2 Sheets—Sheet 1.

S. D. A. MASON.

LIQUID-METER.

No. 174,694. Patented March 14, 1876.

Fig 1.

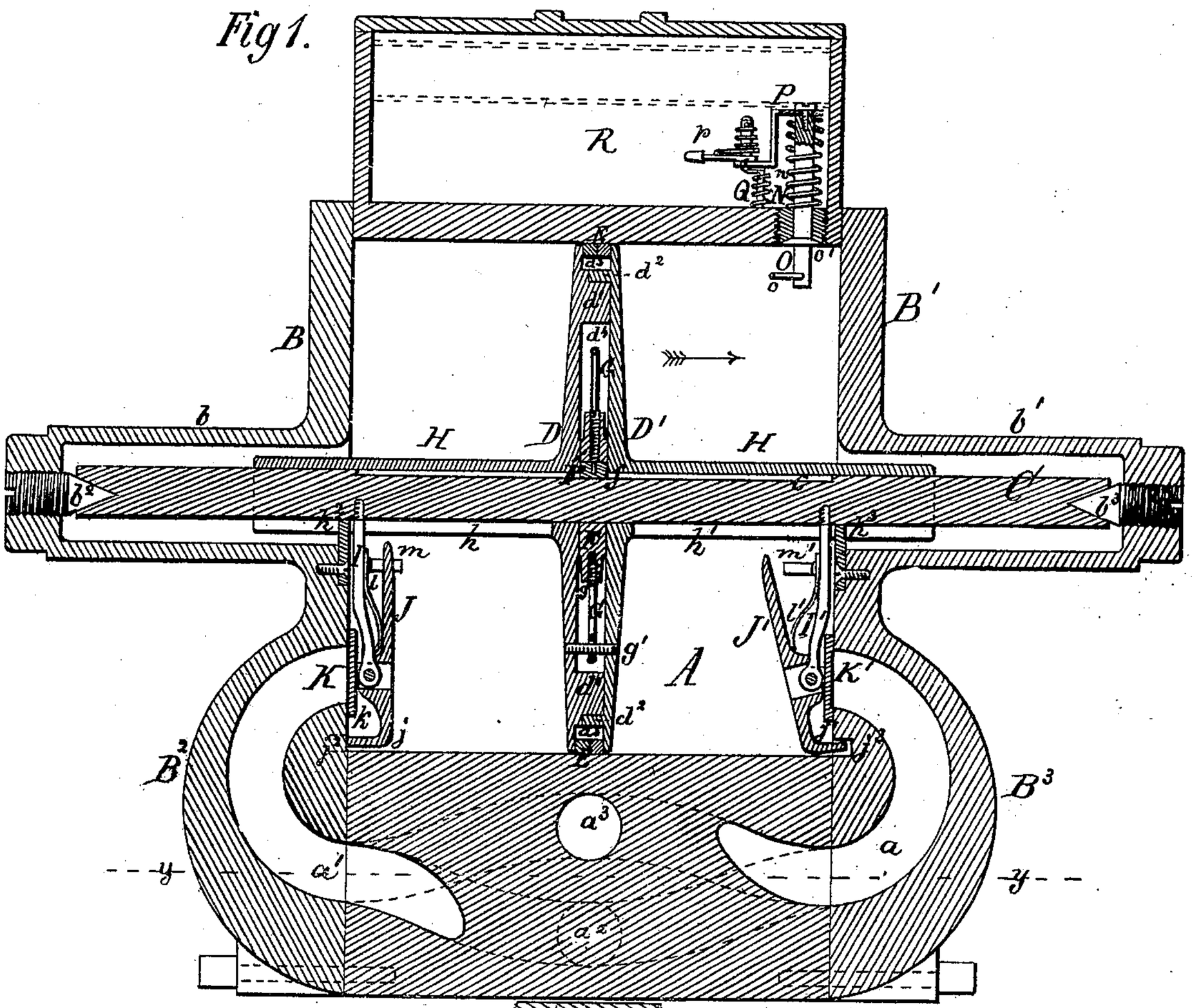


Fig 2.

