Sheet 1 - 2 Sheets.

Horton & Hawkins

Piston Meter,

No. 68,746. Patented Sep. 10, 1867.

Fig: 1.

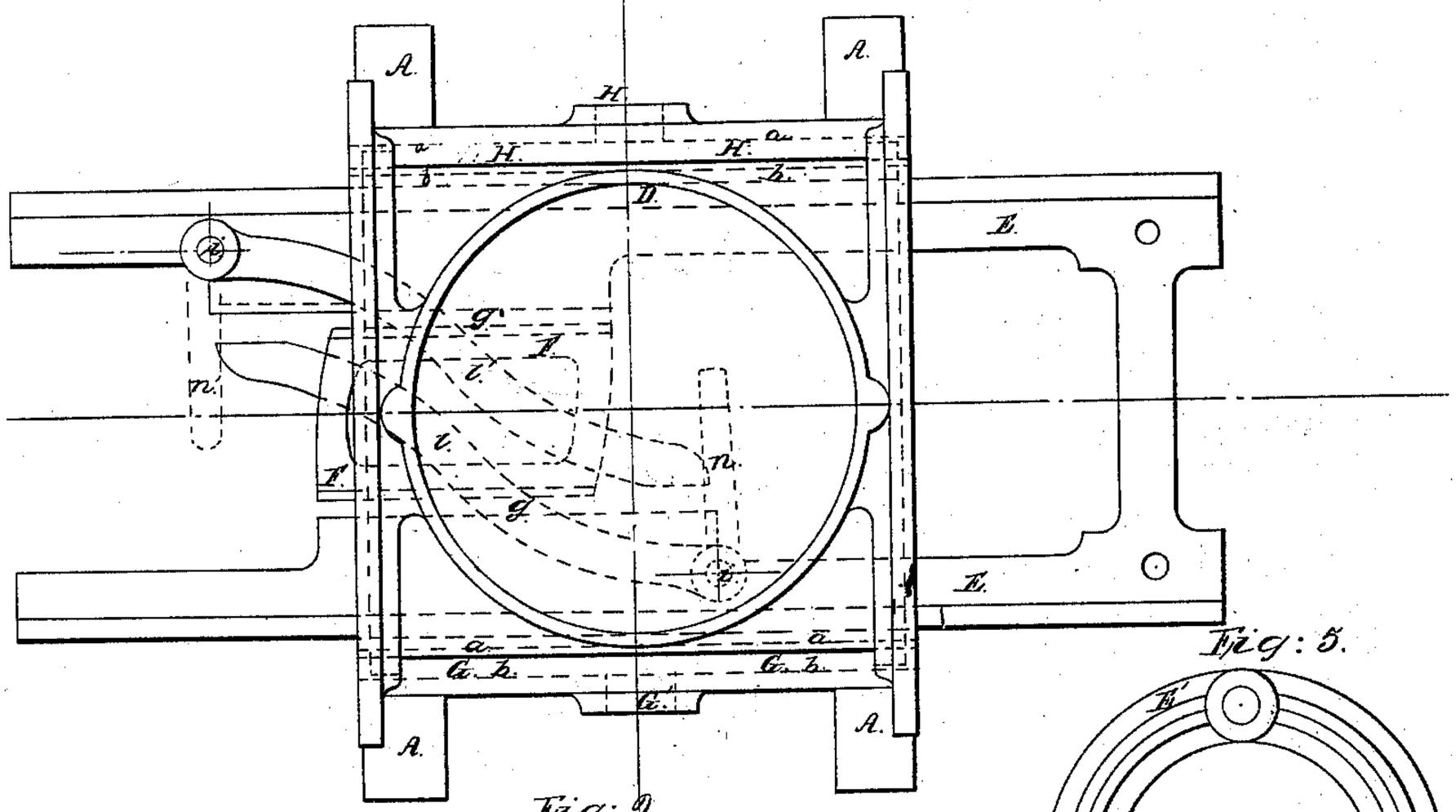

Fig: 2.

