2 Sheets--Sheet 1.

J. M. BLANCHARD.

Fluid-Meters.

No. 146,745. Patented Jan. 27, 1874.

Fig. 1.

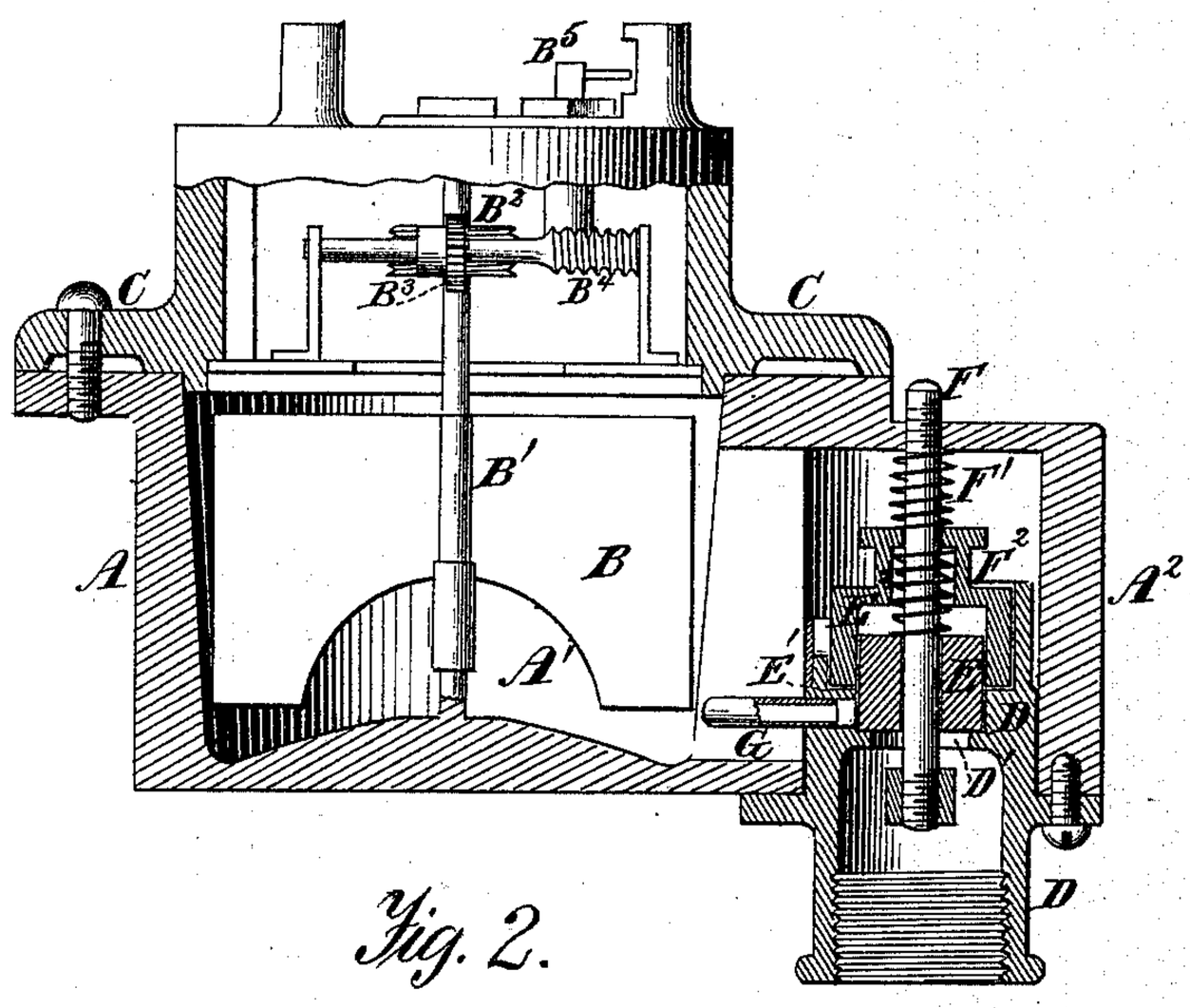
