2 Sheets—Sheet 1.

T. SWEENEY.

Water-Meter.

No. 101,059. Patented Mar. 22, 1870.

Fig. 1.

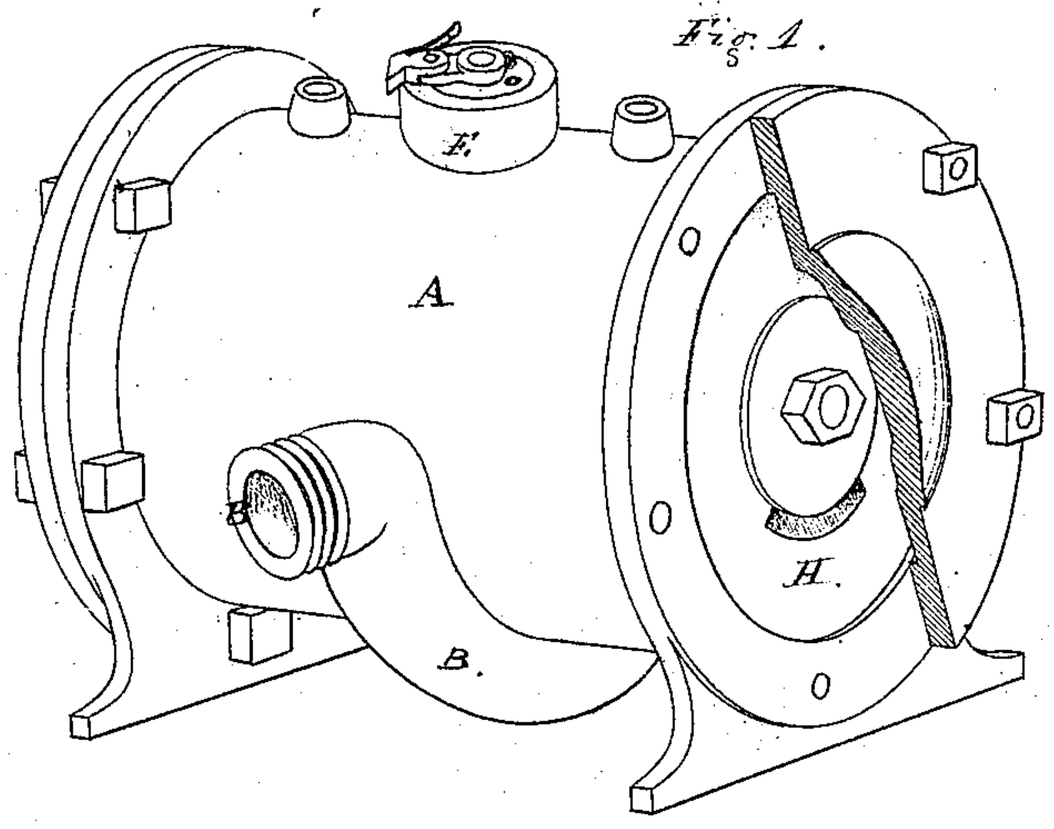


Fig. 2.

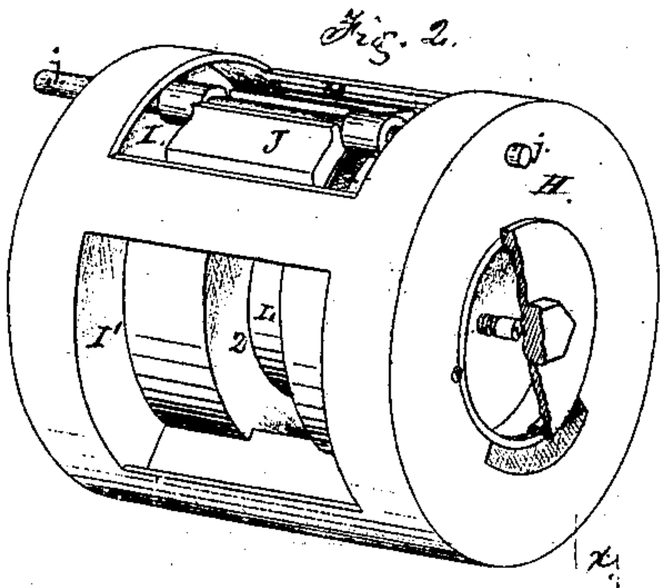


Fig. 3.