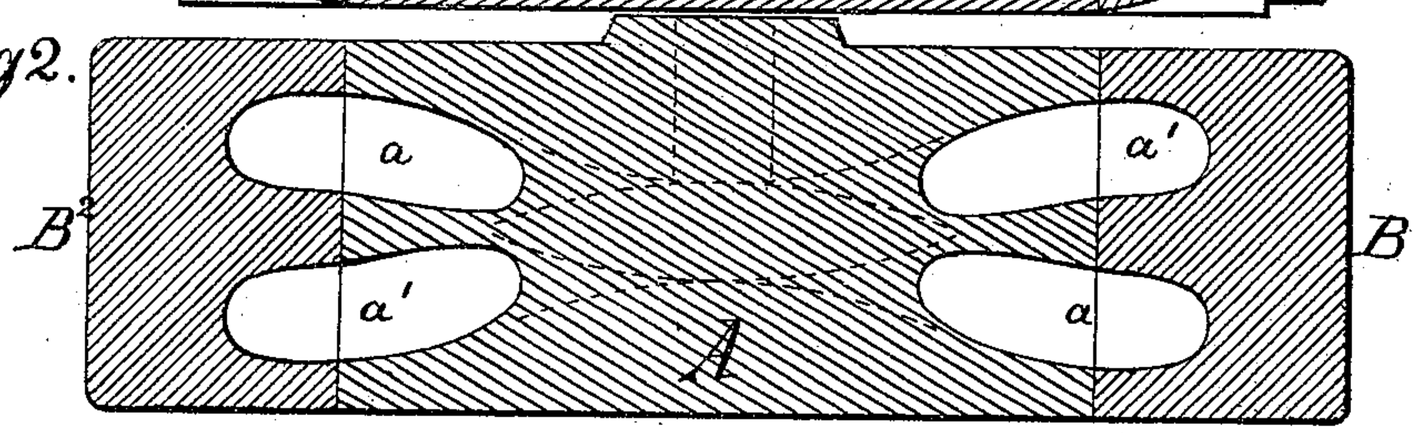
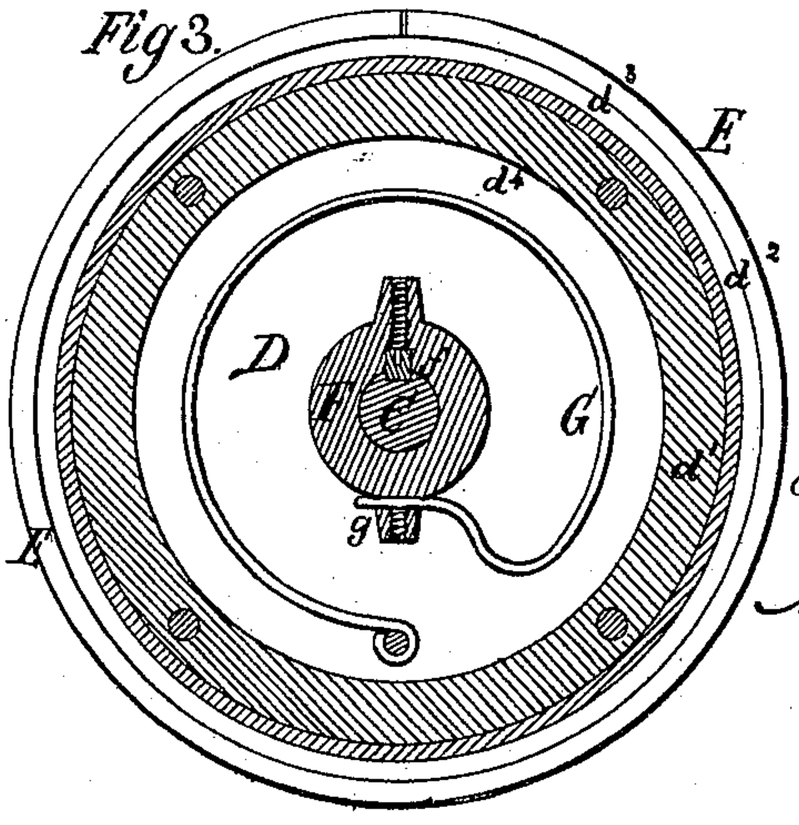


Fig 3.



