2 Sheets--Sheet 2.

# A. SWASEY.
## Water-Meter.

No. 168,354. Patented Oct. 5, 1875.

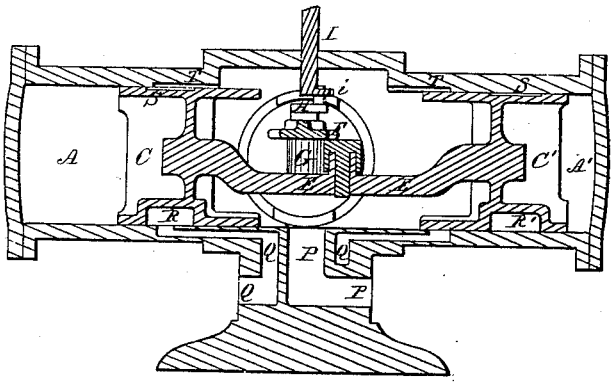



Fig. 3.

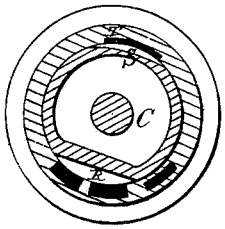



Fig. 4.

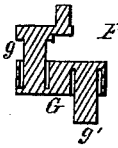



Fig. 6.

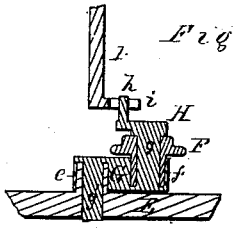



Fig. 5

Witnesses.

Wendell C. Curtis

Albert Watkinson

Inventor.

Ambrose Swasey,

by Theo. G. Ellis, attorney.

2 Sheets--Sheet 1.

# A. SWASEY.
## Water-Meter.

No. 168,354. Patented Oct. 5, 1875.

Fig. 1.

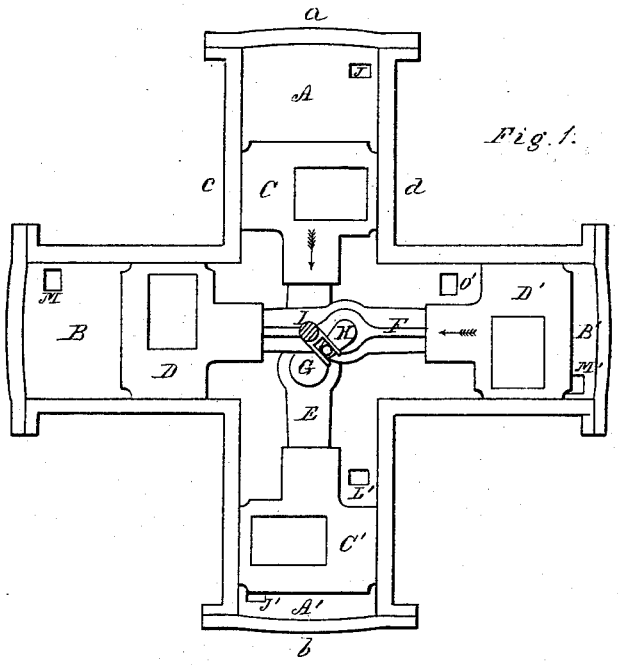
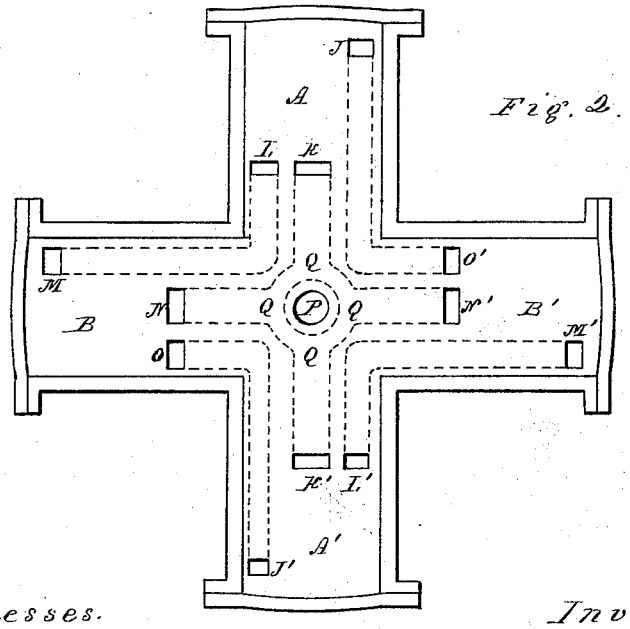



Fig. 2.




Witnesses.

Wendell R. Curtis
Albert Prattshorn

Inventor.

Ambrose Swasey
by Thos. G. Ellis, Attorney

# UNITED STATES PATENT OFFICE.

AMBROSE SWASEY, OF HARTFORD, CONNECTICUT, ASSIGNOR OF PART OF HIS RIGHT TO WORCESTER R. WARNER, OF SAME PLACE.

## IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. **168,354**, dated October 5, 1875; application filed August 13, 1875.

*To all whom it may concern:*

Be it known that I, AMBROSE SWASEY, of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Water-Meters; and I do hereby declare that the following is a full, clear, and exact description thereof, whereby a person skilled in the art can make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Like letters in the figures indicate the same parts.

