[39.]

HENRY W. MATHER.

Improvement in Meters.

No. 118,867. Patented Sep. 12, 1871.

Fig. 1.

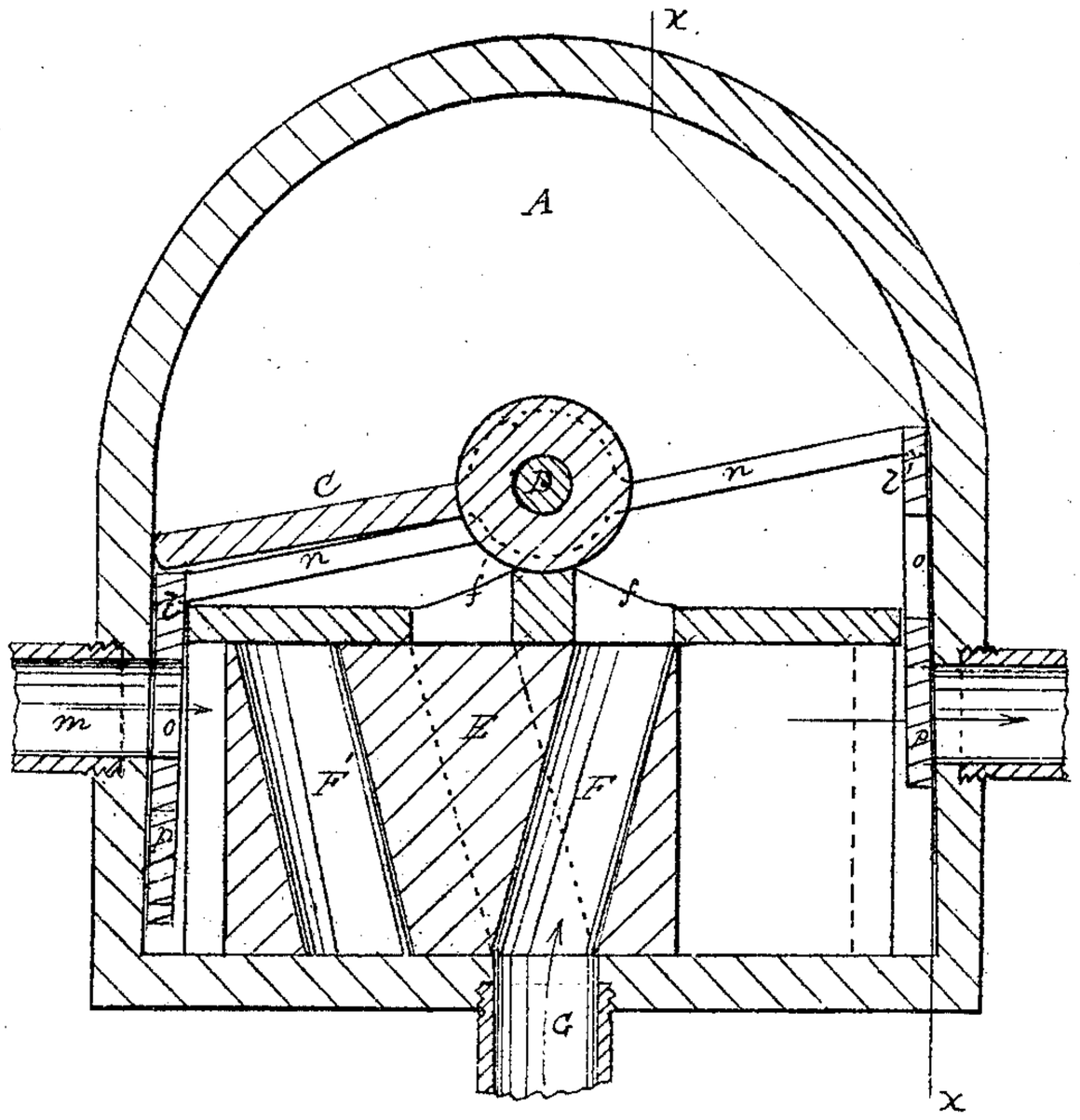


Fig. 3.