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2 Sheets—Sheet 2.

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LIQUID-METER.

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Fig 4.

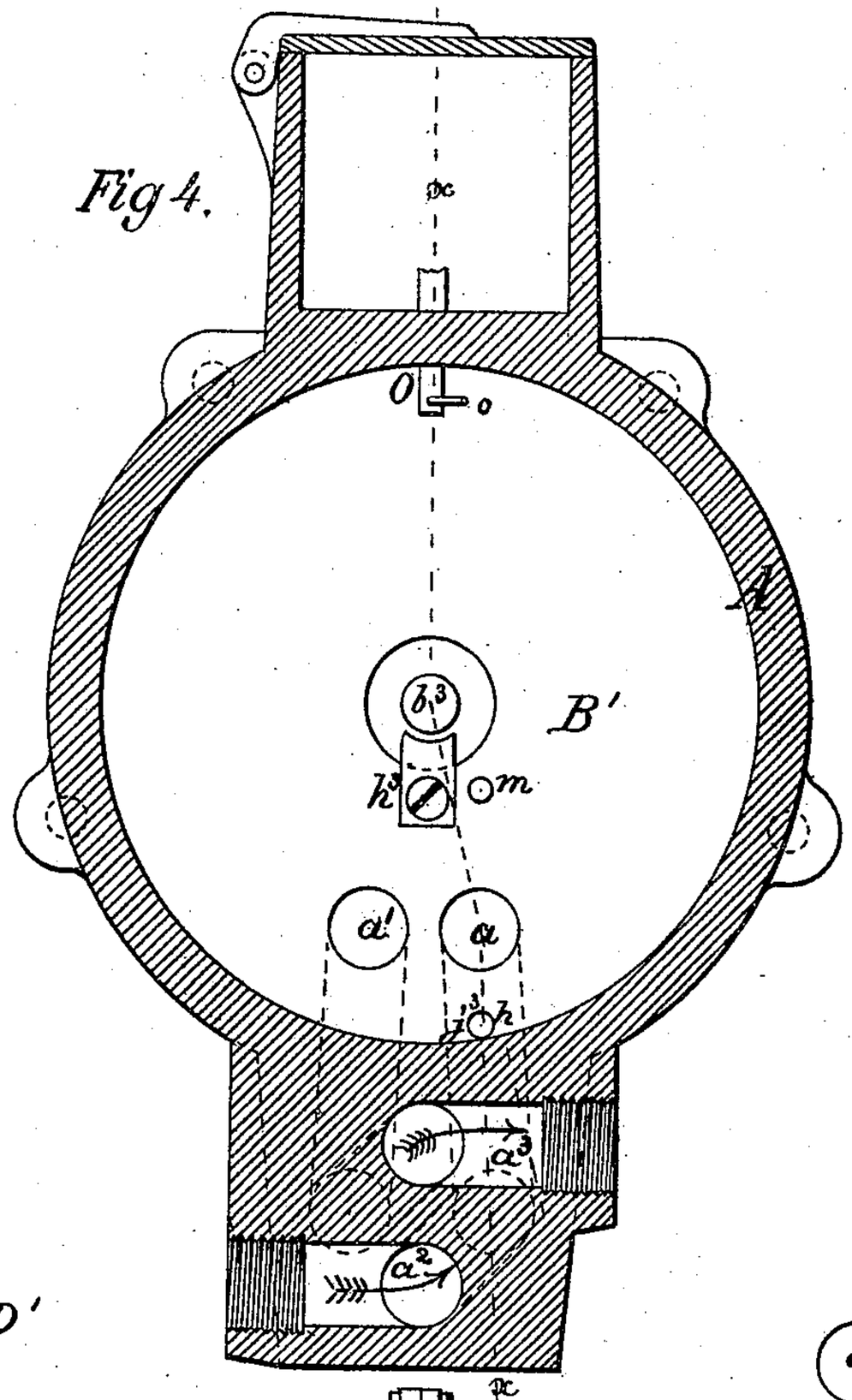


Fig 7.