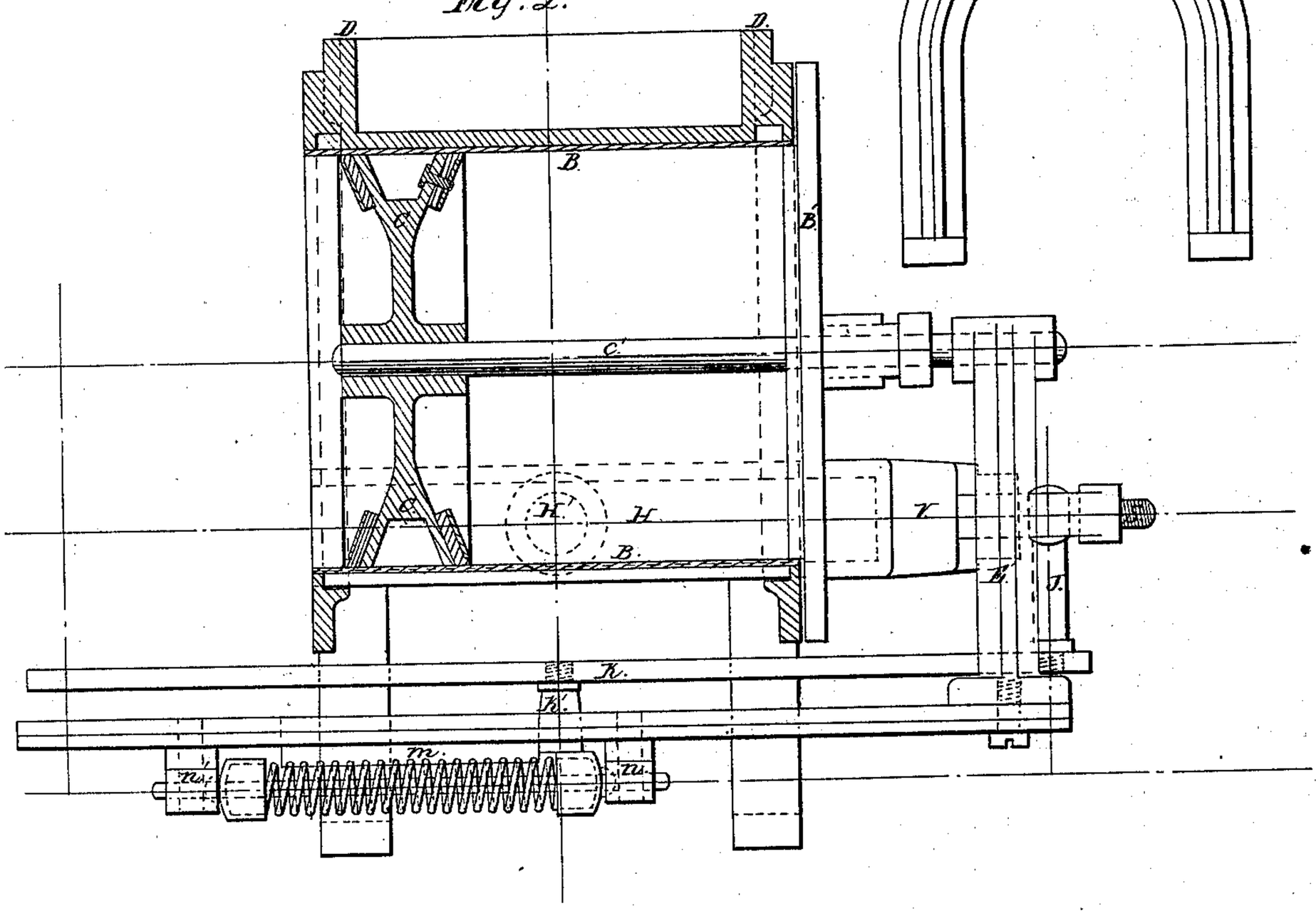

Fig: 5.

Witnesses:
H. L. White
D. S. Coombs

Inventors:
Jacob C. Newton,
Samuel K. Hawkins
By J. S. Coombs
Atty

Sheet 2-2 Sheets.

Horton & Hawkins,

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Fig: 3.

