G. B. Wiggin

Piston Meter.

No. 104,675. Patented June 21. 1870.

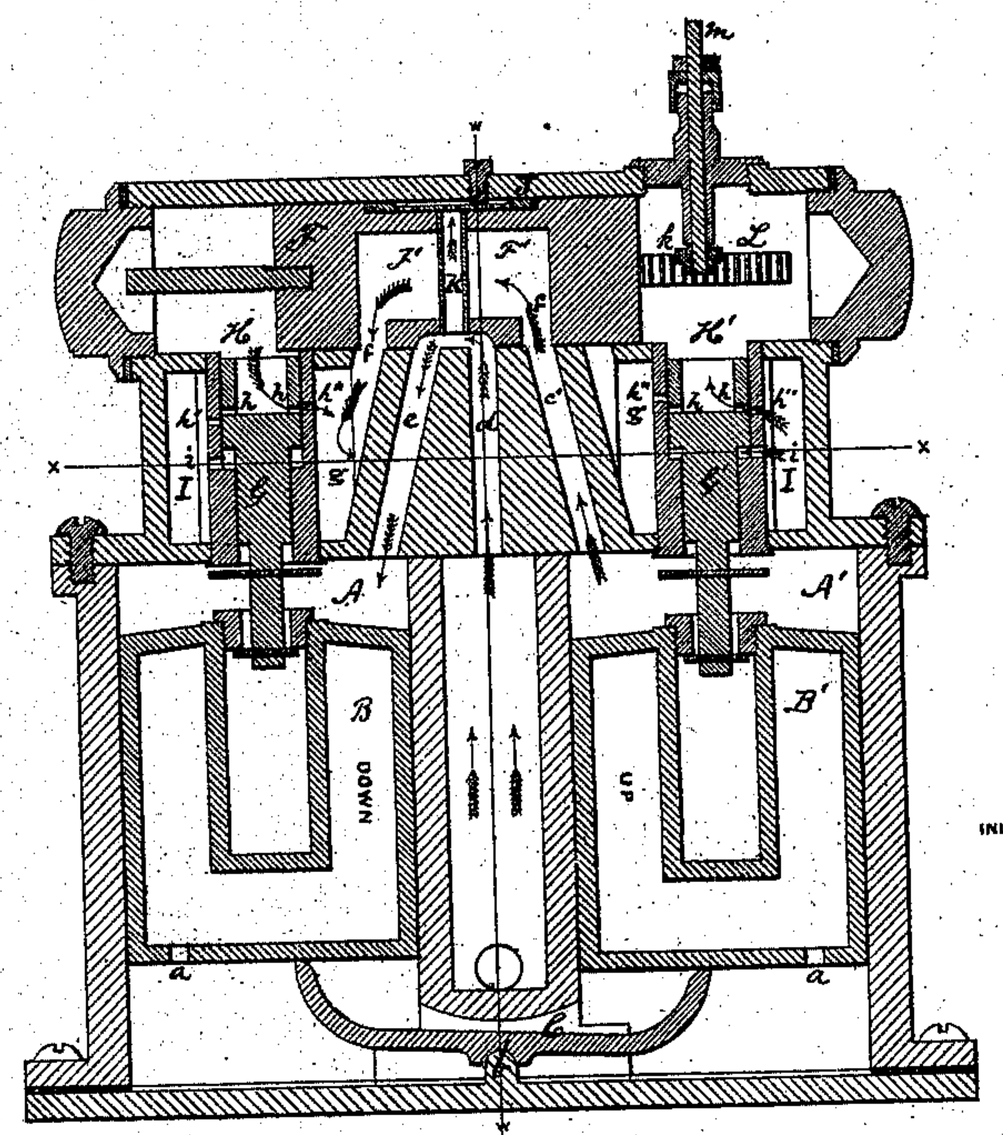

FIG. 1.

LONGITUDINAL VERTICAL SECTION ON PLANE YY.

