

UNITED STATES PATENT OFFICE.

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IMPROVED METER FOR WATER, GAS, &c.

Specification forming part of Letters Patent No. 33,348, dated September 24, 1861.

To all whom it may concern:

Be it known that I, HENRY Q. HAWLEY, of the city of Albany, in the county of Albany and State of New York, have invented certain new and useful Improvements in Meters for Water, Gas, and other Fluids; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central longitudinal vertical section of a water-meter with my improvements. Fig. 2 is a transverse vertical section of the same through one of the valve-boxes.

Similar letters of reference indicate corresponding parts in both figures.

This invention consists in a novel system of valve-operating mechanism applied to operate, as hereinafter explained, in combination with a reciprocating piston or diaphragm, upon whose opposite sides the water or other fluid is caused to act alternately by the operation of the valves affected by the said mechanism.

To enable others skilled in the art to make and use my invention, I will first describe the construction and operation of the meter represented in the drawings, and then explain, briefly, some modifications which may be made.

A is a horizontal cylinder having at its ends two valve-boxes B B', to which are fitted the two inlet-valves C C' and outlet-valves D D', and which contain the principal parts of the valve-operating mechanism, consisting of two levers E E' and two tumbling-bars F F' and their attached tumbling-weights G G', the said bars being connected by chains H H' with the rod I of the piston J, which is fitted to the cylinder A, and upon whose opposite sides the water acts alternately.

The valves C C' D D' are of the puppet kind. The inlet-valves C C' are at the bottoms of their respective boxes and the outlet-valves D D' at the tops of their respective boxes, and the two—viz., one inlet and one outlet valve belonging to either end of the cylinder and arranged in the same box B or B'—have their stems c or c' and d or d' connected with their respective lever E or E' on opposite sides of its fixed fulcrum a or a', so that the same movement of the lever will

open the inlet and close the outlet, or vice versa. The two tumbling-bars F F', one in each valve-box, work upon fixed pins b b' and are connected with opposite ends of the piston-rod I by means of the chains H H', through the agency of which the piston can move the tumbling-bars by pulling them, but not by pushing them.

Before explaining the operation of the meter I will remark that the arrangement of the valves C C' and D D' is such that the closed valve at either end of the cylinder inlet or outlet is subject to the pressure of the head of water.

The operation will be best understood by referring to Fig. 1, which represents the inlet-valve C' and outlet-valve D open and the inlet-valve C and outlet-valve D' closed, the water entering the cylinder by the box B', driving the piston to the left, and leaving the cylinder by the box B, the chain H falling and the chain H' tightening. When the piston in this movement arrives within a certain distance of the left-hand end of the cylinder, the left-hand end of the rod I comes in contact with a protuberance on the tumbling-bar F, and at the same instant the chain H' is drawn tight, and the continued movement of the piston causes the piston-rod I to push the bar F and to pull the bar F' in such a manner that both at the same time pass vertical positions and are caused to fall over by their weights G G' until the bar F comes in contact with the outer arm of the lever E—that is to say, the arm farthest from the cylinder—and the bar F' comes in contact with the inner arm of the lever E'—that is to say, the arm nearest the cylinder—letting the chain H' slack again. The weights G G' now act against the levers E E' with a tendency to close the valves C' D and open C D', but are not heavy enough to counteract the pressure of the water on the closed valves C D', and the valves therefore remain undisturbed until as the piston arrives very near the left-hand end of its stroke the left-hand end of its rod I again comes in contact with the tumbling-bar F and the chain H' is again straightened, and the least continued movement causes the valves C and D' to start from their seats, and as all the valves are then nearly balanced or subject to nearly similar pressures of water

the weights G G' drop and complete the opening of those valves and close the valves C' and D, thus causing the movement of the piston to be reversed. In moving in the opposite direction the piston-rod acts on the tumbling-bar F' by pushing it in the same manner as it acted on F in its movement to the left, and acts upon F by pulling it by the chain H in the same manner as it acted upon F' in that movement, by which means as the piston arrives near the right-hand end of the cylinder the valves C' and D are opened again and C and D are closed.

It will have been observed that in the example of my invention represented in the drawings the weights are not used to start the valves, but only to complete the opening and closing after they have been started, and hence they do not require to be very large and their arrangement within the valve-boxes does not require the said boxes to be of very large capacity; but the weights alone, if heavy enough, may be depended upon for operating the valves by the fall of the tumbling-bars from the vertical position.

In the above operation it is desirable in order to prevent the too violent slamming of the valves that the weights G G' should be arrested by coming down upon the bottoms of the valve-boxes before the valves are quite closed, leaving the valves to be closed by the flow of water alone. To permit this the weights are so fitted to the pins *e e'*, on which they are suspended from the tumbling-bars F F', that a slight upward and downward movement thereon is provided for.

In the construction of the meter care should be taken that the piston-rod and chains H H' are respectively of the proper length to move the two tumbling-levers at the same time, and that the length of the movement of the piston is sufficient at least to permit of length enough in the chains to allow either end of the piston-rod to move beyond where the end of its attached tumbling-bar when pulled over will fall.

Folding rods may be used instead of chains for connecting the piston-rod with the tumbling-bars and will operate in the same manner.

In adapting the meter to the measurement of gas I propose to substitute a diaphragm for the piston and to substitute sliding

valves, either flat or arc-formed, for the puppet-valves, and the said valves may be operated upon directly by the tumbling-bars without the intervention of the levers E E'.

The wheel and dial work for counting and registering the strokes of the piston may be arranged within either of the valve-boxes and made to derive motion in any convenient manner from any suitable part of the valve-operating mechanism.

By extending the piston-rod through a stuffing-box in one of the valve-boxes and making suitable connections the same construction of apparatus may be adapted to make a water-pressure engine.

In meters for measuring water in places where the head is sufficient to make it advantageous I propose to protect the puppet-valves from the too violent action of the water, and also to regulate partially its action upon them, by means of boxes or shields covering their backs, the water in such case being admitted to the valves by openings around or near the upper edge of the said boxes or shields.

I do not confine myself to the use of any particular construction or arrangement of valves; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Combining the piston or diaphragm of a fluid-meter with weighted levers or tumbling-bars for operating the inlet and outlet valve or valves thereof by means of a rod I and chains H H', applied to operate substantially as herein specified.

2. The employment, in a fluid-meter, of a system of valve-operating mechanism, in which weighted levers or tumbling-bars arranged within the meter are first brought by the movement of the piston or diaphragm to a position or condition to exert upon the valves a tendency to reverse their position, but not to move them until they have been started by the direct action of the piston or diaphragm in its further movement, and then caused to suddenly complete the movement of the valves, substantially as herein described.

HENRY Q. HAWLEY.

Witnesses:

JAMES LAIRD,

JAMES F. BUCKLE.