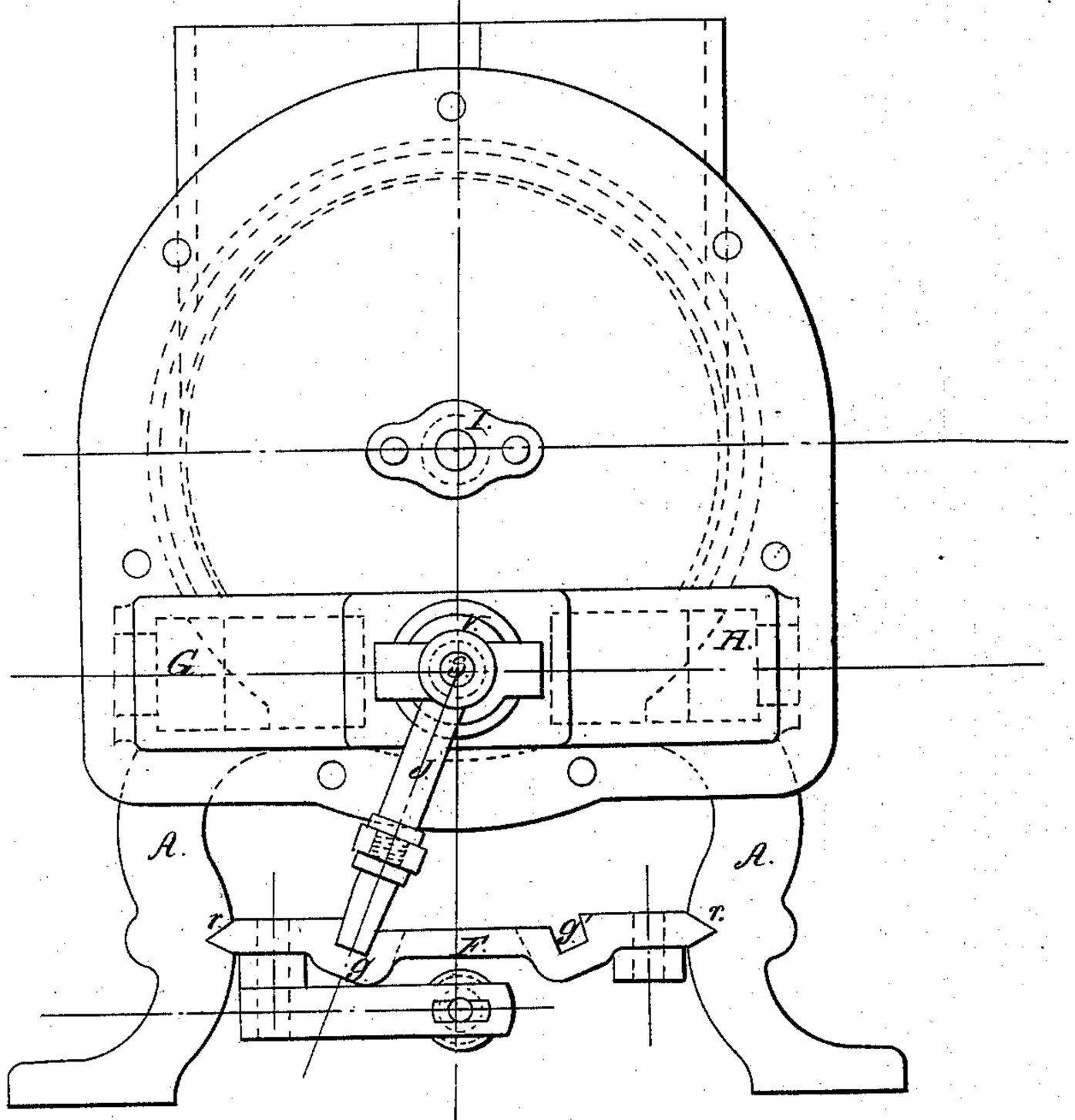
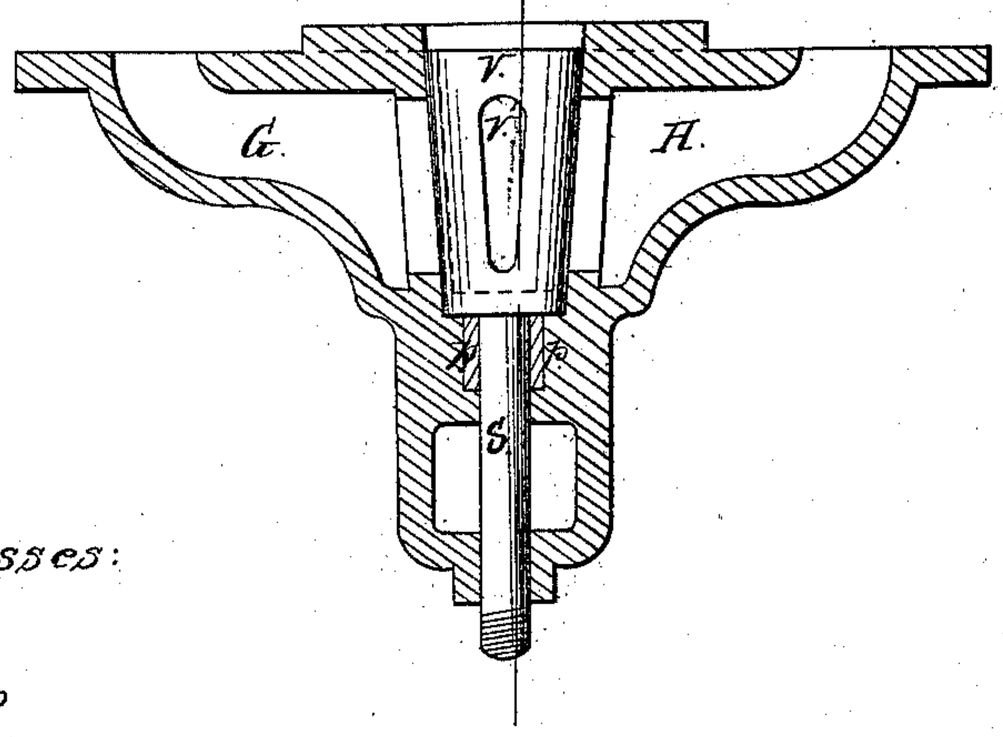