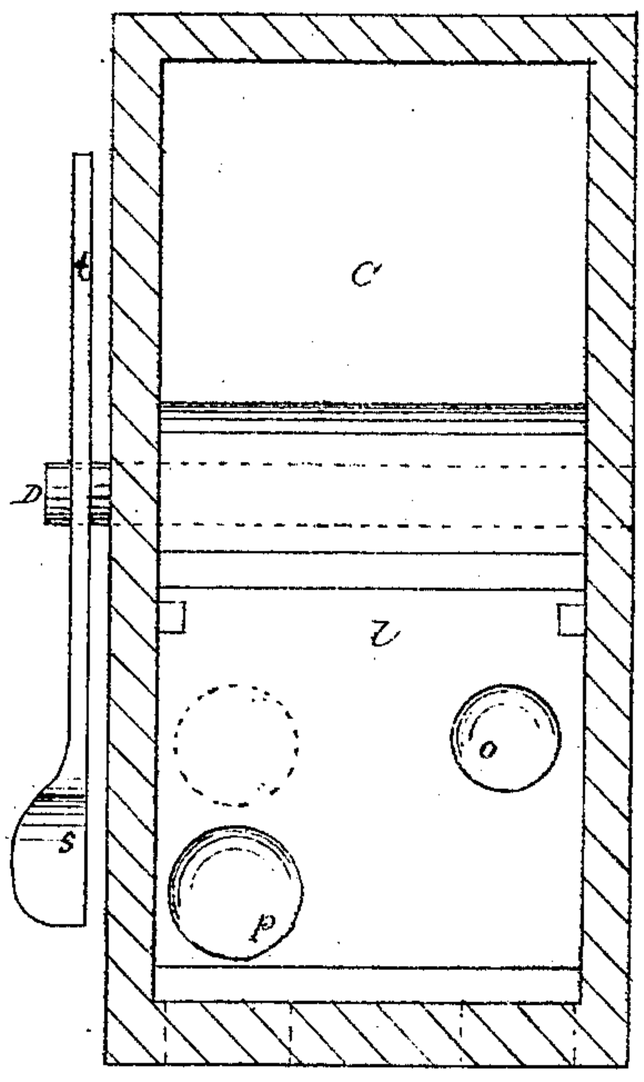
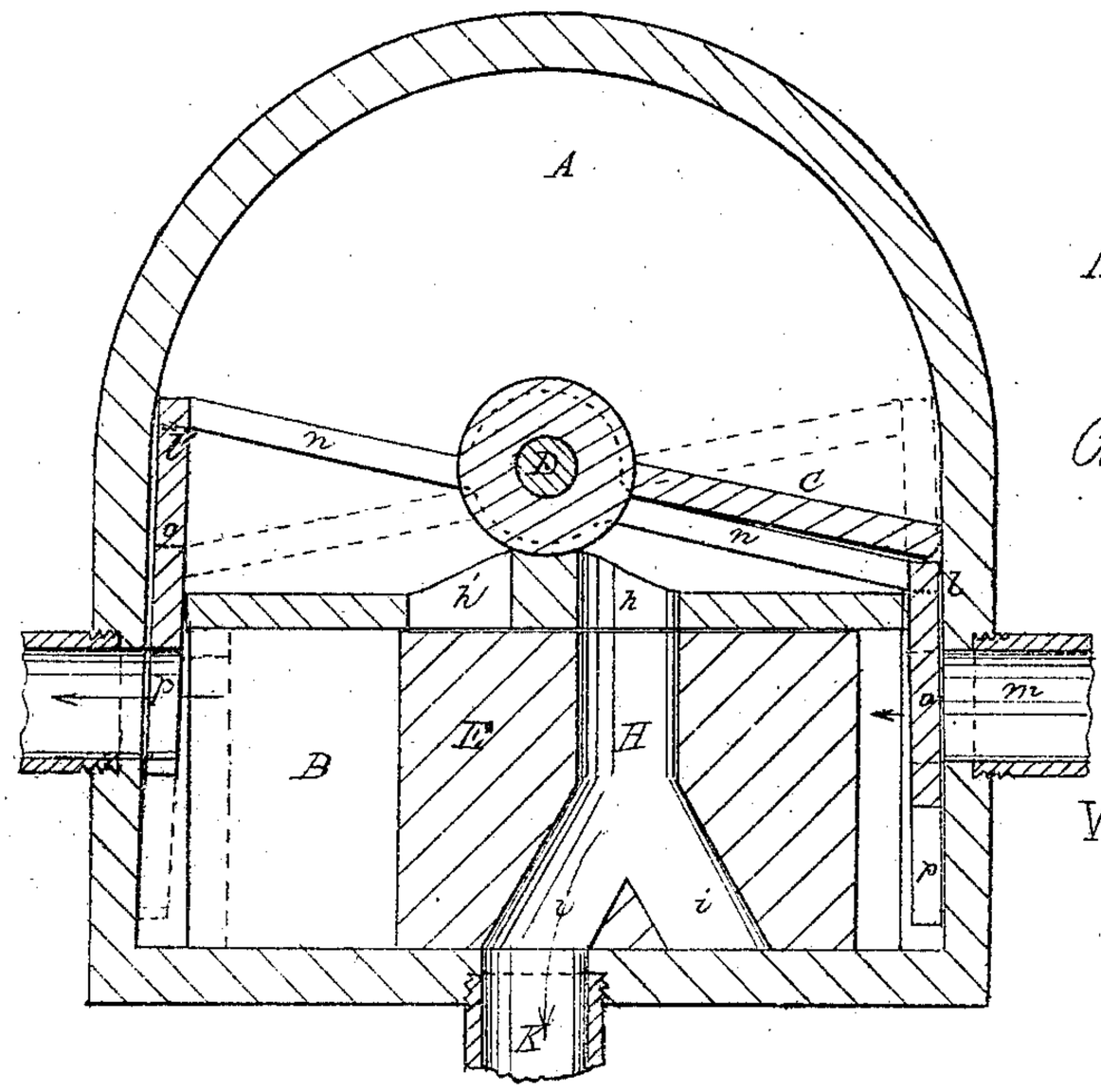