My invention relates to that class of apparatus which measures the volume of water or other liquid flowing through a pipe; and it consists in the mechanical arrangements and devices which will be hereinafter described.

In the accompanying drawings, on two sheets, Figure 1 is a top view of my improved water-meter, with the top half of the outer shell removed to show the interior parts. Fig. 2 is the same with the pistons and connecting-rods removed to show the arrangement of the ports, and their connections with the entrance and exit pipes. Fig. 3 is a section through the vertical axis and two of the cylinders, on the line *a b* of Fig. 1. Fig. 4 is a section upon the line *c d* of Figs. 1 and 3. Fig. 5 is a section through the two connecting-rods of the cylinders and their connecting-link when the link is in line with the lower connecting-rod. Fig. 6 is a section of the connecting-link, detached.

A A′ B B′ are four cylinders, opening into each other at the center. C C′ D D′ are four pistons, moving in the four cylinders, and connected together in pairs by the rigid connecting-rods E and F. G is a connecting-link, with pivots *g g′* fitting into sockets in the middle points of the rods E F. These sockets have raised edges or flanges *e f*, (see Fig. 5,) so as to bring the line of strain between the two pivots *g g′* within their bearing-surfaces. The pivot *g* extends upward through the connecting-rod F, and has at its top a crank, H, lying directly over the link G, in such a manner that the crank-pin *h* is vertically over the center of the link. I is a small vertical spindle, having a bearing in the outer shell of the space inclosed by the cylinders. Its vertical axis passes through the intersection of the axes of the cylinders. The bottom of this spindle forms a forked crank, inclosing the crank-pin *h*, which communicates motion to it. The top of the same is connected with a register of any usual form for indicating the quantity passing through the meter. J K L J′ K′ L′ M N O M′ N′ O′ are entrance and exit ports in the cylinders, connected with each other by channels within the thickness of the metal, as shown by the dotted lines in Fig. 2. P is the entrance-pipe. It passes directly into the meter at the junction of the four cylinders, and fills the space between the four pistons with water under pressure. Q is the outlet-pipe. It forms an annular space around the outside of the vertical part of P, and leads out from the meter on the opposite side to the entrance P. The port J is always open into the cylinder A. The port K is always closed from the cylinder and central chamber by the piston C and its extending flange. The port L is opened to the central chamber and closed alternately by the piston C at each stroke. After being closed to the central chamber by the forward motion of the piston, it is opened to the exhaust-port K through recess R in the piston C. (See Figs. 3 and 4. The ports in the other cylinders are all the same and operated in the same way as those in the cylinder A above described. Each piston acts as a valve for the next cylinder adjacent. The piston C acts as a valve for the cylinder B, &c. In order to balance the pistons and give them an equal pressure on all sides when over the ports and acting as valves, recesses S, &c., exactly opposite and corresponding to R, &c., are made in the surface of the pistons, and the pressure of the water from the central chamber is let into them through openings or grooves T, &c., in the upper part of each cylinder, corresponding in arrangement to the ports below.

The operation of my improved meter is as follows: The water enters through the pipe P, and fills the central chamber between the pistons. It passes into the ports L′ O′ and out at the ports M′ J when the pistons are in the position shown in the drawings, and drives

the double pistons D′ D and C C′ in the direction of the arrows. The water between the pistons D C′ and the ends of the cylinders B A′ is forced out through the ports M J′, and as the ports L K and O N are covered and connected by the pistons C and D, the water passes out through M L K Q and J′ O N Q to the discharge. When the double piston D D′ arrives at the middle of its stroke the double piston C C′ is at the end. The ports O′ N′ are closed and covered, and the port O is opened to the central chamber. The pistons C C′ then commence to move back, and, as they pass their central point, reverse in like manner the ports for the cylinders D D′. The connection of the middle points of the piston-rods E and F by means of the link G governs and regulates their motion, and causes them to have always the proper position and stroke. The centers of motion at the ends of the link move in absolutely straight lines with a reciprocating motion; but, relatively, each moves around the other with a crank-motion. As the link G gyrates around the intersection of the axes of the cylinders, with its ends alternately passing through that point, its middle point, and no other, describes a circle around the intersection, or the central point of the machine. The crank H brings the pin *h* over this point, and as it revolves in a circle it carries the spindle I for operating the registering mechanism. This register is placed in a small box outside and on top of the meter, the spindle I passing through a stuffing-box to prevent leakage from the interior.

What I claim as my invention is—

1. The four cylinders, in combination with double pistons, connected and arranged as described, and with entrance and exit pipes communicating between the cylinders, substantially in the manner herein set forth, so that each pair of pistons act as valves for the other pair.

2. The link G, in combination with the two piston-rods, moving at right angles to each other and in straight lines, as a device for regulating and controlling their motion, substantially as described.

3. The combination of the link G, whose ends move in straight lines at right angles to each other with a reciprocating motion, and the crank and spindle I, connected with the middle point of said link, as a new mechanical movement for converting rectilinear into rotary motion, substantially in the manner described.

AMBROSE SWASEY.

Witnesses:

THEO. G. ELLIS,

WENDELL R. CURTIS.