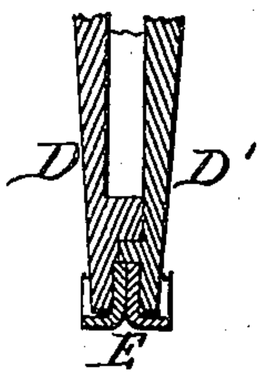


Fig 5.

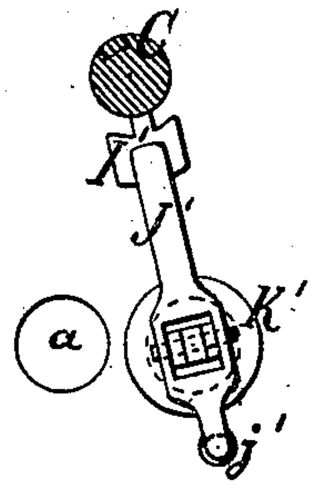
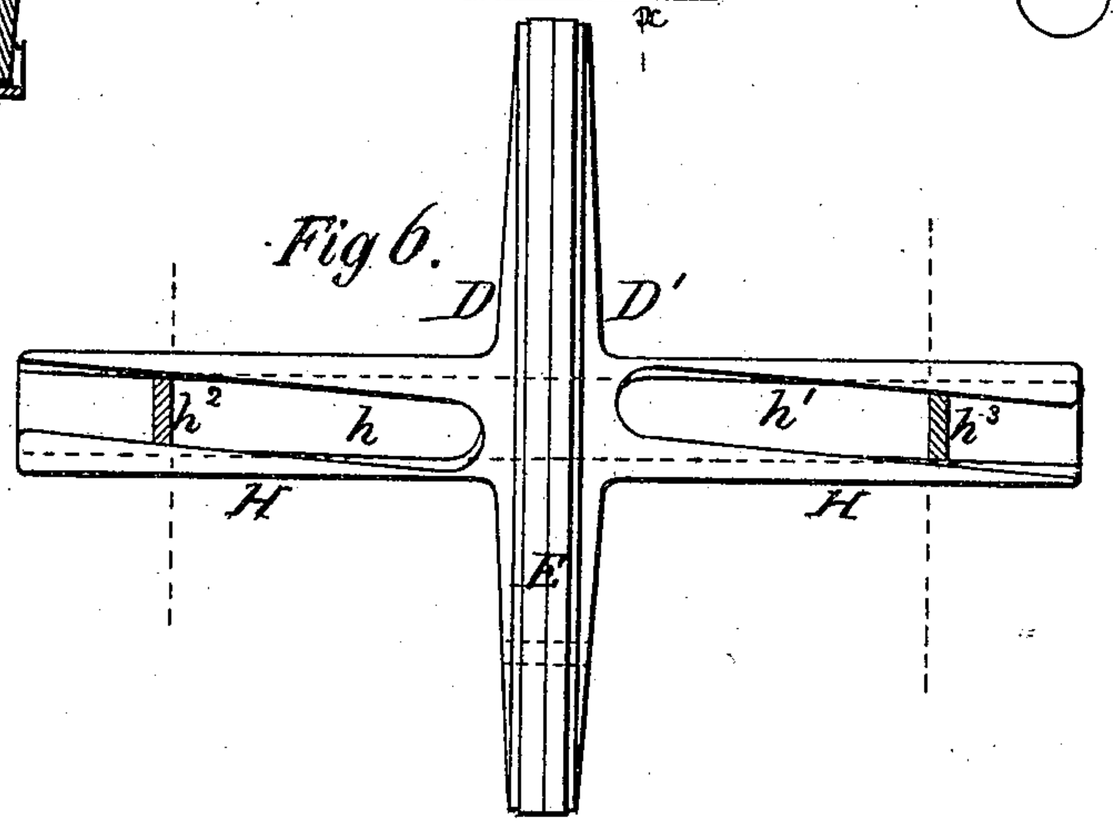


Fig 6.