Fig. 2.



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UNITED STATES PATENT OFFICE.

HENRY W. MATHER, OF NEW YORK, N. Y.

IMPROVEMENT IN LIQUID-METERS.

Specification forming part of Letters Patent No. 118,867, dated September 12, 1871.

To all whom it may concern:

Be it known that I, HENRY W. MATHER, of the city, county, and State of New York, have invented an Improved Liquid-Meter, of which the following is a specification:

My invention has for its object to produce a meter of simple construction and reliable operation, and the improvements relate to that class of meters in which a chamber of definite capacity is successively filled by the water or other liquid entering alternately on different sides of a diaphragm or piston moving in said chamber; and consists mainly in the arrangement of the passages for the influx and efflux of the liquid in a reciprocating or sliding valve, which is actuated by the pressure of the water applied independently of the main supply or through auxiliary passages; in the employment of an oscillating frame in connection with the piston for changing the position of the auxiliary valves; and also, in the use of a counter-balance in combination with said piston, so that the water-pressure will not have to lift the weight of the piston, but merely overcome its friction.

In the accompanying drawing, Figure 1 is a vertical section through the induction-ports of the valve, showing the chamber filled from one side and the auxiliary valves in a position in which the main valve is about to be moved to change the induction. Fig. 2 is a section on the line of the eduction-ports of the valve viewed from the reverse side from that of Fig. 1. Fig. 3 is a transverse section on the line *x x* of Fig. 1, showing one of the auxiliary valves in a position for receiving water to move the main valve; it also shows the weighted arm for counterbalancing the weight of the diaphragm.

