(No Model.)

H. B. WHITTAKER.

PISTON WATER METER.

No. 336,678. Patented Feb. 23, 1886.

Fig. 1

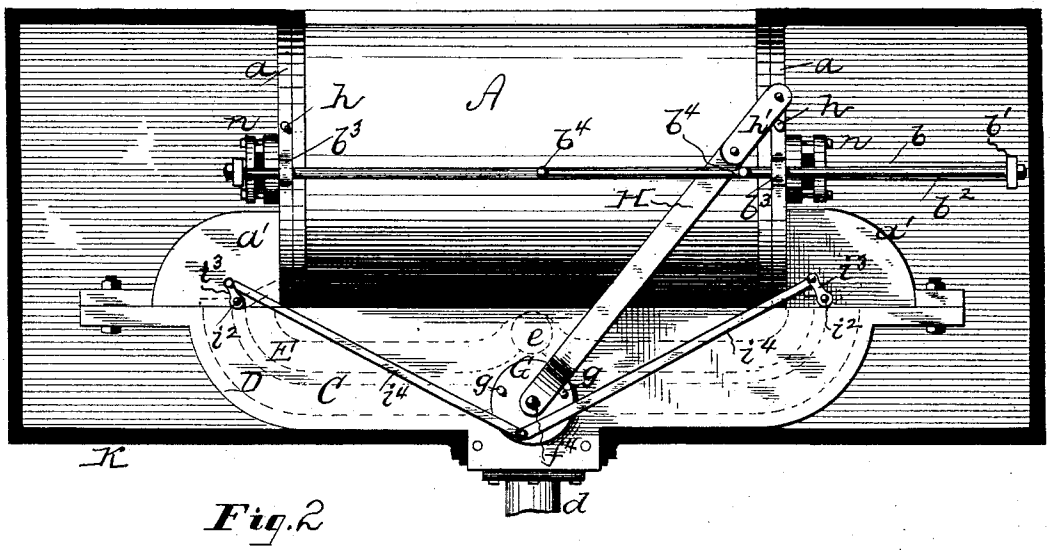


Fig. 2

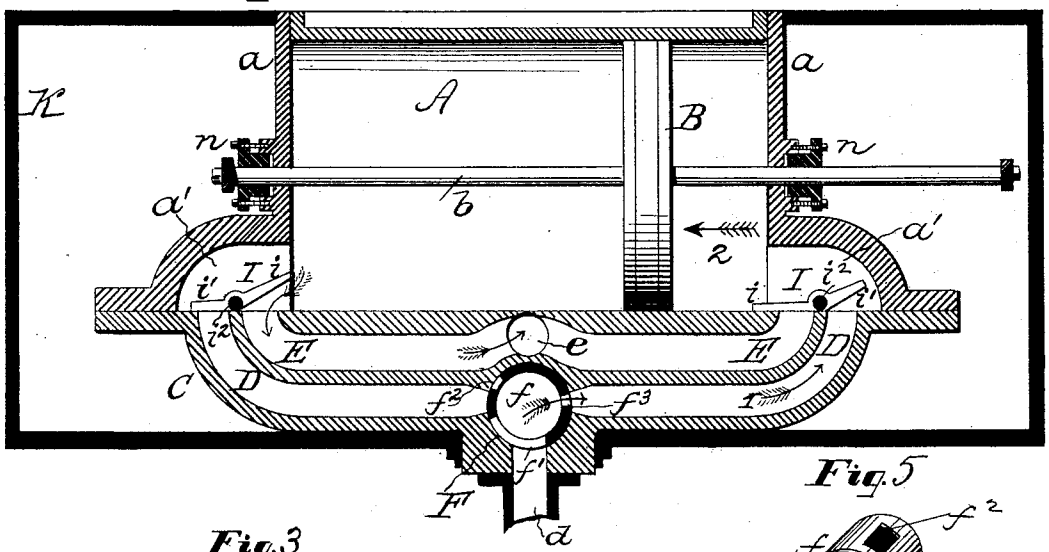


Fig. 3

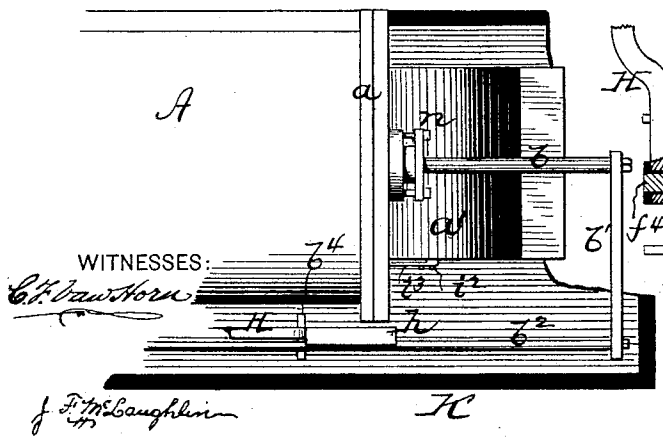


Fig. 5

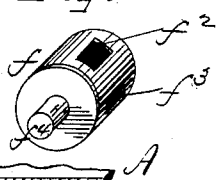
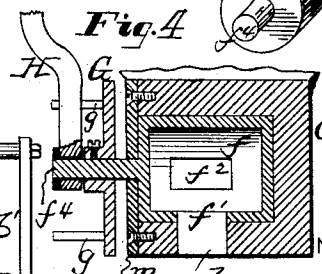


Fig. 4



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HENRY B. WHITTAKER, OF PHILADELPHIA, PENNSYLVANIA.

PISTON WATER-METER.

SPECIFICATION forming part of Letters Patent No. 336,678, dated February 23, 1886.

Application filed December 26, 1884. Serial No. 151,263. (No model.)

To all whom it may concern:

Be it known that I, HENRY B. WHITTAKER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Liquid-Meters, of which the following is a specification, reference being had therein to the accompanying drawings, wherein—

Figure 1 is a sectional elevation illustrating a water or liquid meter embodying my invention. Fig. 2 is a longitudinal vertical section, and Fig. 3 a broken sectional plan, of same. Fig. 4 is a transverse vertical section showing the oscillating valve in the inlet or supply pipe, and Fig. 5 is a detail perspective of said valve.

My invention has relation to water or liquid meters of the form comprising a cylinder having end ports, a reciprocating piston, and a valve in the inlet or supply pipe for controlling the admission of the liquid supply to either end of the cylinder; and it has for its object to so construct and arrange the working parts for operation that all back-pressure on the cylinder-piston is avoided, friction or packing pressure on the piston-rod materially reduced, and all the working parts placed in gear with and operated by the cylinder-piston whereby a simple, durable, and accurate meter is obtained.

