A. Heaton.

Water Meter.

No. 88,709. Patented Apr. 6, 1869.

Fig. 1.

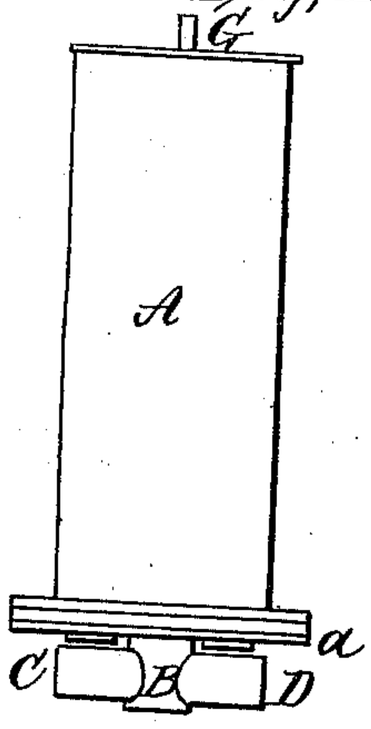


Fig. 2.

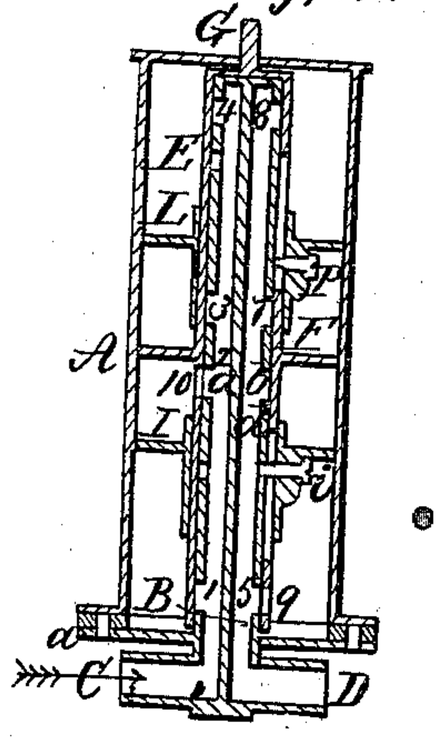


Fig. 3.

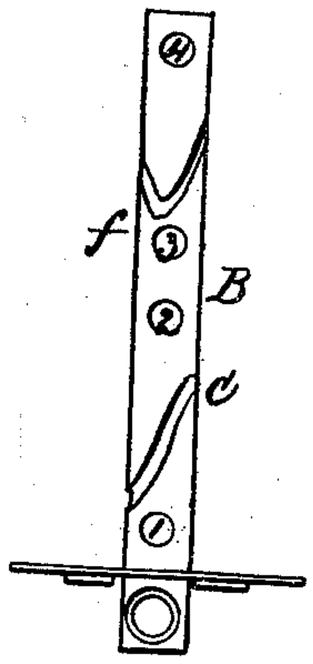
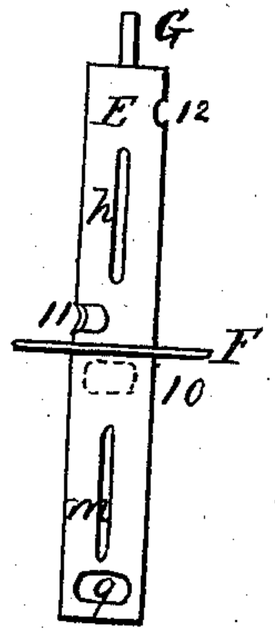


Fig. 4.



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ABRAM HEATON, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO HIMSELF, AND BRADBURY & GOODSELL, OF SAME PLACE.

Letters Patent No. 88,709, *dated April* 6, 1869.

IMPROVEMENT IN FLUID-METERS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ABRAM HEATON, of Bridgeport, in the county of Fairfield, and State of Connecticut, have invented a new Improvement in Water-Meters; and I do hereby declare the following, when taken in connection with the accompanying drawings, and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a side view;

Figure 2, a vertical central section;

Figure 3, a side view of the inner tube; and in

Figure 4, a side view of the outer tube.

This invention relates to an improvement in meters for measuring running-fluids, and consists in the arrangement, within a cylinder, of a fixed hollow shaft, receiving at its lower end the fluid, and divided longitudinally, so that the fluid passes up the hollow shaft, one side of the partition, down the other side, and out at the exit, the said hollow shaft being provided with an endless spiral groove, above and below its centre, extending around the tube, and a corresponding spiral groove above its centre, but located relatively at right angles to the groove below, and the said shaft having arranged over it another hollow shaft, the outer hollow shaft revolving freely upon the inner, and provided, at its centre, with a flange, which fills the cylinder at the centre, dividing it into two parts, one above and the other below the said flange; and upon the said shaft, above and below the said flange, is arranged a piston, having a pin extending through a longitudinal groove in the inner fixed shaft, and outlets and inlets arranged through the two shafts, so that the fluid, passing in below the lower piston, will cause the said piston to rise; and, through its connection with the spiral grooves in the inner shaft, will cause the outer shaft to revolve, so that when the lower piston has arrived to its full height, the connection of the inlet will be cut off from below, and opened above the piston, and between the piston and central flange.

