2 Sheets—Sheet 1.

M. STANNARD & J. R. REYNOLDS.

Piston Water Meter.

No. 202,127. Patented April 9, 1878.

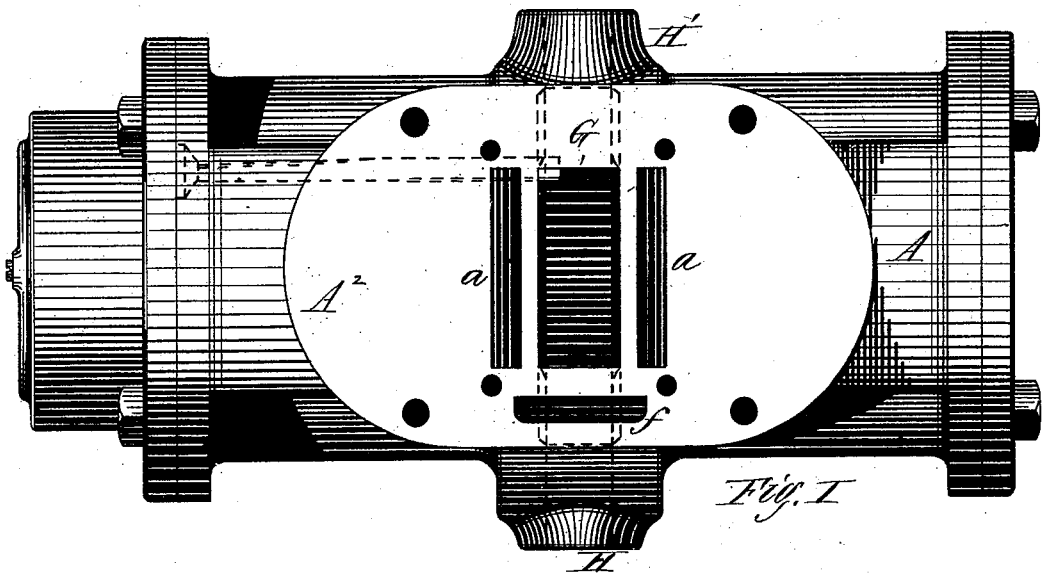

Fig. I

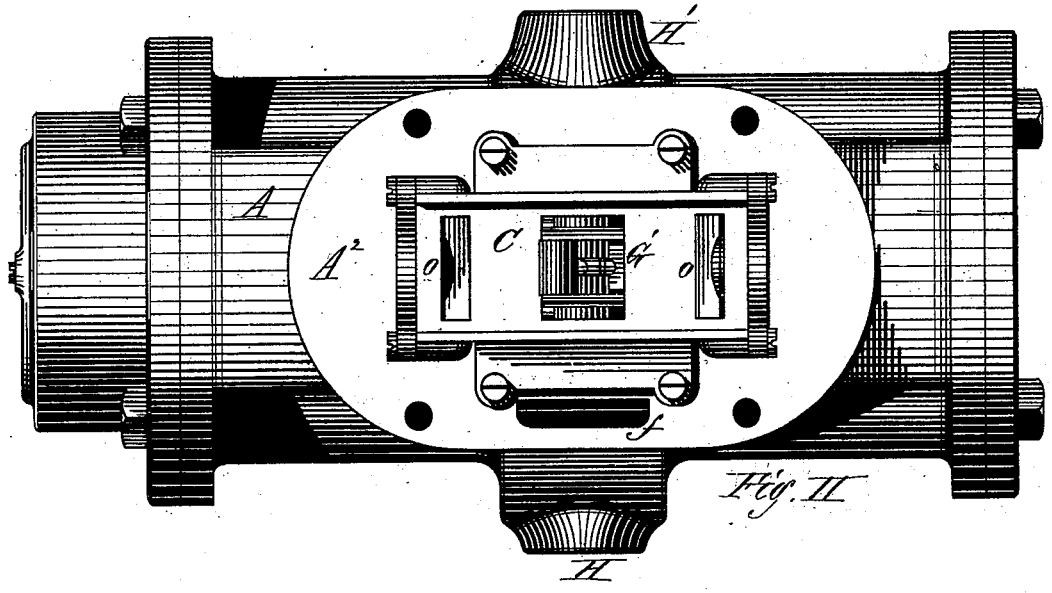

Fig. II

Witnesses,
Andrew G. Partridge.
C. Brockland.