My invention accordingly consists of the combination, construction, and arragement of parts as hereinafter described and claimed, having reference particularly, first, to a cylinder having at both its ends an inlet and an outlet port arranged in pairs, and also a valve for each pair of said ports, which valves are adapted to be positively moved at the end of each stroke of the cylinder-piston, to effect an alternate complete closing of one and opening of the other port of each pair of ports, whereby the simultaneous admission of the liquid-supply to both ends of the cylinder, and consequent back-pressure against its piston at the beginning of its stroke are avoided; second, to a cylinder having at both its ends a pair of ports, a valve common to the ports of a pair, an oscillating valve in its supply-pipe, and a reciprocating piston in gear with and operating all of said valves, whereby a simply-constructed and durable and accurately-operating meter is produced; third, to a water-tight casing for the cylinder and its operative parts, whereby stuffing-boxes for the cylinder-piston-rod, and other parts are dispensed with, and friction or packing pressure incident thereto is materially reduced, and, fourth, to a cylinder having a reciprocating piston, a pair of ports at each end, flap-valves for said ports, an oscillating valve in the supply-pipe, a link-connection between each flap-valve and the oscillating valve, and a lever attached to the latter, which lever is in gear with and operated by the cylinder-piston.

In the drawings, A represents a cylinder, of any desired construction, having a piston, B, the rod *b* of which passes through both cylinder-heads *a a*, as shown. Upon one side of cylinder A is an elongated chest, C, which is preferably formed integral with the cylinder; or both said parts may be separately made and secured together, or be otherwise provided for as desired. In chest C are formed the cylinder inlet and outlet ports D and E, respectively. These ports are arranged in pairs, and are preferably located outside of but adjacent to the ends of the cylinder, as shown, being inclosed or covered by recessed extensions or chambers *a'*, formed on the cylinder-heads *a* to receive valves for said ports, as hereinafter described.