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UNITED STATES PATENT OFFICE.

SAMUEL D. A. MASON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF HIS RIGHT TO ERNST H. F. D. GEEWEE, OF SAME PLACE.

IMPROVEMENT IN LIQUID-METERS.

Specification forming part of Letters Patent No. **174,694**, dated March 14, 1876; application filed February 25, 1876.

To all whom it may concern:

Be it known that I, SAMUEL D. A. MASON, of Chicago, in the county of Cook and the State of Illinois, have invented a new and useful Improvement in Water or Fluid Meters, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section, in the line *x x* of Fig. 4, of my improved meter. Fig. 2 is a transverse horizontal section of the same in the line *y y* of Fig. 1. Fig. 3 is a vertical cross-section of the piston used in my machine. Fig. 4 is a central cross-section of my machine, the piston and piston-rod being removed. Fig. 5 is a detailed view of the valve and valve shaft, and the apertures opened and closed by the valve. Fig. 6 is a bottom view of the piston and its sleeves, the detent-plates being shown as sectioned horizontally. Fig. 7 represents a modification of my piston packing.

The nature of my invention consists of certain constructions, combinations, and arrangements of parts, as hereinafter described and specifically claimed, whereby water to be delivered to a consumer may be measured in its flow, and without interrupting the same, and whereby the quantity measured may be registered by a registering apparatus indicating the strokes of a double-acting piston.

The object of my invention is to reduce the size of the water-meter by making it double-acting with a single piston, and to make a more simple and cheaper machine by reducing the number of the operating parts.

In the drawings, A represents a cylinder with covers B and B^1. The said covers are provided with tubular sockets b b^1, and with center pivot-screws b^2 b^3 at the ends thereof. The cylinder A is provided with two separate water-ways, a a^1, which cross over each other about midway, so that, for instance, the water-way a is at the right side of the cylinder at the left end, and vice versa at the right end. The said water-ways a a^1 are continued through the heads B^2 B^3 of the covers B B^1 into the interior of the cylinder. Between the center screws a shaft, C, is secured, to which the two piston-heads D D′ are loosely fitted. The said piston-heads are united by screws d, in the same manner as piston and follower are in a steam-engine, and they are also interlocked by closely-fitting annular rims d^1 d^2, whereby a chamber, d^3, is left for the packing-ring E. An interior chamber, d^4, formed by the said construction of the piston-heads D D′, incloses a collar, F, with a spring, G, fastened to it at g. The other end of the spring G is, by aid of a pin or screw, g', attached to the piston-heads D D′. The collar F is confined to a straight longitudinal motion on the shaft C by means of a tongue, f, which moves in a straight groove, c, in the shaft C. Thus the piston-heads D D′ are prevented by the springs G from casual turning. The said piston-heads are provided with prolonged hubs H, which are loosely fitted on the shaft C, and have each a spiral slot, h h^1, into which, at the ends of the cylinder, the detent-plates h^2 h^3 are fitted, so as to effect a slight turn of the piston at each stroke of the same. Near the ends of the cylinder the shaft C is provided with the arms I I′, to which arms the spring-levers J J′ and the valves K K′ are pivoted. The spring-levers J J′ have latching-pins j j^1, which are pressed by the springs l l' against the end surfaces of the cylinder, and there enter by turns the stop-sockets j^2 j^3. The valves K K′ are made to alternately cover the inlets and outlets a a^1 by the movements of the arms I I′, hereafter described. The stroke of the piston is terminated or adjusted by two thrust-pins, m m', on the covers B B^1 of the cylinder. At the top of the cylinder A a plug, N, is screwed into the metal, and the upper part of a shaft, O, is passed through it. The said shaft O extends into the cylinder, and is there provided with an arm, o, and a collar, o', which latter bears against the plug N, and thus prevents the escape of water. A spring, n, bearing against the lever P, keeps the collar o' in contact with the plug N. To the lever P a spring-pawl, p, is attached, whereby the wheels of the registering apparatus (not shown) are moved. A tension-spring, Q, causes the back motion of the lever P. A casing, R, above the cylinder serves for the reception of the registering apparatus.