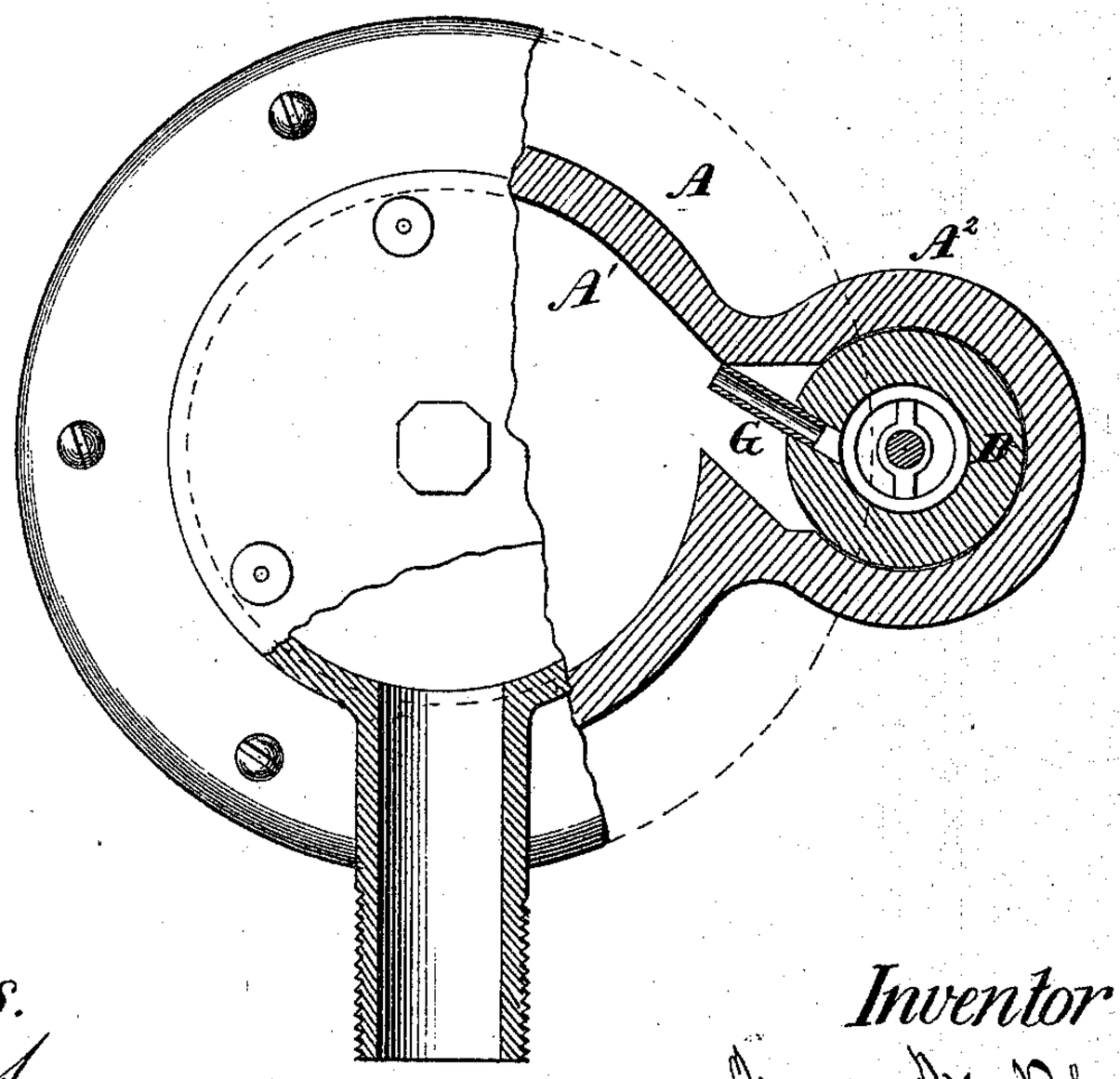


Fig. 2.



Witnesses.

A. Ruppert.
C. Edwd. Gill

Inventor

James M. Blanchard

2 Sheets--Sheet 2.

J. M. BLANCHARD.

Fluid-Meters.

