116576 PATENTED JUL 4 1871

G. D. Emerson's Water Meter.

Fig. 1.

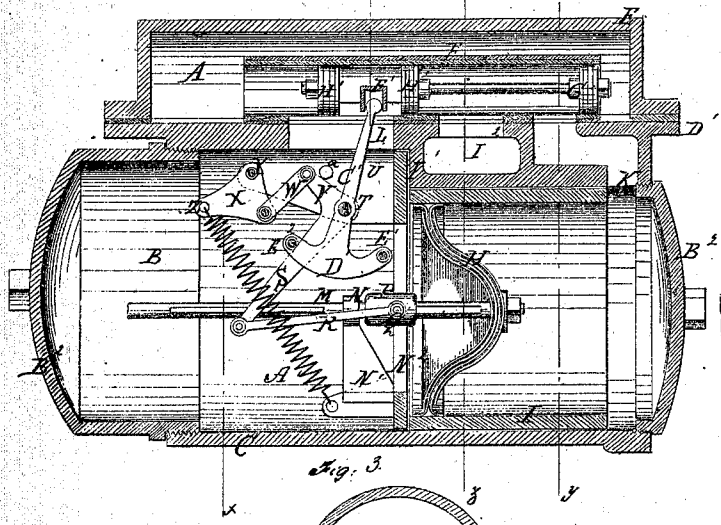


Fig. 2.

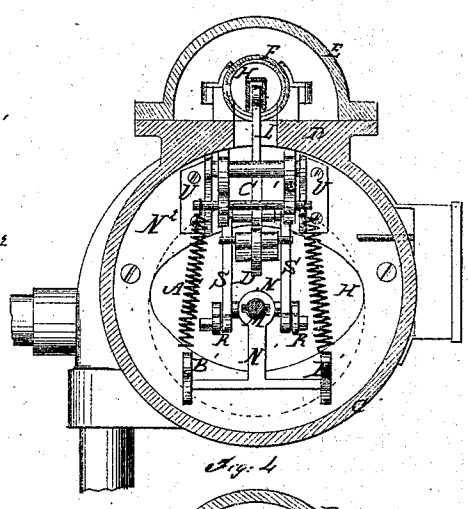


Fig. 3.

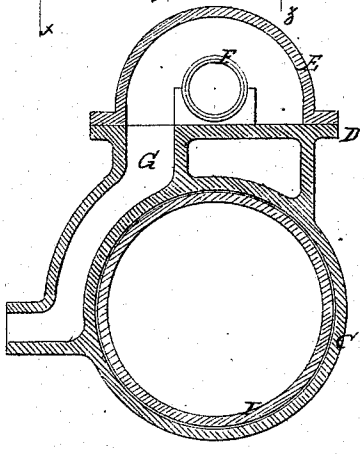


Fig. 4.

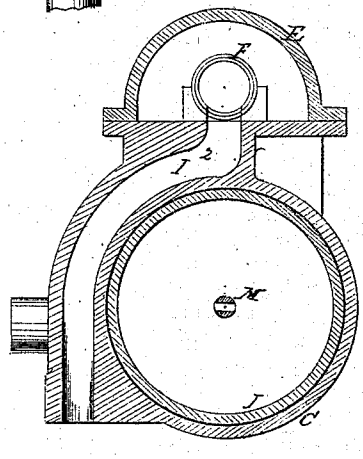
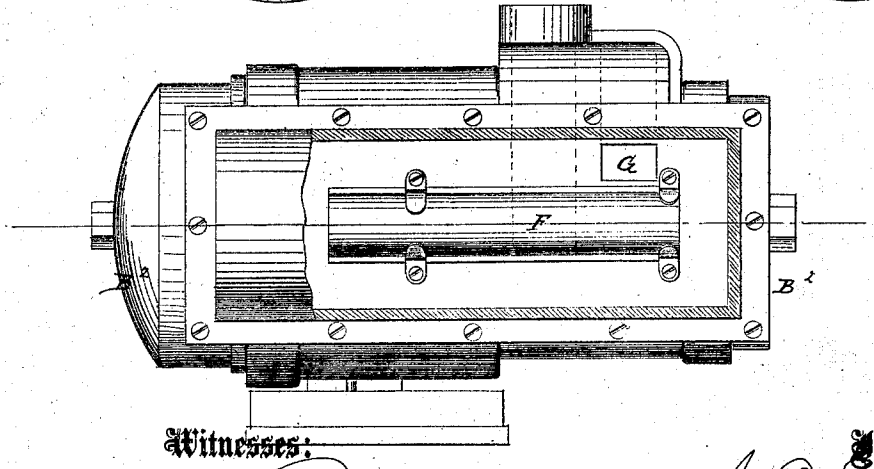