Inventor,
Monroe Stannard
John R. Reynolds.
By T. A. Lewis.
their Atty.

2 Sheets—Sheet 2.

M. STANNARD & J. R. REYNOLDS.

Piston Water Meter.

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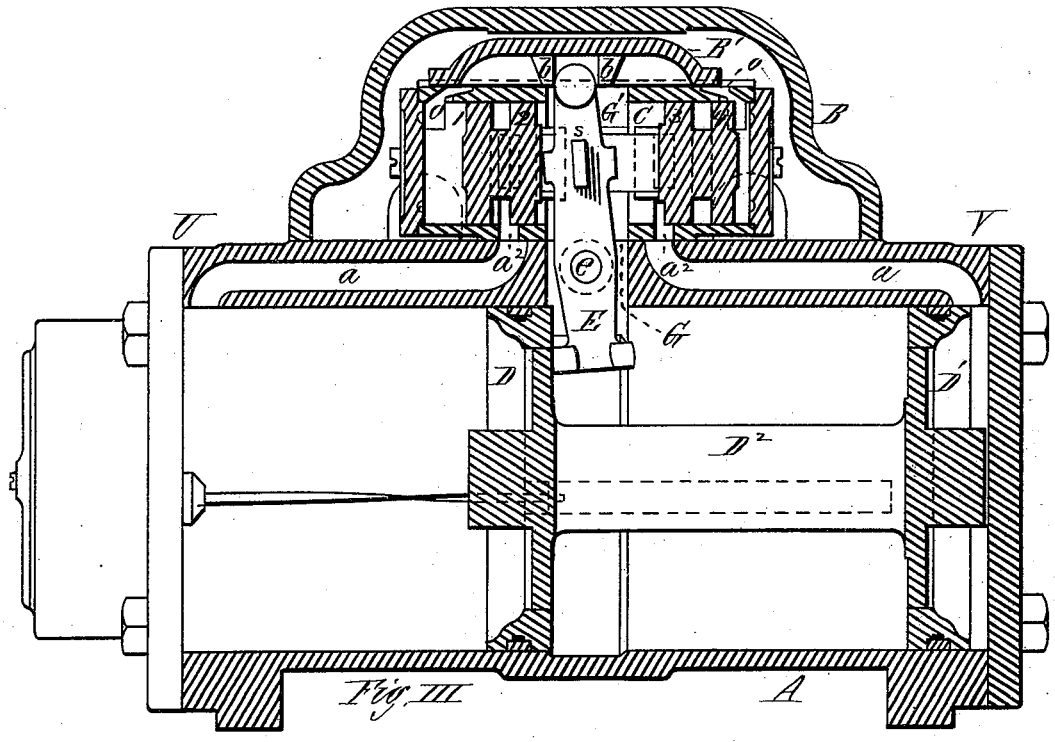

Fig. III

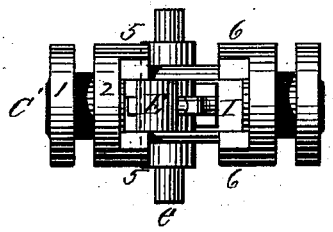

Fig. V

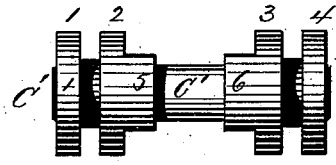

Fig. VI

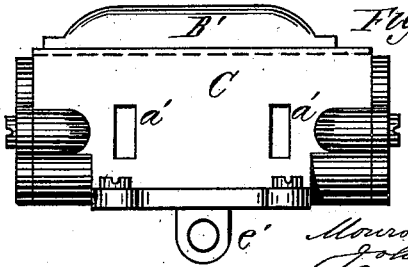

Fig. IV

Witnesses.
Andrew L. Partridge
C. E. Buckland.

Inventors.
Monroe Stannard
John R. Reynolds.
By T. Albertis
their Atty.

UNITED STATES PATENT OFFICE.

MONROE STANNARD AND JOHN R. REYNOLDS, OF HARTFORD, CONNECTICUT.

IMPROVEMENT IN PISTON WATER-METERS.

Specification forming part of Letters Patent No. **202,127**, dated April 9, 1878; application filed January 24, 1878.