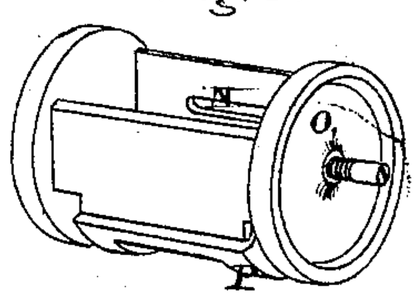
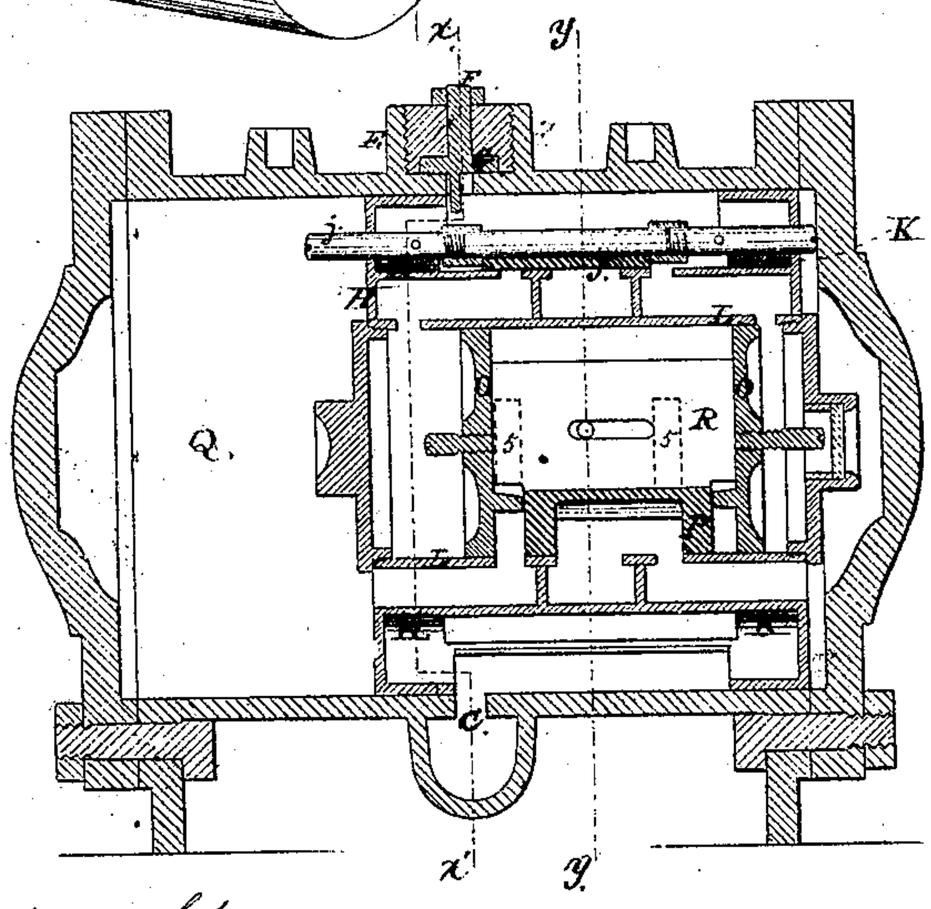


Fig. 4.



Witnesses:
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Inventor.

2 Sheets—Sheet 2.

T. SWEENEY.

Water-Meter.

No. 101,059. Patented Mar. 22, 1870.