No. 146,745. Patented Jan. 27, 1874.

Fig. 3.

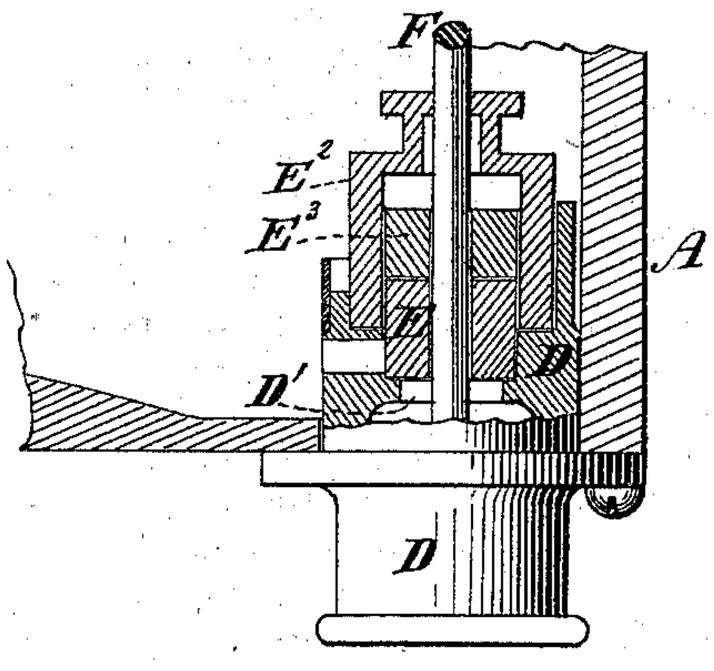
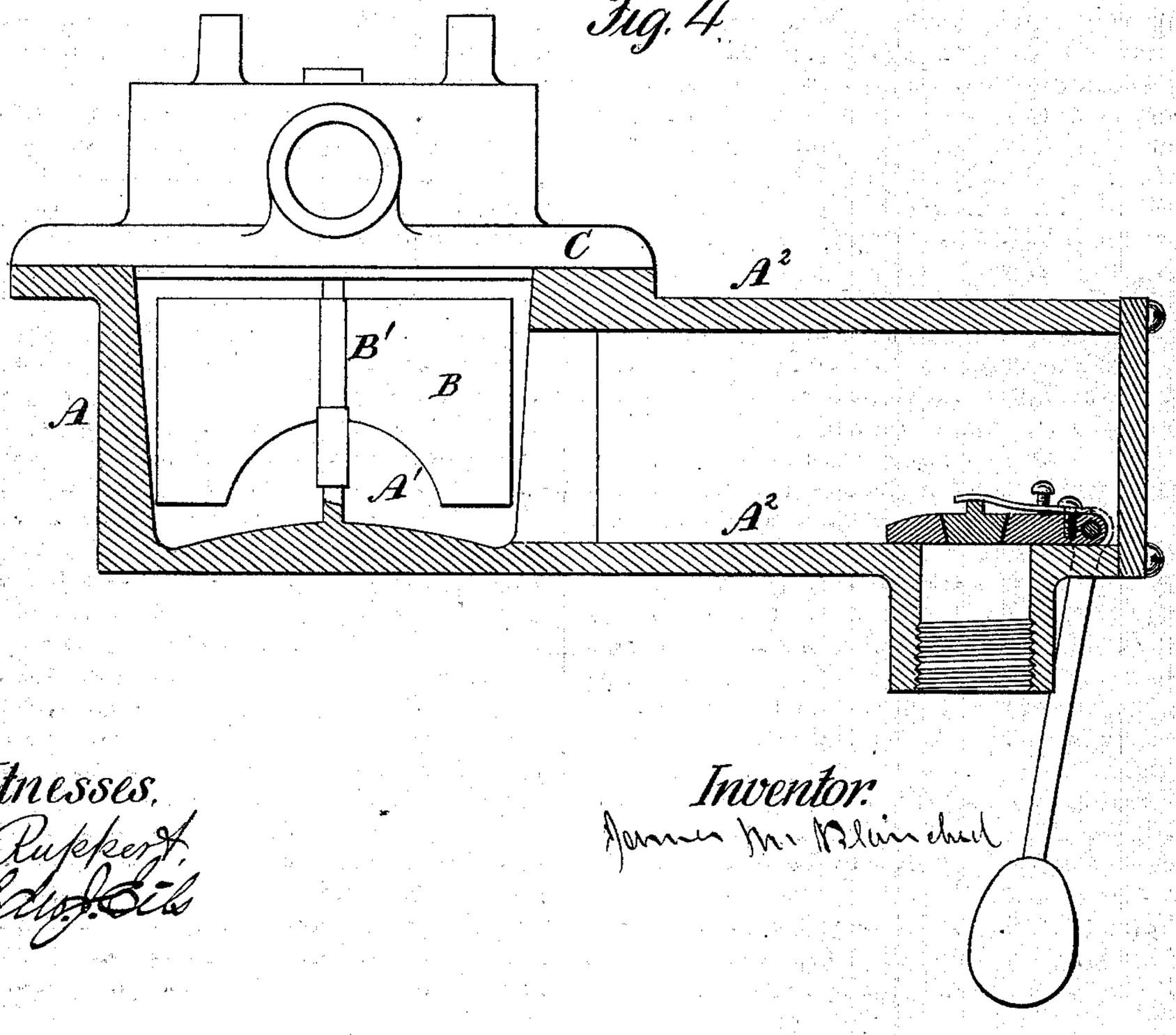