The outlet-ports E E lead to a service or other outlet pipe, *e*, and the inlet-ports D D to a supply or inlet pipe, *d*. At the junction of the latter and the inlet-ports D is formed a valve seat or chamber, F, for the reception of, preferably, a tubular valve, *f*, which has a large side opening or way, *f'*, and two like smaller openings or ways, f^2 f^3, to provide a three-way valve for alternately cutting off the liquid-supply to one of the inlet-ports D and admitting it to the other of them at the end of every stroke of the piston. The valve *f* is held in place by a plate or cap, *m*, suitably secured to the chamber or casing F.

Any suitable valve having ways for effecting a change of direction of the fluid-supply to either of the inlet-ports D may be substituted for the tubular valve shown. Upon its stem f^4 is rigidly secured a plate or disk, G, having on its face, on opposite sides of its center or stem f^4, two projecting studs *g*, between which is located and against which alternately strikes

a lever, H, which is loosely mounted in any suitable way upon the stem f^4 of valve f for oscillating it, to effect the changes of direction of the inflow fluid to one or the other of inlet-ports D.

Each pair of ports is provided with a pivoted double or two-part flap-valve, I, the parts or leaves i i' of which are arranged at an angle to one another, as illustrated, so that when one part of a valve I is down upon or closes one port of a pair the other part of said valve is raised from or opens the remaining port of the pair; or, in other words, each flap-valve is common to both ports of a pair. These flap-valves I are suitably pivoted to or have bearings in the septum dividing the ports or in the walls of chambers a', and their shafts or pintles i^2 project through one side of said chambers, and are provided with winches or crank-arms i^3, which in turn are connected to disk G on valve-stem f^4 by means of links i^4, as more plainly shown in Fig. 1, whereby said flap-valves are placed in gear with and are moved by the oscillations of valve f whenever it is so moved by the lever H.

To the piston-rod b is secured, by means of end cross-bars, b', an outside parallel rod, b^2, having guides b^3 on the cylinder A; or said guides may be otherwise located as desired. Both said rods therefore move together. The rod b^2 has projecting studs b^4, located at suitable intervals along its length, which studs are in line with the upper end of lever H, so that as rod b^2 is reciprocated in unison with the cylinder-piston the studs b^4 alternately impinge against and oscillate lever H from side to side, and cause it to alternately strike the studs g g on disk G, to effect an oscillation of valve f, and in turn a movement of the flap-valves I for changing the direction of the flow of the liquid-supply to one or the other ends of the cylinder or to different sides of its piston for reciprocating the same.

If desired, stops or studs h may be secured to cylinder A or otherwise located for limiting the degree of oscillation of lever H and consequent movement of valve f, and the outer end of said lever may be weighted, as indicated at h', in order that its gravity may act to impart the necessary momentum to lever H, after it passes its center of oscillation, for insuring a positive and complete oscillation of valve f and movement of flap-valves I.

The collective operation of the foregoing described parts is obvious. The flow of water from pipe d passes first to one of the inlet-ports, D, or, as shown by arrow 1, to port D at the right of Fig. 2, the flap-valve I thereat being opened or raised for said port while its mate or outlet-port, E, is closed. At the opposite end of the cylinder the flap-valve I thereat then opens the outlet-port E and closes the inlet-port D, so that the inflow from the supply cannot gain a simultaneous admission to both ends of the cylinder; consequently as the piston is moved by the pressure of the inflow-water from port D to the right of Fig. 2 in the direction indicated by arrow 2 said piston is free from all back-pressure. As the piston so moves, lever H is oscillated in a corresponding direction by the impinging stud b^4 on rod b^2, to cause said lever to drop upon one of the studs g on disk G, oscillate valve f, and in turn move flap-valves I to positions respectively the reverse of those shown in Fig. 2. This reversal occurs at or near the end of the described stroke of the piston, at which time the direction of the flow of the supply is changed to the inlet-port D at the left of Fig. 2, which port is then opened and its mate or outlet-port E closed, while at the opposite end of cylinder A the inlet-port D is now closed and its mate or outlet-port E opened, to provide for the escape of water in the cylinder to outlet or service pipe e, and to effect the return-stroke of the piston by the liquid-pressure admitted to inlet-port D to the left of the cylinder, as above last described. As the piston makes its return-stroke, the lever H is reversely oscillated by rod b^2, to effect a movement of valves f and I to the positions shown in Fig. 2, and so on.