To all whom it may concern:

Be it known that we, MONROE STANNARD and JOHN R. REYNOLDS, of Hartford, in the State of Connecticut, have invented a new and useful Improved Water-Meter; and that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, and to the letters of reference marked thereon.

Our invention relates to a machine for measuring water and other liquids, in which a chamber in the cylinder, holding any given quantity, is filled, and the liquid thereby measured and expelled therefrom by the action of a piston moving in the cylinder; and it consists of a double piston, having a recess or space between the heads, operating in a main cylinder, in connection with a slide-valve and a valve-case containing the main valve, placed within a chest connected with the main cylinder, with a lever pivoted to the valve-case, and extending down through the exhaust-port into the cavity in the double piston of the main cylinder, and connected at the upper end with the slide-valve, by means of which, together with the ports made in the main cylinder and valve-case, the said valves and piston are operated, all which will be more fully hereinafter described.

Figure I is a plan view of the main cylinder, with the chest and valve-case removed. Fig. II is a plan view of the same, with the chest removed, but with the valve-case and lever in place. Fig. III is a vertical longitudinal section through the chest, valve-case, and main valve, and the cylinder and piston. Fig. IV is a side view of the valve-case and the slide-valve. Fig. V is a plan view of the main valve, showing the position of the lever, which extends up through it. Fig. VI is a side view of the main valve.

In the drawings, A represents the cylinder, containing the double piston D^2 or (as we prefer for the purposes of description) the two pistons D and D^1, connected together by the part D^2, and with the ports *a* and the exhaust-port G made therein. The upper side of the cylinder is faced off at A^2 to a plane flat surface, where the ports *a*, together with the port *f*, extending up in the casting from the inlet H, open out. The valve-case C is bolted down to this flat surface A^2, with its ports a^2 corresponding in size and position with the ports *a*, and with an opening in its lower side corresponding with the exhaust-port G in the cylinder; and this case C, which may have one or both its ends bolted thereto and made removable, contains the main valve C′, having the disks 1 2 3 4, made to fit properly the interior of the case C. The disks 1 and 2 are made near one end of the valve, and the disks 3 and 4 near the other end, with an opening, I, made through the middle portion of the valve, and the latter is provided with the wings 5 and 6 on each side to close the inlet-ports a^1 in the case, as will be more fully hereinafter described.

The lower side of the case is provided with the ears *e′*, into which the lever E is pivoted; and the slide-valve B′ moves to and fro between suitable guides on top of the case C, said slide-valve being provided with lugs *b*, or any equivalent arrangement, so that the upper end of the lever E may readily engage with the slide-valve to move it.

The case C is provided with ports *o* at the top, near each end, and also with the side ports a^1 in one or both sides, and also with ports a^2, (shown in Fig. III,) and these ports a^1 and a^2 are in the same vertical plane as the opening of the ports *a*, (shown in Fig. I.)

The interior of the case C may be of any desired form in its cross-section, and the valve C′ is of such corresponding form as to fit closely the interior of the case, but to slide to and fro freely therein. The valve C′, which, in this case, is of cylindrical form in its cross-section, is provided with two disks, 1 and 2, at one end, and two others, 3 and 4, at the other end, with a space between the two at either end equal to the width of the port a^2 in the lower side of the case at either end, and the two inner disks 2 and 3 extend in toward the middle of the valve on both sides, forming the wings 5 and 6, of sufficient depth and width to completely cover the ports a^1 on the inside when the valve is moved to and fro for that purpose.

The case C is provided with ears *e′*, (shown in Fig. IV,) into which is pivoted a lever, E, which extends up through the opening I in the valve C′, and into the cavity or hollow of the slide-valve B′, and engages with the lugs *b* on the inside of said valve, or into a recess made

therein, so that the lever may move the said valve to and fro freely when in operation. It is evident that this lever may be pivoted either inside the case or in the upper side of the cylinder quite as well; but we prefer to pivot in the ears for convenience, as the lever may be removed with the valve, and it is simple in its construction. This lever E, when the case C is placed upon the flat surface A^2 of the cylinder and secured thereto, extends down into the cylinder, through the exhaust-port G, to a point between the pistons D and D^1; and in practice the lever should be made sufficiently small to permit the water to pass freely all around it in passing down through the exhaust-port, with guides *s* or other means for preventing the valve C′ from acquiring any rotary movement as it moves to and fro.

