piston is communicated by a stud 5, centrally projecting from the upper side of the piston-web, to a crank-arm 3 and shaft 4, to the gear *b′*, which drives the gear *a′*, and the shaft 6, which passes through the stuffing-box and drives the gear 7, to which the dial mechanism is attached. The piston has a stud F on the un-

der side of its web coincident with the stud 5, which operates the registering device.

In Fig. 1 the piston B is the moving part of the meter to which my pressure device is applied, and this is for holding said piston in continuous joint-forming contact with its case and abutment walls. This pressure device is shown as a part of this meter in its adaptation for holding the piston in joint-forming contact with its walls, and for this purpose I have shown a piston *a*, which is arranged so as to constantly exert a pressure or force due to the pressure of the water in one direction upon the piston B in another direction. This pressure device is placed in an opening in the bottom wall of the abutment-chamber *b* to separate said chamber from the bottom case-chamber *c*, which latter is partially or entirely relieved of pressure on its underside, and which preferably communicates with the outlet-passage O. The piston-chamber *b* communicates with the inlet-passage I through an opening *d*, Fig. 2, preferably formed in the wall of the abutment. Referring to this communication, it will be seen in Fig. 4 that the opening *d* in the abutment-wall extends down through the bottom of the piston-chamber *b* and opens into the inlet-passage I by the bottom case-chamber *c*.

The piston *a* is circular and is seated upon a shouldered recess in the chamber-wall, so as to constantly bear thereon at one point. A diaphragm *e* is secured to the piston by a nut *e'* and to the case-wall surrounding the opening closed by the piston by a clamp-ring e^2, so as to form a joint for the piston between the two chambers and to cause the pressure in the chamber *b* to be exerted downward upon said piston. The diaphragm *e* may, however, be omitted and the joint sealed by the fit of the parts or by other suitable means. A stem *a'* projects from the piston within the chamber *b* and carries a roller a^2 at its upper free end, which bears against the stud F of the piston-web, and thus completes the relation of the pressure device with the case and with the case-dividing piston. The piston-stem roller is preferably made so large as to cant and hold the piston *a* over on one edge, as shown, in every position in the movement of the chamber-dividing ring-piston. Hence any vertical pressure in the chamber will tend to press the piston *a* down full upon its seat, and thus cause the roller a^2 to press against the stud F, as indicated by the arrow 9, radially outward, and thereby force the piston B against the bearing-surface of the meter. Whatever, therefore, be the position of the piston as the stud F revolves around the stem *a'*, the pressure will be radially outward, causing the piston to keep in contact with the case and abutment walls. This gives a perfectly yielding and accommodating action to the piston's motion, permitting it to pass readily over obstructions, taking up all wear and allowing the finishing work to be done on the meter with less care. If the roller a^2 be made small enough to permit the piston normally to be in an upright position, it will be brought into action only when the revolving piston meets and passes over obstructions.

The same results are obtained by the modified construction of the pressure device shown in Fig. 3, in which the piston *a* is of tubular form and is fitted in the case like a plunger, and is connected at its closed end with the piston-web by means of an inclined bearing-arm *a'*, which has a universal-joint bearing at each end, so that the downward pressure within and upon the piston *a* in the direction of the arrow 10 is transformed into an outward pressure of said arm upon the piston, giving it sidewise pressure to maintain the joint, as stated.

It will be understood that I do not limit my invention to the precise devices or combination of devices herein shown and described, since it is obvious that substantially the same objects may be attained by different means and that my invention as a fluid-pressure device may be applied to other uses than those herein shown and described.

It will be seen that in the water-meters illustrated in Figs. 1 and 2 the upper and lower measuring chambers separated by the web of the piston operate conjointly and that either will operate independent of the other. Hence the meter can be made with an upper or lower chamber only; also, since the web F divides chambers acting in the same way, it may have holes drilled through it to equalize the pressure on each side of said web.

It will be observed that the secondary piston, as illustrated in the drawings, has a water-pressure surface which divides the inflow from the outflow—that is to say, exposes one side to the pressure of the inflowing water and the other side to the pressure of the outflowing water. The advantage of this construction is that the pressure upon the secondary piston is increased as the flow of water through the meter is increased, because the difference between the heads of the inflow and outflow then becomes greater, and therefore said secondary piston exerts its greatest influence upon the revolving piston when it is most needed. If, however, it is desired to have a steady pressure exerted on the secondary piston, the chamber underneath the water-pressure surface may be connected with the outer air instead of the discharge-passage.

I claim as my invention—

1. In a water-meter, an inclosing case and a primary piston or moving part uncontrolled by any rigid mechanical connections, combined with a secondary part seated in an opening in said case and acted upon by water-pressure to force it into a given position and with means, substantially as described, for communicating said pressure to said primary piston.

2. The combination, in a water-meter, of a secondary piston acted upon by the pressure

of the water in the one direction, a revolving piston, and means, substantially as described, for transmitting said pressure to said revolving piston in a different direction, substantially as described.