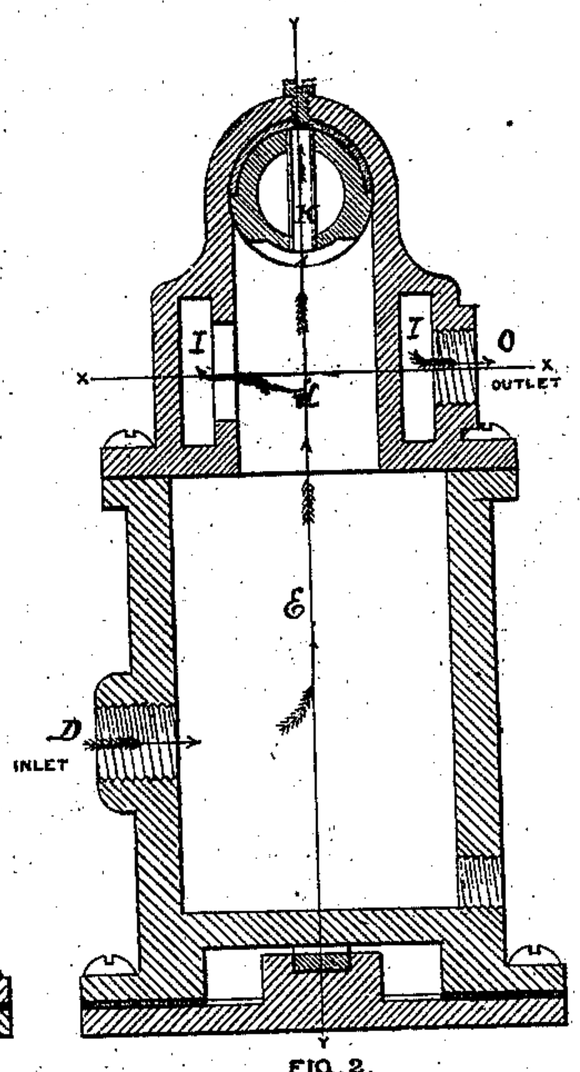

FIG. 2.

TRANSVERSE VERTICAL SECTION ON PLANE WW.

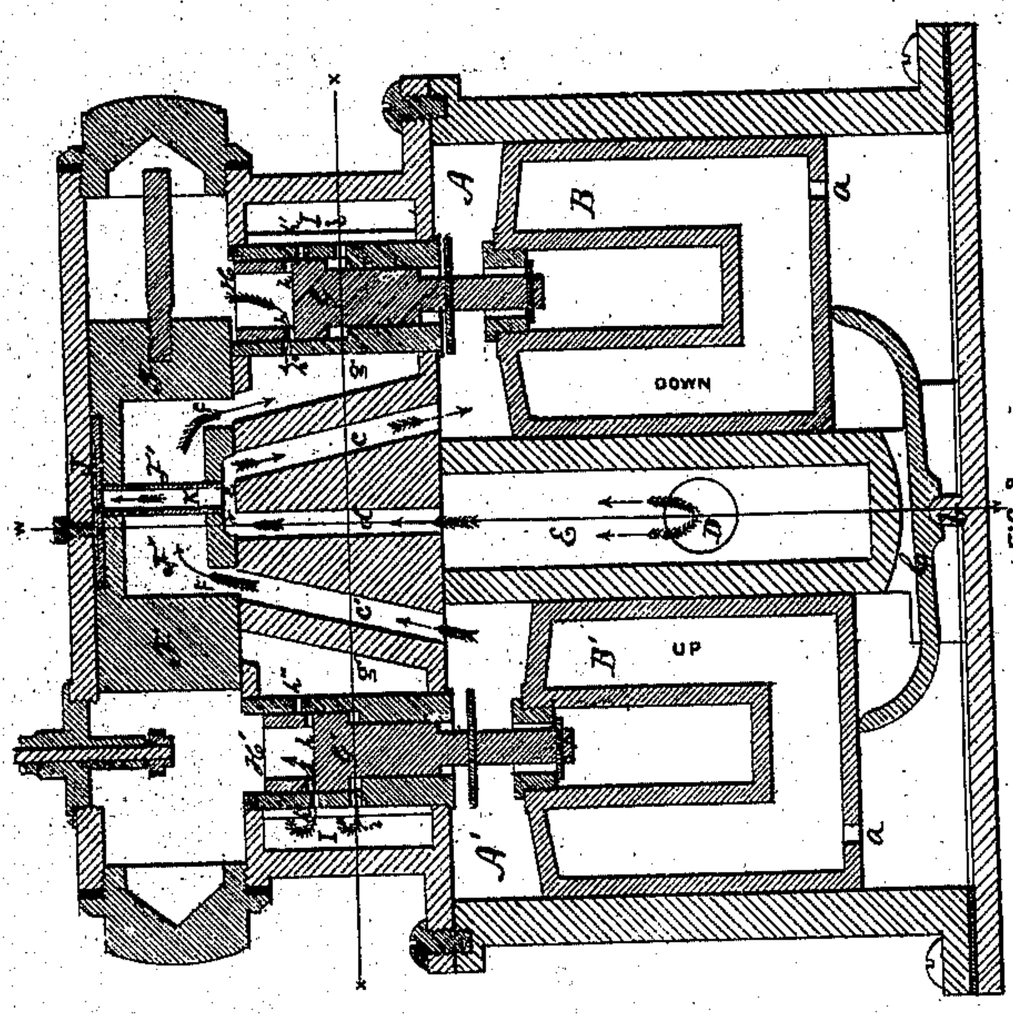

FIG. 3.