Fig: 4.



Witnesses:
H. J. White
J. L. Coombs

Inventors:
Jacob C Horton
Samuel K. Hawkins
By J. L. Coombs
Atty

United States Patent Office.

JACOB C. HORTON, OF NEW YORK, AND SAMUEL K. HAWKINS, OF LANSINGBURG, NEW YORK.

Letters Patent No. 68,746, *dated September* 10, 1867.

IMPROVEMENT IN LIQUID AND FLUID-METERS AND IN THE METHOD OF OPERATING VALVES.

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

TO ALL WHOM IT MAY CONCERN:

Be it known that we, JACOB C. HORTON, of the city, county, and State of New York, and SAMUEL K. HAWKINS, of Lansingburg, in the county of Rensselaer, and State of New York, have invented a new and useful Improvement in Liquid and Fluid-Meters, and in the Method of Operating Valves; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Our invention consists in improvements upon a liquid and fluid-meter, and a "new method of operating valves," described in Letters Patent granted to us, bearing date April 2, 1867. In the accompanying drawings—

Figure 1 is a plan view of our improved meter, the cylinder-heads being removed, and the under parts shown by dotted lines.

Figure 2 is a vertical section through the centre of the measuring-cylinders, one cylinder-head being removed.

Figure 3 is a front end view of the meter.

Figure 4 is a view of one of the valves, which operates alternately as an induction and eduction valve, with the valve-seat, induction and eduction pipes, and cylinder-head all cast together.

Figure 5 is a detached view of the bracket which connects the piston-rod with the reciprocating frame and plate underneath the cylinder.

A A are the legs upon which the meter stands, and which may be cast solid with the cylinder. B B is the measuring-cylinder, made of cast-iron and lined with brass. C is the piston, and C′ the piston-rod. B′ is the front head of the cylinder. D is a dial-case for containing a dial-face and registering index, not shown in the drawings. E is a reciprocating frame, located underneath the cylinder, and carried to and fro by the piston-rod, by means of the connecting bracket E′ attached to the front end of the piston-rod. F is a skeleton plate connecting the two side bars of the frame E, and having in its upper side two grooves, *g* and *g′*, shown by dotted lines in fig. 1, but more distinctly in cross-section in fig. 3. G G (the internal diameter of which is shown by dotted lines *a b*, fig. 1,) is the induction pipe, branching at the induction port G′, and running to each end of the cylinder, where it connects with continuation cross pipes, one of which is shown at G, fig. 4. H H is the eduction pipe, (shown by dotted lines *a b*, fig. 1,) branching at the eduction port H′, and connecting with continuation cross pipes in the cylinder-heads, like the induction pipe, one of which said continuation cross pipes is shown at H in fig. 4. The side induction and eduction pipes are cast on and with the cylinder, and the cross pipes are cast on and with the cylinder-heads, so that when the cylinder-heads are in place, the side and cross pipes unite and become continuous. At each end of the cylinder there is a conical oscillating valve, V, which is hollow, and has an opening or slot, V′, to admit water or other liquid or fluid into the cylinders, through induction pipe G, or out through eduction pipe H, as said slot coincides with one or the other of said pipes. S, fig. 4, is the valve-stem, and *p p* packing. A precisely similar valve, with the same arrangement of pipes, stem, and packing, is connected with the opposite cylinder-head. The piston-rod moves in a stuffing-box, I, fig. 3, in the front cylinder-head, but does not pass through the rear cylinder-head. To the outer end of each valve-stem an arm, J, is rigidly affixed, extending downward, at right angles with the valve-stems. These arms J are connected together at their lower ends by a bar, K, fig. 2, but neither the valve nor the arm J is shown at the rear end of the cylinder in the drawing. K′ is a stud fixed in the centre of the bar K, and projecting down into groove *g* or *g′*, according as said stud may be thrown to the right or left, by the means hereinafter described. *l* and *l′* are two levers pivoted to the side bars of the reciprocating frame E, (on the upper side thereof,) at *i* and *i′*. These pivots pass through the said side bars, under which are two transverse levers *n* and *n′*, attached to the lower ends of said pivots *i* and *i′*, both the upper and lower levers being attached rigidly to the pivots, which turn in said side bars, thus forming, in fact, bent levers, turning on their fulcra, *i* and *i′*. The ends of said transverse levers, *n* and *n′*, are connected by a spiral spring, *m*, (shown clearly in fig. 2,) which tends to strain the ends of said levers towards each other. The slots V′ in the valves V are on opposite sides of said valves, so that (the valves oscillating together) when the slot at the front end coincides with the induction pipe G, that at the rear end will coincide with the eduction pipe H, and *vice versa*.