3. The combination, in a water-meter, of a revolving piston and a secondary piston acted upon by the pressure of the water in one direction with means, substantially as described, for transmitting said pressure upon said revolving piston in a radial direction, substantially as described.

4. The combination, in a water-meter, of a revolving piston, and a secondary piston or plunger acted upon by the pressure of the water, and means for transmitting the pressure of said secondary piston to the revolving piston to preserve its joint-forming function, substantially as described.

5. In a water-meter, the combination of a revolving piston having a stud F with a secondary piston having a stem a', operating substantially as described.

6. In a water-meter, the combination, with the casing and a primary piston adapted to divide the measuring-chamber thereof, of a secondary piston seated in an opening in said casing communicating with the outflow, a flexible material forming a seal, and means for connecting said secondary piston with the primary piston within said casing, substantially as described.

7. The combination, with a water-meter case having inlet and outlet ports and fixed abutments and a primary piston B, having a diameter web, of a secondary piston arranged to receive the pressure of the inflowing water, a sealing-diaphragm for said secondary piston, and means for connecting the latter with the joint-forming piston, for the purpose stated.

8. The combination, in a water-meter, of a case having inlet and outlet ports and abutments, a primary piston operating between said abutments, having a diameter web provided with a central hub, and a secondary piston operated by the pressure of the inflowing water to exert an outward radial force against said joint-forming piston, substantially as described.

9. The combination, with a water-meter case having inlet and outlet ports and fixed abutments and a primary piston having a diameter web operating between said abutments, of a piston seated in the bottom of said case to receive the pressure of the inflowing water, having an upright stem bearing against a central part of said primary piston, and a diaphragm fixed to the case for sealing said piston-joint, substantially as described, for the purpose specified.

10. The combination, in a water-meter case having inlet and outlet ports divided by an abutment, as described, of a revolving non-rotating piston having a vertical central bearing-stud and a radial wall-projecting hollow arm inclosing said abutment, a pressure-controlling device for said piston, consisting of a piston seated in an opening in the case-wall, having a vertical stem provided with a bearing-roller co-operating with the said piston-stud to maintain said seated piston in a canted position, a sealing-diaphragm for the seat of the latter, and means, substantially such as described, whereby a water-pressure is maintained upon said sealing-diaphragm, for the purpose stated.

11. The meter-case having inlet and outlet ports, a central circular abutment having a radial extension dividing the inlet and outlet ports, and an opening d in the inner wall of the circular abutment communicating with the inlet-passage I, in combination with a revolving non-rotating piston having a diameter web coacting with said abutment to form a pressure-chamber supplied through said opening d within said abutment, and a pressure device consisting of a piston having a canted bearing relation with and upon said revolving piston and a sealed seat upon the wall of the case, whereby the water-pressure in the abutment-chamber is caused to act downward upon the sealed upper face of said piston, for the purpose stated.

12. In a water-meter, a circular piston seated upon a corresponding case-seat in a canted position, a joint-forming diaphragm, and means for connecting said piston to a moving part of the meter, whereby the water-pressure acts to cause said piston to close full upon its seat and said pressure is communicated to a moving part of the meter, substantially as described.

13. In a water-meter, the combination of a a revolving piston and a secondary piston operated upon by the pressure of the water to maintain the joint-forming function of said revolving piston, substantially as described.

14. In a water-meter, the combination of a revolving piston and a secondary piston acting upon said revolving piston, having a water-pressure surface exposed on one side to the pressure of the inflowing water and on the opposite side to the pressure of the outflowing water, substantially as described.

15. In a water-meter, the combination of a revolving piston, and a secondary piston operated upon by the pressure of the water to maintain the joint-forming function of said revolving piston, and a bearing-roller a^2, substantially as described.

16. In a water-meter, the combination, with the casing and a revolving piston adapted to divide the measuring-chamber thereof, of a secondary piston seated in an opening in said casing, operated upon by the pressure of the water to preserve the joint-forming function of said revolving piston, and means, substantially as described, for connecting said secondary piston with said revolving piston, substantially as described.

17. In a water-meter, an inclosing case and

a primary piston or moving part, combined with a secondary part seated in an opening in said case and acted upon by water-pressure to force it into a given position and with means, substantially as described, for communicating said pressure to said primary piston.

18. A meter-case having inlet and outlet ports, a circular abutment within said case, and a passage connecting the inlet-port with the interior of said abutment, in combination with a primary piston, and a secondary piston operated upon by the pressure of the water within said abutment to force it into a given position, and with means, substantially as described, for communicating said pressure to the primary piston.

19. In a water-meter, an inclosing case and a primary piston or moving part uncontrolled by any rigid mechanical connections, combined with a secondary part seated in an opening in said case and acted upon by water-pressure to force it into a given position and with means, substantially as described, for communicating said pressure to said primary piston.

LEWIS HALLOCK NASH.

Witnesses:
JNO. H. NORRIS,
PERCY MACCALLUM.