LONGITUDINAL VERTICAL SECTION ON PLANE YY.

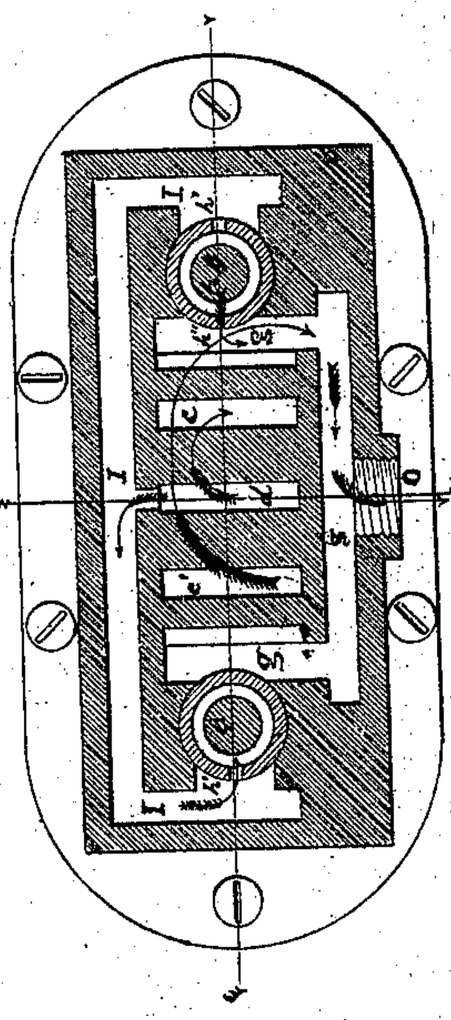

FIG. 4.

HORIZONTAL SECTION ON PLANE XX.

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Letters Patent No. 104,675, *dated June* 21, 1870.

IMPROVEMENT IN WATER-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, GEORGE B. WIGGIN, of South New Market, Rockingham county, in the State of New Hampshire, have invented a new and useful Improvement in Water-Meters; and I do hereby declare that the following specification, taken in connection with the drawing making a part of the same, is a full, clear, and exact description thereof.

Figures 1 and 3 are respectively longitudinal vertical sections, viewed from opposite points, upon the line *y y* of fig. 4.

Figure 2 is a transverse vertical section upon the plane *w w* of fig. 4.

Figure 4 is a horizontal section upon the plane *x x* of figs. 1 and 3.

The apparatus hereinafter described employs two pistons, acting as lifting buckets, which are respectively fitted to work in cylinders of exactly equal dimensions.

The pistons work in alternation, one being elevated when the other is depressed.

In combination with such lifting pistons and their cylinders, a piston-valve is arranged, controlling suitable induction and eduction passages connecting with the two cylinders, and which valve changes its relation to such passages with every stroke of the lifting-pistons, in consequence of the force of the water due to the pressure in the inlet-pipe being applied alternately upon opposite sides of the valve, such change in the application of the force of the water being induced by supplemental valves which are opened to shift the main valve cotemporaneously with the completion of the downward stroke of the lifting pistons.

The water from the inlet-pipe is discharged first into one cylinder and then into the other, over the top of the lifting-pistons, in uniform quantities, determined by the dimensions of the cylinders, and is afterward lifted by the ascent of the pistons and forced into the service-pipes through the main valve, whose alternating movement upon each change of stroke of the lifting-pistons, registers, through indicators, the quantity which passes through the apparatus, and which is uniform in amount for each stroke of the pistons.

A A′, in figs. 1 and 3, indicate two cylinders of equal dimensions.

B B′ are lifting-pistons fitted thereto.

No packing is required for the pistons beyond such as the water itself furnishes, the thickness of the piston being such that it is easier for the water introduced from the street-mains to move the pistons than to work its way between the surfaces of the pistons and their cylinders, even if the former are not fitted closely to the latter, and especially if the surfaces of the former are scored to allow of the formation of water-packing rings.

The pistons are cast hollow, with openings *a* in their bottoms, to form an air-space and diminish their weight.

A tilting-bar, C, with arms bent upward at their ends, and of equal length, is balanced upon a knife-edge fulcrum, *b*.

The ends of such bar bear constantly against the bottoms of the pistons, and it is apparent that as one piston is descending the other, through the influence of such tilting-bar, must be made to ascend.

The inlet-pipe from the street-main enters the apparatus at D.

The water is received from it into a chamber, E, located between the two cylinders, and which is put into connection with each cylinder alternately by the movement of the main valve hereafter to be described.

