C. C. BARTON & J. B. WEST.

Piston Water-Meter.

No. 221,147. Patented Nov. 4, 1879.

Fig. 1.

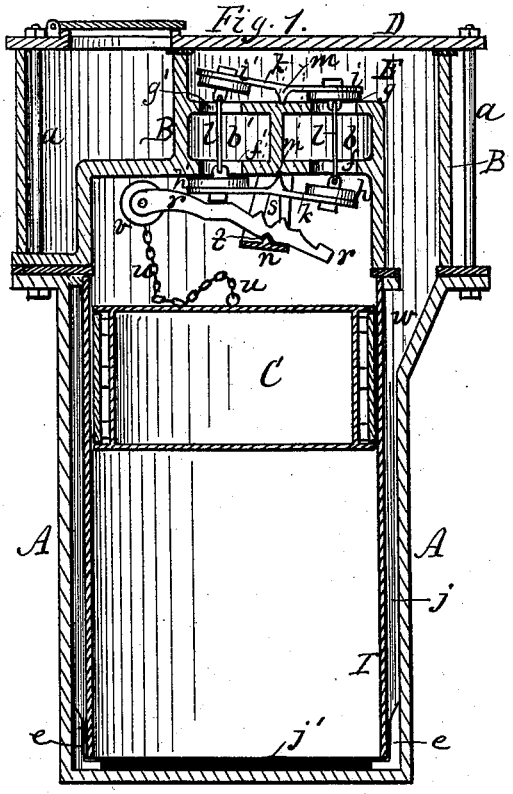


Fig. 2.

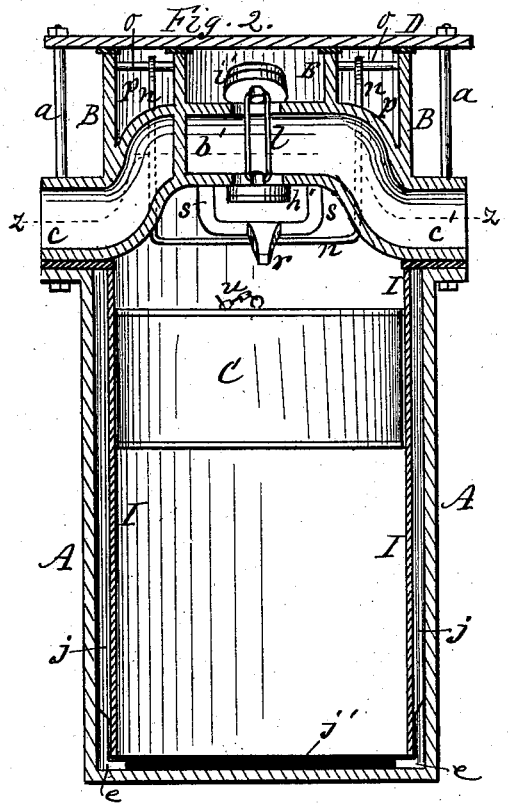


Fig. 3.

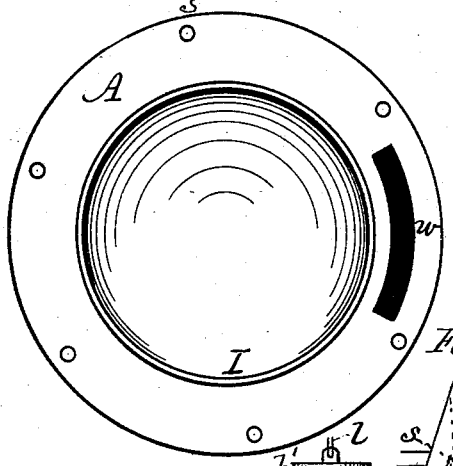


Fig. 4.

