2 Sheets--Sheet 1.

H. M. WILCOX.
Water-Meter.

No. 165,966. Patented July 27, 1875.

Fig. 1

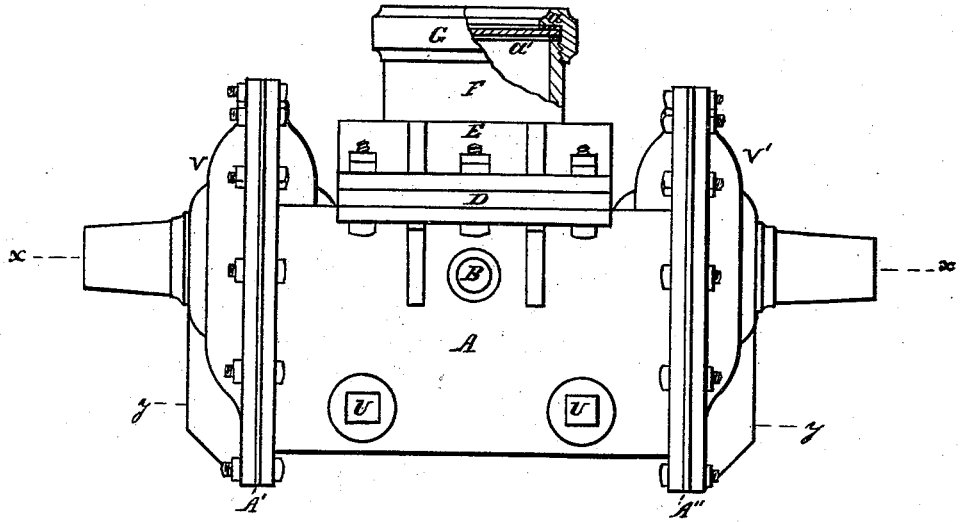
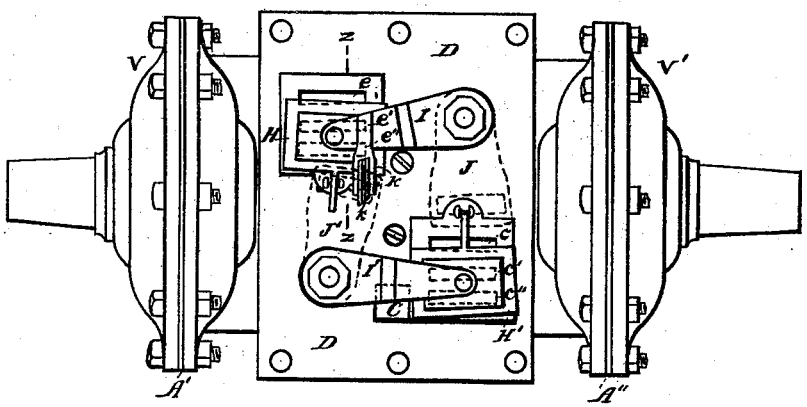


Fig. 2



WITNESSES.
F. F. Warner.
N. C. Ludley

INVENTOR.
Harlow M. Wilcox

2 Sheets--Sheet 2.

H. M. WILCOX.
Water-Meter.

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Fig. 3

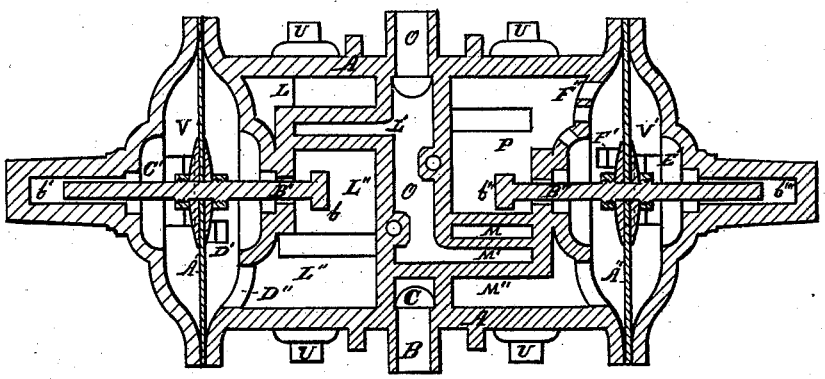


Fig. 4

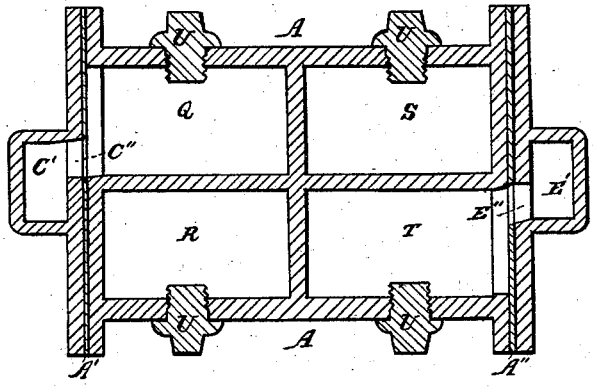
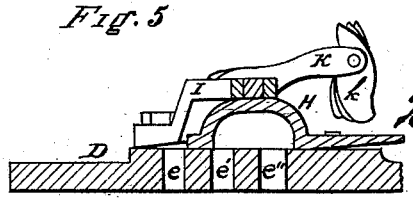


Fig. 5



WITNESSES.