The volume of liquid passing through or to the cylinder at each stroke of its piston is measured or indicated on a dial or register. (Not shown, as it is common and well known and forms no part of my invention.) Such register is placed in gear with and operated by lever H or valve-stem f^4, or otherwise located, as desired.

To avoid the use of stuffing-boxes n for rod b, the cylinder and its operative parts are incased in a water-tight receptacle, K, as shown. By so doing the friction or packing pressure usually incident to rod b is materially reduced.

While I have shown and described a link and crank connection between flap-valves I and oscillating valve f, and a lever, H, and rod-connection b^2 between valve f and piston-rod b, yet I do not wish to be understood as limiting myself thereto, as it is obvious that other suitable constructions and arrangements of connecting or gear mechanism may be substituted without departing from the spirit of my invention. So, too, in case the valve f is dispensed with, a stud corresponding to valve-stem f^4, having mounted thereon the lever H and disk G, with its studs g and link-connections i^4, is swiveled to the casing or chest C, whereby said lever is oscillated to move valves I, as above described.

What I claim is—

1. A liquid-meter comprising a cylinder having a reciprocating piston, an inlet and an outlet port arranged in pairs at each end of the cylinders, valves common to both ports of a pair, and operating mechanism between said valves and piston, substantially as shown and described.

2. A liquid-meter comprising a cylinder having a reciprocating piston, an inlet and an

outlet port arranged in pairs at each end of the cylinder, the oulet-ports leading to a service-pipe, the inlet-ports to a supply-pipe, flap-valves I for said ports, which are in gear with and operated by said piston, substantially as shown and described.

3. A liquid-meter comprising a cylinder having a reciprocating piston, an inlet and an outlet port arranged in pairs at each end of the cylinder, valves common to both ports of a pair, and an oscillating lever in gear with said valves and piston, substantially as shown and described.

4. A liquid-meter comprising a cylinder having a reciprocating piston, a supply-pipe having an oscillating valve, inlet and outlet ports at each end of the cylinder, valves for said ports, and mechanism interposed between all of said valves and the cylinder-piston, substantially as shown and described.

5. A liquid-meter comprising a cylinder having a reciprocating piston, a supply-pipe provided with an oscillating valve, inlet and outlet ports at each end of the cylinder, valves for said ports, mechanism interposed between all of said valves and the cylinder-piston, and a water-tight casing, K, for said parts, substantially as shown and described.

6. The combination of cylinder A, having reciprocating piston B, and duplicate ports D and E, having flap-valves I in gear with and operated by said piston, substantially as shown and described.

7. The combination of cylinder A, having reciprocating piston B, duplicate ports D and E, a service-pipe for ports E, a supply-pipe for ports D, and valves I and *f* in gear with and operated by said piston, substantially as shown and described.

8. The combination of cylinder A, having reciprocating piston B, a supply-pipe having valve *f*, and duplicate ports D and E, having valves I in gear with valve *f*, which in turn is in gear with and operated by said piston, substantially as shown and described.

9. The cylinder A, having reciprocating piston B and duplicate ports D E, valves I for said ports, and cylinder-heads *a*, having chambers *a'* for said valves, substantially as shown and described.

10. In a liquid-meter, the supply-pipe *d*, having valve *f*, combined with a disk, G, having studs *g*, a lever, H, having weight *h'*, and rod b^2, connected to the piston-rod of the cylinder A, substantially as shown and described.

11. The combination of cylinder A, having reciprocating piston B, cylinder-heads *a*, having extensions or chambers *a'*, chest C, having ports D E, and pipes *e* and *d*, flap-valves I, and valve *f*, connected to the flap-valves and in gear with and operated by said piston, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY B. WHITTAKER.

Witnesses:
S. J. VAN STAVOREN,
JOHN RODGERS.