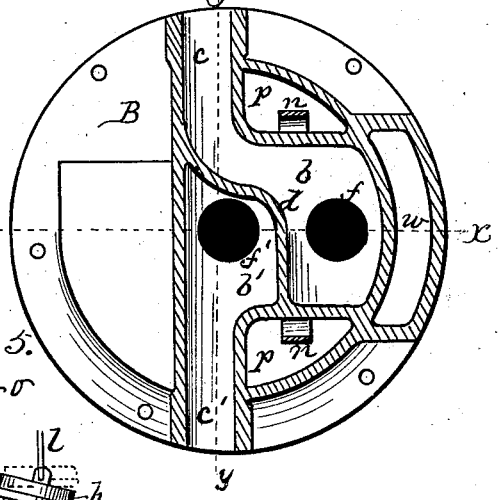
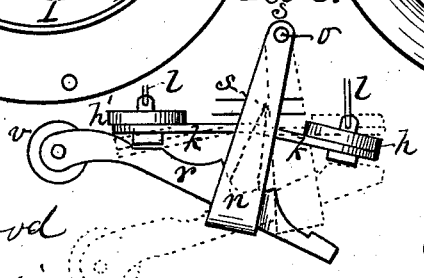


Fig. 5.



Attest.

R. F. Osgood

R. E. White

Inventors.

Charles C. Barton

Jonathan B. West.

UNITED STATES PATENT OFFICE.

CHARLES C. BARTON, OF ROCHESTER, AND JONATHAN B. WEST, OF GENESEO, NEW YORK.

IMPROVEMENT IN PISTON WATER-METERS.

Specification forming part of Letters Patent No. **221,147**, dated November 4, 1879; application filed September 17, 1878.

To all whom it may concern:

Be it known that we, CHARLES C. BARTON, of the city of Rochester, in the county of Monroe and State of New York, and JONATHAN B. WEST, of Geneseo, in the county of Livingston and State aforesaid, have invented a certain new and useful Improvement in Water-Meters; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a central vertical section in line *x x* of Fig. 4. Fig. 2 is a similar view in line *y y*. Fig. 3 is a plan of the lower half of the meter, showing more particularly the arrangement of the barrel in the case or cylinder. Fig. 4 is a horizontal section in line *z z* of Fig. 2. Fig. 5 is a diagram showing the spring arrangement for shifting the valves.

Our improvement relates to water-meters having a reciprocating piston, which at each stroke shifts the valves to change the currents of the water.

The improvements consist in the construction and arrangement of valves and spring for shifting them, as will be hereinafter fully described.

A represents the cylinder or case, forming the lower half of the apparatus. B is a casting, forming the upper half, and containing the water-chambers, the valves, and other operating parts, except the piston C, which works up and down in the cylinder. The whole is surmounted by a cap or cover, D, and secured together by bolts *a a*.

In the casting B are formed two chambers or compartments, *b b'*, with which communicate, respectively, the induction and eduction pipes *c c'*, as shown most clearly in Fig. 4. These compartments are separated by a vertical curved diaphragm, *d*. In the upper and lower faces of these compartments are made valve-openings *f f' g g'*, those in the lower face opening into the barrel I, and those in the upper face into a chamber, E, which is situated directly above the upper valves. These valve-openings are covered by four valves, *h h'* and *i i'*, arranged in pairs and attached to plates *k k*, so that each pair will cover two holes on opposite sides of the diaphragm *d*. The plates are bent at an angle, as shown, so that when one valve is closed over its opening its fellow is open, and the valves opposite each other vertically are connected by links or equivalent connections *l l*, and retain their parallelism at all times. In the center of each plate, and rigidly attached thereto, is a knife-edge, *m*, which rests in a groove upon the wall of the chamber, thus allowing the valves to move up and down alternately. The distance between the knife-edges *m m* must be less than the length of the links *l l*, and the plates *k k* must be elastic, or the links *l l* elastic in the direction of their length, and when so constructed the valves will rest firmly on their seats when closed in either direction, and also have a tendency to close from the center in either direction of their own action when the valve-plates pass the dead-point. *r* is a lever, having a knife-edge bearing, *s*, resting in grooves against the wall, which lever is held in place and operated by a spring, *n*, which is pivoted at *o o* in passages *p* in line with the center of the arc in which the lever travels and beyond the knife-edges.

The knife edge *s* is preferably made in the form of a loop, as shown in Fig. 2. To the outer end of the lever *r* is attached a chain, *u*, connected at the opposite end with the top of the piston C, and said end of the lever is also preferably provided with a roller, *v*, to take the friction of the piston as the latter rises against it.