When all the parts are in place, the chest B is placed over the case C and slide-valve B′, and bolted to the faced part A^2 of the cylinder. The orifice of the outlet H′ opens directly into the cylinder, midway its length.

The operation of our invention is as follows: When the pistons D and D^1 are at the end of the cylinder marked U, and the lever E is in a position with its upper end tilted toward the end of the cylinder marked V, the slide-valve B′ covers the port *o* in the case nearest the end of the cylinder marked V, and the valve C′ is in a position in its case C with the wings 6, closing the ports a^1 in the corresponding end of the case, and the water which is admitted into the chest B through the inlet H and passage *f* passes into the case C through the inlet-ports a^1, between the disks 1 and 2 of the valve C′, and thence into the cylinder at the end marked U, through the ports a^2 and *a*, and forces the pistons toward the end of the cylinder marked V until the piston D reaches the lower end of the lever E and strikes it, moving its upper end, together with the slide-valve B′, with which it engages, over toward the end of the cylinder marked U.

As the lever is thus moved, its upper portion comes in contact with the end of the opening I in the valve C, and moves the latter also in the same direction until its end or the disk 4 is moved a little distance from the end of the case C, as shown clearly in Fig. III. At this point in the movement of the pistons, lever, and valve C′, the valve B′ has moved sufficiently to partially uncover the port *o* nearest the end of the cylinder marked V, and also to partially uncover the port *o* in the opposite end of the case, so that the water in the case C, behind the disk 1 of the valve, may pass up into the space under the valve B′, and thence down into the exhaust-space G′ in the case C. When the valves are in this position, as shown clearly in Fig. III, the live water in the chest B rushes into the end of the case C through the uncovered port *o*, communicating with the chest, and instantly forces the valve C′ to the opposite end of the case into a position with the disk 1 of the valve against the inside of the end of the case.

In this new position of the valve the wings 5 close the inlet-ports a^1, and the ports *a* in that end of the cylinder communicate, through the ports a^2 in the case, with the exhaust-space between the two inside disks 2 and 3 of the valve, while at the other end the port a^1 communicates with the port *a* in the cylinder through the space between the two disks 3 and 4. The live water in the chest B then enters the end V of the cylinder through the inlet-ports a^1 between the disks 3 and 4, and through the port *a*, forcing the pistons D and D^1 toward the end U of the cylinder. The water which has filled this end of the cylinder, and was thus measured, is now forced out through the ports *a* and a^2 at that end into the space between the two disks 2 and 3, down through the exhaust-port G, into the exhaust-space between the pistons D and D^1, and thence out through the outlet H′.

When the piston D^1 reaches the lever E, it strikes against its lower end, and, moving it, moves the valve B′ back again until the port *o* toward the end U of the cylinder is uncovered, to communicate with the chest B, and the port *o* at the other end is uncovered, to communicate with the inside of the slide-valve B′, when the live water in the chest rushes into the port *o* toward the end U of the cylinder and changes the valve C′, as before.

In this manner the ends U and V of the cylinder, which are made to hold any certain quantity of water when filled, are alternately filled and emptied, and the number of times this is done is counted upon a register connected either with the pistons D and D^1, or with the valve B′ in the chest, as may be most convenient and desirable.

The working parts of the machine may be made of metal that will not easily corrode, and the valve C′ may be made of hard rubber; or its axial portion may be made of metal, with hard-rubber disks secured thereon, as hard rubber is much lighter, and the valve may be made cheaper.

Having thus described our invention, we claim as new—

1. The valve-case C, provided with the inlet-ports a^1, the ports a^2 and *o*, the valve C′, the oscillating lever E, and the slide-valve B′, combined with a cylinder provided with ports *a* and a chest, B, and containing a double piston, D^2, to operate said lever and measure the water, substantially as described.

2. In a water-meter, in combination with the valve-case C, provided with ports a^1, a^2, and *o*, the valve C, made substantially as described, and the slide-valve B′, as a means of controlling the flow of water into the measuring-cylinder, substantially as set forth.

MONROE STANNARD.
JNO. R. REYNOLDS.

Witnesses:
H. E. BISSELL,
WALTER L. CHENEY.