Fig 5

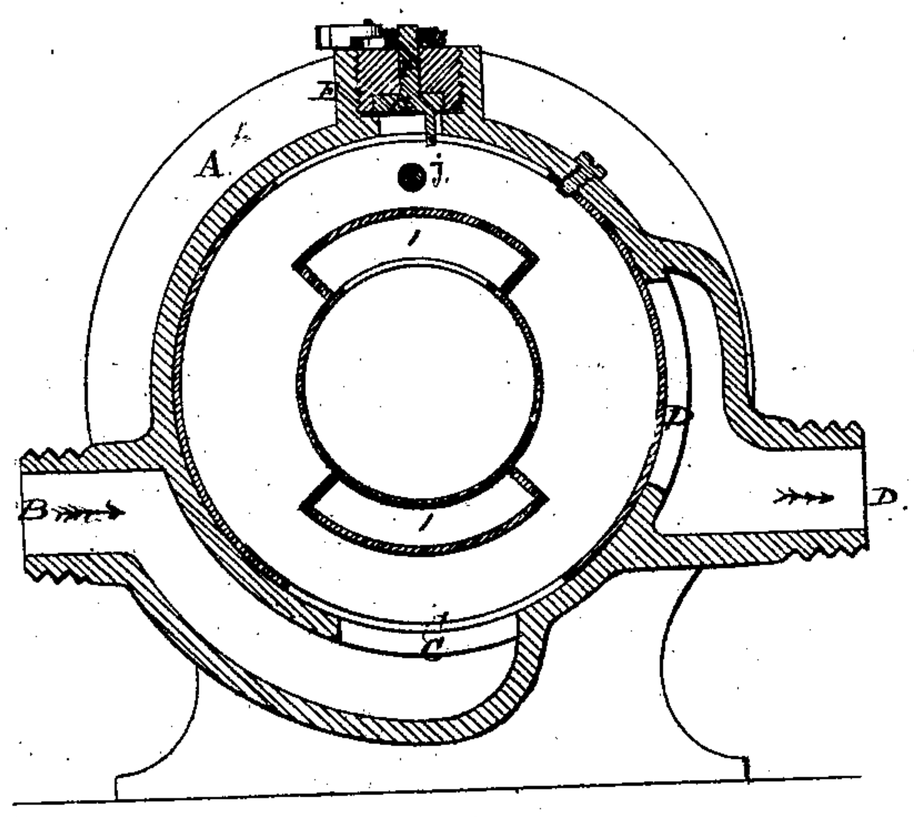


Fig. 7.

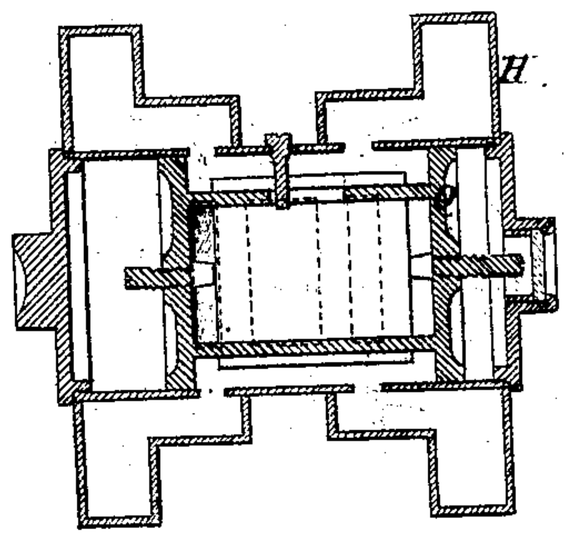


Fig. 6.

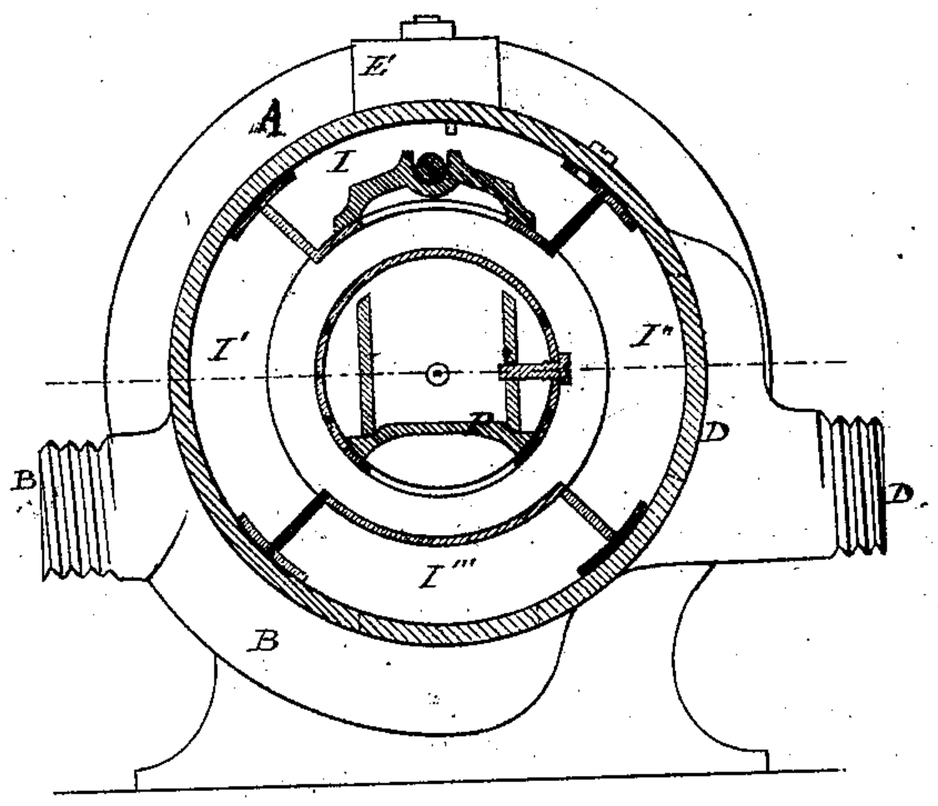
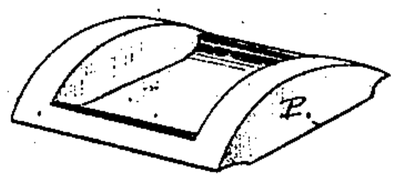