Fig. 5.



Witnesses:

Chas. Nida

G. S. Mabee

Inventor:

G. D. Emerson

PER Munn & Co

Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE D. EMERSON, OF CALUMET, MICHIGAN.

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. 116,576, dated July 4, 1871; antedated June 20, 1871.

To all whom it may concern:

Be it known that I, GEORGE D. EMERSON, of Calumet, in the county of Houghton and State of Michigan, have invented a new and useful Improvement in Water-Meter; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

This invention relates to improvements in water-meters; and it consists in a piston and balanced valve-meter divided into two chambers, one an inlet-chamber, the other a working-chamber, the latter being divided into two parts by the moving piston, and the valve motion being imparted from the working-chamber to the inlet-chamber containing the valve, through one of the ports, by an arm worked by springs in which the power for working the valve is stored up during the greater portion of the movement of the piston, but which are let free to actuate the valve just previous to the arrival of the piston at the end of the stroke, thereby utilizing all or nearly all the power of the water. The working of the piston by means of an arm passing through one of the ports avoids the necessity for the employment of any parts working through stuffing-boxes or other arrangements involving friction. The invention also consists in lining the cylinders with glass to reduce the friction, and to provide a true and smooth surface cheaper than it can be made in metal.

Figure 1 is a longitudinal sectional elevation of my improved water-meter. Fig. 2 is a transverse section of the same taken on the line *x x* of Fig. 1. Fig. 3 is a sectional elevation on the line *y y*. Fig. 4 is a section on the line *z z*, and Fig. 5 is a horizontal section through the inlet-chamber.

Similar letters of reference indicate corresponding parts.

A is the inlet-chamber, and B the working-chamber, which are preferably formed in a cylindrical casting, C, having a plane top, D, and an oval cap, E. The upper smaller chamber A contains a valve-cylinder, F, open at both ends to receive the water which enters the chamber at G. The lower cylinder, which is much larger than the other one, contains the piston H and the operating-gears, and is divided into two compartments by the said piston, which works in the short glass cylinder, I, introduced between the ports K and L, which cylinder is open at both ends and requires no stuffing-box for the piston-rod. The piston-rod M works through the guide N, supported by the bracket N^1 attached to the plate N^2 screwed up against the end of the part I^1 of the chamber B, which is made smaller than the other part. The piston-rod has a long slot, O, through it, near the piston. P is a collar fitted on the rod, and confined by a pin, Q, passing through the slot, which allows the collar to slide on the rod from end to end of the slot. This collar is connected by the rods K with the free ends of a pair of bell-cranks, S, pivoted at T to brackets U projecting from the plate N^2. The short arms V of said bell-cranks are connected by rods W with plates or bell-cranks X pivoted at Y, also to the brackets U, and connected at Z to spiral springs A′, which are connected at their other ends to the projections B^1 from the plate N^2. C′ is an arm pivoted on the stud T, and provided with a T-head, D′, having a pin, E^1, in one end and another, E^2, in the other, against which the bell-crank S is caused to strike, as will be presently described, to work the valve. The arm C′ rises up through the long port L and engages the stem F′ of the cylindrical valve working in the cylinder F, said valve having the piston G for the port K, and the double-piston H′ for the long port L. I^2 represents the exhaust-port. The ends of the cylindrical chamber B are closed by screw-caps B^2, and the oval top E for the chamber A is screwed down to plate D′. The part I^1 of the case C containing the piston-cylinder is made smaller than the other part, for providing space between the cylinder-wall and the outer case for the exhaust-port I^2 and the inlet-port K. The lune-shaped end of this part, next the valve-working gear, affords a convenient place for attaching the disk N—to which all the working parts except the two pistons are attached—for affording a ready means for removing the parts for repairs. *a* is a stop for arresting the movement of the bell-crank S when moving one way; for arresting it when moving the other way, provision is made for the arm to strike against the edge of plate N^2.