The water is supplied through the inlet a^2 to the water-way a, and it is exhausted through the outlet a^3 from the water-way a^1.

Operation: Water being let on into the inlet a^2 fills the water-way a. The left end of the said water-way being open, the water fills the cylinder, and propels the piston to the right until its progress is checked by the thrust-pin m'. By the said stroke the end of the spiral slot h is moved near the stationary detent-plate h^3, and the piston has thereby received a turn a little more than equal to the distance apart of the centers of the openings a a^1 in the cover B. The spring G is thereby thrown out of balance, and exerts a torsional strain upon the shaft C, which, however, does not yield, as the lever J′ on the arm I′ is locked with its pin j^1 in the socket j^3. Before the piston reaches the thrust-pin m' it strikes the lever J′, and thereby removes the pin j^1 from the stop-socket j^3. The spring G immediately resumes its original condition, and thereby turns the shaft C and moves the arm I′, with the lever J′ and valve K′, over the opening a^1, and thereby closes it. At the same time the arm I moves the valve K from the opening a^1 to the opening a, which is thereby closed. The pin j of the lever J is, during the last operation, moved to the stop-socket j^2, (shown with dotted lines in Fig. 1,) into which it enters, thus latching the shaft C to the cover B. The water now enters through the water-way a in the cover B^1, pushing the piston back and the water behind it, through the water-way a^1 and the outlet a^3, into the consumer's supply-pipe. During the movement of the piston the spring G is, by the action of the slots h h^1, wound up in the opposite direction, and when the piston strikes the lever J the shaft C is turned back by the spring G, and causes the water-ways a (seen in Figs. 4 and 1) and a^1 (seen in Fig. 1) to be closed by the valves K K′, and also causes the pin j^1 of the spring-lever J′ to enter the stop-socket j^3. Thus the shaft C is caused by the slots h h^1 of the piston, and the detents h^2 h^3 and the spring G on the shaft C, to oscillate from one water-way to the other, while it is kept in place between the oscillations by the stopping-pins j j^1 and sockets j^2 j^3.

In Fig. 7 I have shown, as a modification, a leather packing for my piston, which may, in a majority of cases, be preferable to metal packing E.

The operation of my machine would be precisely the same as described if the outlet and inlet were reversed.

The plates h^2 h^3 may, to avoid friction, be provided with one or two friction-rollers, which would bear and travel on the spiral sides of the slots h h^1 of the piston-hubs.

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

1. The vibrating shaft and the valves attached thereto, said shaft having a reciprocating piston arranged to turn and slide back and forth on it, for the purpose of expelling the water or liquid within the cylinder, and for releasing the valves and reversing them, substantially as described.

2. The case for containing the mechanism, constructed with inlet and outlet passages at each end, and with the separate crossed passages a a^1, substantially as described.

3. The combination of the spring G, the piston and its obliquely-grooved sleeves, the detents, vibrating shaft, the valves and their latching-pins, and the stops j^2 j^3 of the case, substantially as described.

4. The combination of the reciprocating piston and the vibrating arm O, which operates the indicator mechanism.

Witness my hand this 21st day of February, in the matter of my application for a patent on my improved water or liquid meter.

SAMUEL D. A. MASON.

Witnesses:

M. C. KAIM,

JNO. C. ALLEN.