Fig. 8.



Witnesses { Wm. R. Washburn, Horatio G. Parker

Thomas Sweeney, Inventor

United States Patent Office.

THOMAS SWEENEY, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 101,059, *dated March* 22, 1870.

IMPROVEMENT IN WATER-METERS.

The Schedule referred to in these Letters Patent and making part of the same.

I, THOMAS SWEENEY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Water-Meters, of which the following is a specification.

My improvements relate to the construction of the main piston, and the arrangement of its ports; to the arrangement of passages surrounding the inner piston located within the main piston; to the construction and arrangement of a convex valve for the inner piston; to the construction and arrangement of a concave valve for the main piston; to the arrangement of a valve-rod for giving motion to the concave valve; to other details; and to the mechanism for actuating the indicator.

In the drawings accompanying this specification—

Figure 1 is a perspective view of my improved meter, one of the heads being partly broken away to show the head of the inclosed main piston;

Figure 2 is a perspective view of the main piston, detached;

Figure 3 is a perspective view of the small inner piston, one end of which is shown in place in fig. 2, the head of the main piston being partly broken away for this purpose;

Figure 4 is a longitudinal vertical section of the whole apparatus;

Figure 5 is a cross-section, on line *x x*, of fig. 4;

Figure 6 is a cross-section, on line *y y*, of fig. 4;

Figure 7 is a central horizontal section through the main piston; and

Figure 8 is a view of the under side of the valve in the inner piston.

A is the outer shell or cylindrical case, cast or formed integral with an inlet-tube of passage B, at one side, and which passes down outside the cylinder, and communicates with the inside of the case by a port, C, in its bottom, in a direction at right angles to the line at which the water enters B.

At the side directly opposite the inlet is the outlet port D, leading to the exhaust-pipe. These ports and passages are cast integral with the cylinder, as is also the tubular chamber E, for the reception of the rock-shaft F and piston-head or collar G, which imparts the movements to the dial-indicator, not necessary to be shown.

H is the main piston, which, with the exception of its heads and inner walls, is cast integral, including its chambers I and ports or passages.

There are four chambers I, the top one of which contains the sliding concave valve J, and also communicates by four passages K K, with the bottom chamber I‴, two of these passages being at one end, and two at the other end of said top and bottom chambers. The other two chambers I′ I″ are at the sides, and communicate with the passages 2, fig. 2.

This main piston is lined centrally with a sheet-metal tube, L, having openings therein, communicating with the various passages or ports, and also with the exit, and between it and the inner side of the piston are spaces 1 1 and 2 2, left in the casting.

The concave valve J is held to position by the rod *j*, which gives it its movements, said rod being composed of pieces connected together by screw-threads and sockets, as shown, and the sockets forming heads to hold the valve firmly, and also to come into contact with and actuate the rock-shaft connected with the indicator. The ends of the rod play snugly through perforations made for the purpose in the heads of the main piston, to allow of its reciprocations.

The inner or smaller piston O is made, as shown in fig. 3, with two upright walls, open top, and valve, the latter shown inverted in fig. 8.