The operation is as follows: When the piston is moving from the rear end to the front end of the cylinder, the stud K′ will be in the groove *g* of the reciprocating plate F, holding the valves in such position that the slot in the rear end valve will coincide with induction pipe G, while eduction pipe H, at the same end, will be closed, but at the same time induction pipe G, at the front end, will be closed, and eduction pipe H, at the same end, will be open. The liquid (under sufficient pressure) will therefore be forced into the rear end of the cylinder through the induction pipe and valve, moving the piston towards the front end of the cylinder, and forcing the liquid out of said front end through the valve and eduction pipe. When the piston has passed to the extreme front end of the cylinder, the rear end of reciprocating plate F will have passed the stud K′, which, being disengaged from the groove *g*, will be suddenly thrown by the lever *l*, actuated by the spiral spring *m*, across the end of plate F, until arrested by a ledge in line with the outer edge of groove *g′*. This causes both valve-stems so far to oscillate as to reverse the valve ports, bringing the slot in the front end valve to coincide with the induction pipe, and closing the eduction pipe at that end, while at the rear end the induction pipe is closed and the eduction pipe is opened at the same instant. As soon as said valves are reversed the pressure on the front side of the piston will cause it to reverse its motion automatically, and travel back towards the rear end of the cylinder, the stud K′ taking the groove *g′*, and when it reaches that point (as shown in fig. 2) the lever *l′*, pressing upon the stud K′, will throw it back to groove *g;* and so the reciprocating motion of the piston will be automatically kept up, and at each stoke of the piston the contents of the measuring-cylinder will be discharged in uniform quantities. The reciprocating frame E slides in V-shaped grooves in the legs of the machine, as shown at *r r*, fig. 2.

An index to be operated by familiar mechanism, which will suggest itself to any competent mechanic, should be attached, to indicate, on a dial-plate, the strokes of the piston. The meter is intended to operate under a pressure of about two pounds to the square inch, more or less.

Having thus fully described our invention, and its mode of operation, what we claim as new, and desire to secure by Letters Patent, is—

1. In combination with a measuring-cylinder and reciprocating piston, the hollow oscillating valves, so constructed as to operate alternately as induction and eduction valves, substantially as described.

2. We claim the reciprocating grooved plate F, in combination with the oscillating valves, arms J, bar K, stud K′, and the levers and spring, by which said stud is thrown from one groove to the other, substantially as described.

3. We claim the reciprocating grooved plate F, in combination with the stud K′ and the levers and spring by which said stud is thrown from one groove to the other, substantially as described, as a means of operating oscillating valves.

4. We claim the hollow oscillating valve V, with its single port V′, so constructed as to operate alternately as an induction or eduction valve to regulate the flow of any kind of liquids or fluids, substantially as described.

J. C. HORTON,
S. K. HAWKINS.

Witnesses:
FRANCIS WASHBURN,
JOHN BUTCHER.