I is a barrel, of brass or other non-corrosive metal, located longitudinally in the casing. It is of smaller diameter than the interior of the case, excepting a contraction at the top of the case, in which the barrel fits, so as to leave a clear water-passage, *j*, from the water-chamber E through throat *w* to the bottom of the case.

The water-passage *j*, extending all around between the barrel I and the case A, equalizes the water-pressure on the outside and inside of the barrel. It is also somewhat shorter than the case, leaving at the bottom one or more ports or passages, *j'*, leading from

the passage *j* to the interior of the barrel behind or below the piston. The upper end is packed or fitted to prevent the ingress or egress of water at that point, and to insure its cylindrical form. The lower end may rest upon and within right-angled lugs *e e*, which support and center it.

The operation is as follows: The water from induction-pipe *c*, entering compartment *b*, passes through the open valve *h* into the barrel I and forces the piston down by its pressure toward the bottom of the case. At the same time the dead water behind or below the piston passes out through ports *j'* into passage *j*, thence up into chamber E, thence into compartment *b'* through the open valve *i'*, when it finally escapes through the eduction-pipe. Just before the piston reaches the end of its stroke it draws upon the lever *r* through chain *u*, bringing said lever down and swinging the spring *n* on its pivots *o*, and when the spring has passed the dead-center it springs over into the opposite position, (indicated by the dotted lines in Fig. 5,) and lever *r* shifts the valves by opening those which were before closed, and closing those before open. This it does by striking on the under side of the valves. The water from induction-pipe *c* now passes through valve *i* into the water-chamber E, thence down through passage *j* and port *j'* into the barrel I beneath the piston, forcing the latter up, and when near the end of the stroke it strikes the end of the lever *r*, raising it again above the dead-point, when the spring *n* springs over, shifting the valves to their original position. The piston in rising forces the dead water above it out through valve *h'* into compartment *b'*, whence it escapes into the eduction-pipe.

We are aware that in pumps two valves have been connected by a jointed rod, so as to alternately cover and uncover two ports in opposition to each other. Our valves differ from such in having four valves connected in pairs, and also in the use of the knife-edged bearings *m m* and the bearing-plates *k k*, to which the valves are attached, being bent so that as one valve opens the other will be closed, each opposite pair being parallel. The spring *n* insures quick action when the dead-point is passed, so that the valves will be shifted so quickly that there will be comparatively no escape of waste-water in the act of shifting, which is an objection to the use of counter-weights.

We are also aware that in pumps and other water apparatus a lining of brass or other non-corrosive metal has been used inside the case or cylinder to prevent rust. The barrel I differs from such in being of smaller diameter than the interior of the case, and also of less length, in order to form the water-way *j* and port *j'*, as before described, being, in this respect, particularly adapted to a water-meter in which alternate currents of water are passed to actuate the piston.

The piston C is a cylinder, made as near the specific gravity of water as may be, preferably hollow, of sheet metal, water-tight, and covered on the periphery with a leather or equivalent packing lightly pressed out by springs. It thus forms a float which is self-buoyant, or nearly so, in the water. Thus constructed, it moves easily and with the same resistance whether moving up or down, and will remain in its position when the meter is at rest. The vertical position of the meter is preferable, although it may be used in any position. Any desired registering apparatus may be used.

Having thus described our invention, we claim—

1. The valve-plates *k*, connected by links *l* and provided with knife-edged bearings *m*, the distance between the said bearings being less than the length of the links, whereby the valve-plates will spring of their own accord as they pass the dead-center to carry the valves to their seats, substantially as shown and described.

2. The spring-connection *n*, attached upon pivots *o o*, so as to swing in the arc of a circle, in combination with a lever, *r*, provided with the knife-edged bearing *s s*, the spring-connection inclosing the lever and being connected therewith by the bearing-point *t*, as shown and described, and for the purpose specified.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

CHARLES C. BARTON.
JONATHAN B. WEST.

Witnesses:
R. F. OSGOOD,
LOUIS SPAHN.