F. F. Warner.

N. C. Gidley

INVENTOR.

Harlow. M. Wilcox

UNITED STATES PATENT OFFICE.

HARLOW M. WILCOX, OF CHICAGO, ILLINOIS, ASSIGNOR OF THREE-FIFTHS HIS RIGHT TO J. J. DELATOUR, E. W. GRAFTON, AND J. A. HALLOCK, OF SAME PLACE.

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. **165,966**, dated July 27, 1875; application filed April 6, 1875.

To all whom it may concern:

Be it known that I, HARLOW M. WILCOX, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Water-Meters, of which improvements the following is a full, clear, and exact description, which will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawing, forming a part hereof, and in which—

Figure 1 is a side elevation of my improved meter; Fig. 2, a top or plan view thereof when the walls of the valve-chamber are removed; Fig. 3, a horizontal section in the plane of the line *x x* of Fig. 1; Fig. 4, a like section in the plane of the line *y y*, and Fig. 5 a cross-section through one of the valves and its seat in the plane of the line *z z*.

Like letters of reference indicate like parts.

In the drawing, A A represent the side walls of the meter. B is an induction entering one of these walls. C is a passage-way or flue, into which the induction B passes, or in which it terminates, as shown in Fig. 3. D is a valve-plate arranged across the body of the meter, as represented in Sheet 1. The passage C continues through this plate, and enters the chamber above it. E is the valve-chamber. F is a cupola or dome opening into the chamber E. G is an annular cap, screw-threaded and run upon the upper end of the part F. On this cap is an inwardly-projecting flange, *a*, between which and the upper end of the wall of the dome is clamped a glass, *a'*, above and below which suitable packing is arranged, for the purpose of making water-tight joints, and to prevent the glass from being broken when firmly pressed by the cap. *e e' e''*, and *c*, *c'*, and *c''*, are ports in the plate D. H and H' are slide-valves, arranged to operate in connection with the ports above referred to, in the manner hereinafter described. The lower faces of these valves are concave, as represented in Fig. 5. I and I' are arms, which are pivoted at one end to the valves H and H', respectively, and the other ends of which are rigidly attached to pins passing freely through the plate D. J and J' are arms arranged below the plate D, and rigidly attached to the pins projecting from the arms I and I', respectively. The arms J and J' are slotted near their free ends, and arranged at an angle to the arms I and I', as represented by the dotted lines in Fig. 2. K is a small rigid arm projecting from the arm I. *k k* are small dogs or pawls of unequal length, suspended from the end of the arm K, and heaviest at their lower ends or heels. The chambers or channels next below the plate D are represented in Fig. 3. L is a channel, into which the port *e* opens. L' is a passage, into which the port *e'* opens; and L'' is a chamber, into which the port *e''* opens. M is a channel, into which the port *c* opens. M' is a passage, into which the port *c'* opens; and M'' is a passage, into which the port *c''* opens. O is an exit-way entered by the passage-ways L' and M'. P is a chamber lying next below the plate D. When the port *e* is open, the way L' and chamber L'' communicate with each other, for the reason that the valve H, being arched in the manner described, does not then lie on the wall, which separates them. The channel L and way L' communicate for a like reason when the port *e* is closed. The way M' also alternately communicates with the passage M'' and channel M during the play of the valve H'.

Fig. 4 represents the settling-chambers. The channel L has an opening in its bottom, and communicates with the chamber Q. The chamber L'' also has a port or opening in its bottom, which connects it with the settling-chamber R. The channel M and chamber P communicate in like manner with the settling-chambers T and S, respectively. U U are removable plugs entering the settling-chambers. V V' are double-concave chambers, between the walls of which are clamped the flexible diaphragms A' and A'', made preferably of rubber. B' B'' are spindles attached to the central part of the diaphragms A' A'', respectively. The inner end of the spindle B' passes freely through an opening in the chamber L'', and is provided with a lug, *b*, as shown. The outer end of this spindle plays freely in the recess *b'*. The inner end of the

spindle B″ enters the chamber P, and is provided with the lug *b*″. Its outer end plays freely in the recess *b*‴. The lug *b*″ projects into the slot in the arm J, and the lug *b* into the slot in the arm J′.