The arrangement of the passages to effect the alternate connection of the cylinders with the central chamber E is quite obvious from an inspection of the drawing, figs. 1 and 3, and is not unlike the arrangement of the ports in a steam-engine furnished with a D-slide valve.

c c′ are passages leading to the respective cylinders, with which the passage *d* is alternately put into connection, by means of the passage E cut in the under surface of the valve F, which is arranged to slide across the ends of the passages *c c′ d*.

The drawing shows the passage *c* as connected with *d*, and, consequently, the water from the street-main is rushing into the cylinder A, causing the piston B to descend.

When the valve F shifts, passages *c′* and *d* will be in connection, and the water will rush into cylinder A′.

F is a cylindrical piston-valve with an interior chamber, F′, having at each end ports, *f f*, which, by the movement of the valve, are respectively put alternately into connection with passages *c g* and *c′ g′*, to give an exit-passage for the water to the service-pipes of the building.

The piston-valve F is fitted to a suitable cylindrical seat in a well-understood way, but, in consequence of the water from the street-main being admitted to the apparatus through what was the machine, a steam-engine would correspond with the exhaust-passage, a contrivance is introduced for preventing the face of the valve from being pressed upward from the face of its seat, hereinafter to be described.

The main valve F is moved to and fro by the di-

rect action of the force of the water which is admitted upon opposite sides of the valve alternately by means of puppet-piston valves G G′.

Their location and loose sleeve-connection with the pistons B B′ is shown at figs. 1 and 3. They work in cylinders H H′, and have through their sides opposite orifices, *h*, which in one position of the valves coincide with similar orifices, *h′*, through the sides of the cylinder in which they work, and open a connection between the passage I, which leads into the central receiving chamber E, fig. 4, and the cylinder in which the piston-valve F works, and in another position the the opposite orifice *h* coincides with the orifice *h″* to form a connection with the passage *g*, through which the water-back of the valve upon each new stroke is exhausted.

The pistons B B′, in ascending, when near the end of their upward stroke, lift the valve G or G′, appertaining thereto, and bring the passages *h h″* into connection. At the same time the other piston which is descending drags downward the valve G or G′ pertaining to it, and brings the ports *h* and *h′* into connection, whereupon the water which is under pressure in the passage I rushes against the end of the valve F and shifts it. Thus, in figs. 1 and 3, as the lifting-piston B′ has commenced to ascend, the operation above described has taken place, and the valve F has just shifted to the position indicated in the drawing whereas, but an instant before, the passages *c′* and *d*, were in connection.

It will be noticed that passages *i* are cut through the valve-cylinders H, allowing the water in the passage I to strike the under face of the valves G G′ when the exhaust-passage *h h″* is open. This is to keep the valve G from being seated prematurely by the pressure of the exhaust-water passing out through *h h′*, the effect of which would be to open the injection *h h′* before the time for shifting the valve F.

Upon each upward stroke of the lifting-pistons B B′ the water in the cylinders is forced through the passages *c* or *c′*, as the case may be, through the interior chamber F′ in the valve F, and thence into the passage *g*, into which the exhaust-water displaced by the last change of the valve F has already been discharged. From the passage *g* the outlet (fig. 4) O leads to the service-pipes of the house.

For the purpose of preventing an excess of pressure upon the under face of the valve F, tending to lift it from its seat, a loose saddle, J, is placed upon the back of the valve and let into its surface, and a pipe, K, forms a connection between the opening *e* cut in the face of the valve and the under face of such saddle, whereby the valve F is balanced.

A rack-bar, L, working a suitable pinion, *k*, set upon the rod *m*, and connected therewith by a pawl and ratchet-gear, causes the train of the wheels whose primary is attached to the end of the rod *m* outside the case of the apparatus to move one space, as indicated, by a suitable finger and dial-plate for every full stroke of both pistons.

From the foregoing it will be understood that the apparatus constitutes an automatic machine which registers the quantity of water which passes through it, such quantity being under every variation of pressure in the street-pipes a constant one, and equal in bulk to the cubical contents of the water-space in the cylinders, plus the water displaced by the movements of the valve F.

The amount of friction in the working of the apparatus is very small, and from actual trial I have ascertained that the apparatus can be operated by a force which is the equivalent of a pressure of water within the inlet-pipe of less than pounds per square inch.

What I claim as my invention, and desire to secure by Letters Patent, is—

The improvement in water-meters which resides in the construction of the apparatus with alternating lifting-pistons B and B′, fitted to proper cylinders, provided with induction and eduction-passages *c c′*, which are alternately connected with the receiving-chamber E and with the passage *g* leading to the discharge-orifice by means of a main sliding-valve, F, whose movements are controlled by the supplemental valves G G′, the combination of alternating-pistons, main valve, and supplemental valves, being substantially as described.

GEORGE B. WIGGIN.

Witnesses:
ALBERT FIELD,
GEORGE W. SPEED.