R is the space between the heads of the inner piston O.

The main piston H has a slot at M, to receive a pin projecting through the shell, to allow the piston to reciprocate lengthwise without turning, and the inner or smaller piston has also a longitudinal slot, N, to guide it in its reciprocations, and prevent its turning.

The operation is as follows:

Water enters, under pressure, the induction-pipe B, passes downward therein, beneath the outer case or shell, enters said shell through the opening C, which thus admits it to the bottom chamber I‴ of the main piston H, from which chamber it passes through four passages K K, &c., upward to and into the top or valve-chamber I, going around both sides of the piston in its ascent. The water thus arriving at the top chamber finds one of the ports, 3, of the top valve J, open, and therefore enters such open port, and descends to and behind, that is, at one end of, the small piston O, which carries the convex valve P, this course of the water being shown by the arrows in the figures.

The pressure of the water between the heads of the pistons H and O next operates to move to the left, (see fig. 4,) the latter or smaller piston, and thus to open one of the lower ports of the main cylinder or piston H. The inner piston is always full of water and open to its current. The water now passes through such open port to and between the heads of the two pistons, and forces the main piston H to the left, fig. 4, carrying with it, of course, its valve, and rod J *j*, thus causing the left-hand end of the rod to strike or abut against the left-hand head of the shell or case A. This last action opens the upper port, previously closed, of valve J, and also drives the water which was contained in the space Q at the left-hand end of the case, into the exit or exhaust

pipe, it being, of course, understood that such action and discharge take place whenever the stop-cock in any part of the building or elsewhere is opened to draw water, such opening destroying the equilibrium and allowing the force of the incoming water to actuate the parts.

The four ports, 5 5, &c., two of which are shown in dotted lines in fig. 4, at 5 5, open from the inner lining or facing of the main piston H, and they are always open to admit water to supply and keep full the small inner piston. There are two of these ports on each side of the said lining.

The upper or rod-valve must, of course, be the first thing shifted before water can enter behind the smaller piston O, in order to move it so as to open its valve and admit water between the end of the casing and the adjacent end of the large piston.

This first shifting of the slide is effected thus: The entering water passes through the four passages K K, &c., thence to the top valve-chamber, bears against the inner end of the case, and its first stroke presses back against and forces the slide to the left, (see fig. 4,) assuming the main piston to be then at the right-hand end of the case, as seen in the same figure.

To make exit, the water goes down the exit or exhaust part of the apparatus, then up upon the outside of the sheet-metal lining of the main position to the discharge or outlet-pipe. (See right hand of fig. 5.)

I claim—

1. The piston H, having four spaces or depressions on its surface, two of which communicate with the induction-passage, and the other two with the eduction-passage, substantially as shown and described.

2. The arrangement of ports K K K K, as shown and described, so that the spaces in communication with the induction-passage shall be upon directly opposite sides of the piston H.

3. The arrangement of the ports K K K K, as shown and described, so that they shall communicate with and supply a space, R, between the heads of the inner piston.

4. The arrangement of the passages surrounding the shell or wall of the inner cylinder, and passing beneath the valves, for the purpose of forming an exhaust-passage, and to connect the chambers or spaces that communicate with the eduction-port D, as shown and described.

5. The special construction, shown and described, of the main piston H, the same being cast in skeleton form, and having projections and divisions on its inner surface, and adapted to receive the tube, provided with suitable openings, so that the two united shall constitute a cylinder for the inner piston, and having also upon its inner surface suitable ports or passages, through which to supply both pistons, and to form eduction-ports for the same.

6. The convex slide valve P, arranged between the heads of the inner piston, and operated by the same, for the purpose of controlling the action of the main piston.

7. The arrangement of the concave slide valve J, in one of the compartments or depressions of the main piston, communicating with the induction-passage, for the purpose of governing the action of the inner piston.

8. In combination with the concave valve J, a valve rod, *j*, passing through the heads of the piston, for the purpose of giving motion to said valve while the piston is approaching the end of its stroke, by coming in contact with the head of the outer cylinder or shell.

9. The rocking-shaft F, having a collar or piston-head G, arranged within the chamber, so that the pressure of the water will keep it in contact with the face of such chamber, the rock serving to impart motion to the indicator, as shown and described.

Witnesses: THOMAS SWEENEY.

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