As shown in Figs. 1 and 2, the case is divided into a measuring-chamber, A, and a valve-chamber, B. The former is fitted with a piston or diaphragm, C, journaled at D, and the form of the chamber is necessarily semi-cylindrical to adapt it to the movement described by the piston. The valve-chamber B is preferably situated underneath the chamber A. The valve E, which is represented of cubical form, but may as well be made cylindrical, fits the sides of the chamber like a piston, but there is longitudinal space allowed for it to move reciprocally from end to end of the chamber. This valve has two induction-ports, F F′, communicating below with the supply-pipe G, and above with corresponding ports *f f′*, which enter the base of the chamber A. The ports *f f′* are situated on each side of the butment formed by the contact of the axial part of the piston with the bottom of the chamber, which prevents water communication between the two. When the valve is at one end of its movement the port F opens a direct passage from the supply G through the port *f* to the interior of the chamber A, and when at the other end the ports F and *f′* in the same manner admit the supply to the chamber A, but on the opposite side of the piston C, so that the water admitted actuates the piston alternately in each direction. The eduction side of the valve F is provided with a similar arrangement of ports, as seen in Fig. 2, the chamber A having two discharges, *h h′*, and the valve a passage, H, branching into, *i i*, at the bottom, so as to communicate with the discharge-pipe K leading to the faucet. The main trunk of the passage H alternately coincides with the ports *h h′*, while one of its branches, *i i*, opens into the pipe K in both positions of the valve.

The operation of the measuring-chamber will be understood when it is considered that the induction-ports F F′ are admitting water on one side of the piston C that which occupies the other side is escaping through the eduction-ports *h h′* H.

The valve E is operated automatically as follows: When the piston C has moved in its arc from one side of the chamber to the other it strikes the top of the auxiliary sliding valve-plate *l* and moves it downward until its port *o* coincides with the auxiliary supply-pipe *m*. Water then enters (being taken from the main supply-pipe through the auxiliary *m*) into the valve-chamber and forces the valve E to the opposite end of the chamber, and opens port *f′*, admitting the water on the opposite side of the piston C, so that it begins its reverse movement. When it reaches the opposite side it moves down the auxiliary sliding valve *l′*, admitting water into the valve-chamber through an auxiliary supply on that side to change back the valve again. The two auxiliary valves *l l′* are connected by the tilting-frame *n n*, which has its bearing on the journal of the axis of valve C, so that when one auxiliary valve is pushed down the opposite one rises, and each valve being provided with two ports, *o p*, as seen in Fig. 3, the opening of the induction *o* on one side simulta-

neously opens a discharge, *p*, on the opposite side of the valve. The discharge *p* is of greater area than the induction, so that the water escapes freely from the valve-chamber and offers no resistance to the movement of the valve. The auxiliary inlet and waste-pipes are placed on the same horizontal line, while the inlet-ports *o o* in the valves are above the escape-ports *p p;* hence the depression of one valve admits water, and the simultaneous elevation of the other discharges that from the opposite end of the valve-chamber. The arm *t* in Fig. 3, on the outer side of the case, is fixed to the journal of the valve C, and is weighted at *s*, on the end opposite to the valve, to exactly balance the latter, so that the pressure will have only the piston and inertia of the valve to overcome. The opposite end of the arm may be employed to actuate the indicator of any suitable registering attachment.

The piston C may be of the ordinary disk-form to work in a cylindrical chamber, if desired, and operate, in connection with the valve E and its auxiliaries, in substantially the same manner, with only slight and merely mechanical changes of the construction.

I claim as my invention—

1. In combination with the piston C and chamber A, the valve E, constructed as described, and actuated by hydraulic pressure through the auxiliary pipes *m m*, substantially as and for the purpose set forth.

2. In combination with the piston C, the oscillating frame *n n* connecting the auxiliary valves *l l'*, substantially as and for the purpose set forth.

3. The valve C, balanced by the weight *s* on the arm *t*, substantially as and for the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY W. MATHER.

Witnesses:

K. N. JONES,

W. W. PHILLIPS.