C′ is a channel, one mouth of which lies in the outer half of the chamber V, and the other of which enters the chamber Q, the latter mouth being represented at C″. D′ is an opening or port in the inner wall of the chamber V. This opening enters the chamber R. D″ is also a port in the inner wall of the chamber V, and is arranged to enter the chamber L″. E′ is a channel, one mouth of which lies in the outer half of the chamber V′, and the other of which enters the chamber T, as shown at E″. The passage M″ enters the inner half of the chamber V′. F′ is a port in the inner wall of the chamber V′, and is arranged to enter the chamber S. F″ is a port, through which the chamber P communicates with the inner half of the chamber V′.

The operation of the parts now described is as follows: The water enters the induction B under pressure, enters the passage C, and passes through the opening in the plate D into the chamber E. When the valves are in the position shown in Fig. 2 the water flows through the port *c*, into the channel M; thence into the chamber T; thence through the opening E″, into the channel E′, acting on the outside of the diaphragm A″, and pressing it against the inner wall of the measuring-chamber V′, filling the said chamber, and forcing the water from the inner half thereof out through the passage M″, over the bar between the said passage and the passage M′, out through the exit-way O. This movement of the diaphragm A″ carries the spindle B″ inward, and a little before this inward movement ceases the lug *b*″ reaches the end of the slot in the arm J, which is thus carried inwardly sufficiently to close the port *e* and open the port *e*″. The water now enters the port *e*″, and passes into the chamber L″; thence it enters settling-chamber R, and passes thence into the inner half of the measuring-chamber V, pushing out the diaphragm A′ against the outer wall of the said chamber, and forcing the water from the outer half of this chamber out through the channel C′ C″, into the chamber Q, from which it passes into the channel L, and thence over the bar between the said channel and the passage L′, into the latter, and then out through the exit O. Before the outward movement of the diaphragm A′ ceases the lug on the spindle B′ draws the arm J′ outwardly sufficiently to close the port *c* and open the port *c*″. The water now enters the latter port, passes into the channel M″, and thence into the inner half of the chamber V′, pushing back the diaphragm A″, and forcing the water from the outer half of that chamber out through the channel E′ E″, into chamber T; thence into passage M; thence through ports *c* and *c*′, into channel M′ and exit O. By this means the valve *e* is opened, the spindle B″ reversing the movement of the parts actuated by its lug. The water now enters the port *e*, passes into channel L, thence into the channel C′ C″, thus throwing the diaphragm A′ against the inner wall of its chamber, and forcing the water from the inner half thereof out through the chambers R and L″, through ports *e*″ and *e*′, into channel L′ and exit O, opening the port *c*, and continuing the operation now described as long as the water remains under pressure. While the arm I is moved back and forth in this manner the dogs *k k* engage the driving-ratchet of the registering mechanism, which may be arranged in the dome F. These dogs, by being of unequal length, prevent lost motion, and, by being counterweighted or heaviest at their heels, always lie in a proper position to engage the notches of the ratchet.

It will be perceived that the spindles B′ and B″ are not packed, packing being rendered unnecessary for the reason that they play in chambers designedly opening into the measuring-chambers, from which the spindles receive their impulse, respectively, and the water, escaping around the spindles, can only pass out with the bulk of the water, and is thus measured. The recesses *b*′ and *b*‴, it will be observed, are considerably larger than the spindles which play in them, and the action of the spindles is thus prevented from being impeded by a pressure of water in the recesses.

It will also be perceived that the diaphragms A′ and A″ can only be distended to a limited degree in each direction, their movement being controlled by the concave walls on each side of them. The movement is thus rendered positive and definite. The meter is not only accurate, but not liable to get out of order.

The sand or other sediment is washed into the settling-chambers, and may be removed by withdrawing the plugs U U. The chamber S is not essential, but preferable, and the chamber P is only preferable for the purpose of rendering it unnecessary to pack the spindle B″.

I make no special claim to many of the parts herein shown and described, and I am aware that double-concave measuring-chambers have heretofore been employed in connection with the valve-actuating mechanism of a water-meter. I am also aware that the dome has been covered and rendered water-tight, substantially as herein described; but,

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

1. The combination of the pair of double-concave measuring-chambers V V′, flexible diaphragms A′ A″, spindles B′ B″, arms J J′, arms I I′, arched slide-valves H H′, and ports *e e*′ *e*″ and *c c*′ *c*″, all arranged and operating together in connection with each other and the passages or water-channels of a water-meter, substantially as shown and described, and for the purposes set forth.

2. The settling-chambers having removable plugs therein, and arranged in the bottom of the meter, in combination with the pair of double-concave measuring-chambers V V′ and the water-channels of a water-meter, for the purpose of thereby keeping the said chambers and channels clean by collecting the sediment carried in by the water, and admitting of its discharge by removing the plugs for that purpose, substantially as described.

3. The independent counterweighted dogs or pawls *k k*, of unequal length, pivoted to the valve-actuating mechanism of a water-meter, substantially as and for the purposes specified.

HARLOW M. WILCOX.

Witnesses:
F. F. WARNER,
N. C. GRIDLEY.