When the parts are in the position represented in the drawing, the water, being in the chamber A, will be admitted through the port L to the cham-

ber B, wherein it will bear against the piston A and force it to the right, in which direction it will move sufficiently to be fairly set in motion before the end of the slot O in the piston-rod comes against the pin Q of collar P, so that, having nothing to overcome except its own inertia and friction, the starting of the piston promptly may be insured. As the collar is set in motion by the continued motion of the piston, the bell-crank S will be drawn to the right, by which the springs A will be stretched out, the plates X being forced around on their pivots, by the moving of the arm I and link W, into a right line between the pivot T and the point of the connection of link W with the plate X. The parts are so adjusted that these devices will not be brought into the said right line until the piston has very nearly reached the end of the movement to the right, and during this time the power of the moving piston is being stored up in the springs by stretching them, to be spent in moving the valve suddenly at or about the end of the stroke of the piston, which is done by the springs acting on the levers S immediately after the arms V and links W pass below the right line, when the said arm is instantly thrown forward against the pin E^1 of the T-headed arm C′, carrying it to the right and the upper end to the left, also the valves with it, which will thus be shifted so that the port L will be closed to the openings from the chamber A and opened to the exhaust, and the port K will be opened to chamber A and closed to the exhaust. The piston then moving back again will cause the operations above described to be repeated in the reverse order, and so on, as long as the water is admitted to chamber A. The piston is concaved considerably on the side fronting the operating-gear, in order to make room for making the rods R as long as possible with the shortest case, for economizing space. This form of the piston gives more strength with the same amount of metal, and I am, therefore, enabled to make it lighter than if plain.

I propose to line both the piston and valve-cylinders with glass, as shown at I, by fitting tubes within them—said tubes being either formed in molds or ground true when otherwise formed—the glass being preferred for the rubbing surfaces of the cylinders, in consequence of being smoother than iron and working with less friction; also, because it does not corrode.

I am aware that cylinders have been wholly made of glass for steam-engines, pumps, and water-meters, and I do not claim making a piston-cylinder of glass; but, as the cylinders of water-meters if wholly made of glass would be objectionable on account of their liability to break, I propose to make use of the glass linings protected by the metal cases.

The counting or registering apparatus may be connected to any of the moving parts in any approved way.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination of the bell-cranks S, links W, plates X, and springs A′, T-headed lever C, rods R, and piston-rod for moving the lever C′, alternately in opposite directions.

2. The combination of the bell-cranks S, links W, plates X, springs A′, T-headed lever C′, rods R, and piston-rod for storing up the power in the springs and operating the said arm alternately in opposite directions, while the springs move in the same direction when imparting the movement to the said arm, substantially as described.

3. The attachment of the rods R to the piston by a sleeve, P, pin, and slot, for allowing the piston to be set in motion before encountering the resistance of the valve-operating gear, substantially as described.

4. The attachment of the described valve, operating-levers, and springs, to the meter-case, by means of the plate N^2, for moving the same, substantially as specified.

5. The meter-case, composed of the cylinder C, plate D, and oval top E, and having the ports K, L, and I^2, arranged all substantially as specified.

The above specification of my invention signed by me this 26th day of September, 1870.

GEORGE D. EMERSON.

Witnesses:
GEO. W. MABEE,
ALEX. F. ROBERTS.