At the same time, the openings through the shaft, below the piston, are brought into such relative position to each other as to permit the exit of the fluid, so that the inflowing fluid above the piston will force out the fluid below, and the space above the piston be filled by the inflowing fluid, until the piston returns to its lowest point, by means of the continuous groove upon the opposite side of the inner shaft. Then, the valves are again reversed, the inflowing fluid raising the piston, and the fluid before the piston forced out through the tubes, and so on. Also, in combining with a single piston, a second piston above, which operates, in like manner, in the spiral groove above the flange, so that the one tends to carry the other past the dead-centre in the grooves in the inner shaft.

In order to the clear understanding of my invention, I will fully describe the same, as illustrated in the accompanying drawings.

A is a cylinder, of any desirable size, in proportion to the amount of fluid to pass therethrough, fitted to a head, *a*, in which is fixed a shaft, B, the said shaft being divided longitudinally by a partition, *d*, (see fig. 2,) and with an inlet-pipe, C, and outlet-pipe, D, on the opposite side, the said inner shaft extending nearly up to the other end of the cylinder.

Upon the outer surface of the said inner shaft, I form a spiral groove, *c*, below the centre, and another, *f*, above, the said spiral groove being a continuous, endless groove around the cylinder; that is to say, returning, upon opposite sides, at the place of beginning.

The one groove, *f*, is arranged respective to the other groove, *c*, so that their extreme points are axially at right angles to each other, as seen in fig. 3; and over the said shaft B, I arrange an outer shaft, E, which fits closely the inner shaft, but yet so as to revolve freely thereon, and upon the said inner shaft I arrange a flange, F, so as to divide the cylinder A into two chambers, one above and the other below the said shaft E, and in the said shaft E, I cut a groove, *n*, above, and, *m*, below the flange F, each equal to the extent, and corresponding to the grooves *c* and *f*, on the inner shaft; and over the said shaft E, I arrange pistons, I and L, one above and the other below; and into the said pistons, passing through the respective groove in the outer shaft, and into the corresponding groove of the inner shaft, I arrange pins or studs, *i* and *p*, (see fig. 2,) the said pistons moving freely on the surface of the outer shaft, and filling the cylinder, yet so as to move freely therein.

It will, therefore, be seen, that when the lower piston is raised, its pin *i* will traverse vertically in the groove *m*, in the outer shaft, but, at the same time, will travel the spiral groove in the inner shaft, and thus cause the outer shaft to revolve until the piston has arrived to its fullest height in the groove *c*, then, returning upon the opposite side, will continue the revolution of the outer shaft in the same direction, and thus a constant movement, up and down, of the piston I will cause a constant revolution of the outer shaft. The piston L being arranged upon the groove *f*, which is at "quarters," will traverse corresponding to the groove *c*, in like manner as two cranks set at quarters, so that the power, acting upon one, aids the other in passing the dead-centre.

To thus operate automatically, openings, 1 2 3 4, are formed through the inlet side of the inner or fixed shaft, and corresponding openings, 5 6 7 8, upon the opposite side, and upon the outer shaft, below the flange, an opening, 9, is formed upon one side, corresponding to the lower openings, 1 and 5, of the inner shaft, and an opening, 10, upon the opposite side, cor-

responding to the openings 2 and 6, and above the flange, at "quarters" to the openings 9 and 10, are formed, first, an opening, 11, corresponding to the openings 3 and 7 of the inner shaft, and upon the opposite side, an opening, 12, corresponding to the openings 4 and 8 of the inner shaft. (See figs. 2 and 4.)

The operation is as follows:

The pistons being in position, denoted in fig. 2, the fluid, entering the tube C, passes up through the opening 2 of the inner shaft, and 10 of the outer shaft, which, at this point, correspond, so that the pressure of the fluid is brought to bear between the flange F and the piston I. Therefore, the piston I will descend, and in its descent turns the shaft E, until it has reached its lowest point, at which point the opening 2 of the inner shaft is closed, in consequence of the opening 10 in the other shaft having passed beyond the said opening 2. At this point, the opening 1 of the inner shaft is opened by the opening 9 of the outer shaft coming on to it, so that the fluid will be admitted below the piston, and, at the same time, the opening 10 of the outer shaft has reached the opposite opening 6 of the inner shaft. Consequently, the inflowing fluid below the piston will cause the piston to rise, and force the fluid, which first entered through the opening 6, to the outlet D, until the piston has risen to its fullest height. Then the opening 6 is closed, the opening 2 again opened to admit the fluid above the piston. At the same time, the opening 9 of the outer shaft below will have communicated with the opening 5 of the inner shaft, and the inflowing fluid above the piston will force the fluid below the piston out through the pipe D, and thus will continue to act, receiving and discharging the fluid alternately above and below, giving a constant revolution to the outer shaft, which extends up through the cylinder, as at G, so as to form means of attaching an indicator to denote the number of revolutions which the said shaft has made, consequently, denoting the quantity of fluid which has passed through the apparatus.

In order to avoid the stopping of the apparatus at the dead-centres, I add a second piston, L, above the flange F, which operates at "quarters," as before described, receiving and discharging the fluid through corresponding openings, in like manner as described for the piston below, thus insuring a constant and uninterrupted movement of the outer shaft.

A single piston may, however, be used, but in such case it would be better that a fly-wheel should be attached, as a means of aiding the revolution over the dead-centre. I prefer, however, and in practice it would be better, to employ the two pistons with the fixed flange between.

Having thus fully described my invention,

What I claim as new and useful, and desire to secure by Letters Patent, is—

The inner, fixed, divided shaft B, combined with the outer shaft E, arranged within the cylinder A, and combined with one or more pistons, and arranged with corresponding openings through the two shafts, so as to operate substantially in the manner herein set forth.

ABRAM HEATON.

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