Fig. 4.



Witnesses.

A. Ruppert Jr.
E. Schuyler Bibb

Inventor.

James M. Blanchard

UNITED STATES PATENT OFFICE.

JAMES M. BLANCHARD, OF WASHINGTON, D. C., ASSIGNOR OF ONE-HALF HIS RIGHT TO WILLIAM B. BRITTINGHAM, OF CINCINNATI, OHIO.

IMPROVEMENT IN FLUID-METERS.

Specification forming part of Letters Patent No. **146,745**, dated January 27, 1874; application filed January 3, 1874.

To all whom it may concern:

Be it known that I, JAMES M. BLANCHARD, of Washington, in the District of Columbia, have invented a certain Improvement in Fluid-Meters, of which the following is a specification:

In fluid-meters, as heretofore constructed, great difficulty has been experienced from the fact that, owing to the friction to be overcome in moving the parts, there is not a sufficient difference of pressure between the induction side of the pistons or wheels, which are used for measuring the water, and their eduction sides, when small quantities are being drawn, to cause the machine to move; but there is a sufficient difference to permit an amount of water to flow past the pistons or wheels, and to be drawn from the eduction-pipe without being registered, nearly sufficient in quantity to overcome all of the friction of the machine, thus enabling the person having charge of the meter to obtain a large amount of water of which no registration is made; or, in other words, if one pound more of pressure is required on the induction side of the piston or wheel than there is on the eduction side to cause the parts of the machine to be put in motion, then it follows that if the pressure is removed from the eduction side, by opening a small aperture, so as to reduce the pressure upon that side to the extent of seven-eighths of a pound, the piston or wheel will not move, and yet water may pass in sufficient quantities to supply the place of that drawn through the aperture in the eduction-pipe without registration taking place.

My invention is designed to remedy the defect above alluded to; and to this end it consists in combining with water-meters—whether of the type which employ pistons, or those in which a current or other wheel is used—a plurality of pistons or valves, for producing a double induction of the fluid to be measured; and it further consists in the combination and arrangement of some of the parts of which the device is composed, as will be more fully described hereinafter.

Figure 1 is a sectional view of a current-wheel meter, the parts shown being a case for the wheel to revolve in, a revolving wheel, a registering mechanism, double induction pistons or valves, and a small induction-pipe for directing the water first admitted to the revolving wheel. Fig. 2 is a plan view, with a portion of the case removed in order that the induction and eduction apertures may be seen, and also the pipe above alluded to. Fig. 3 is a view, partly in section and partly in elevation, showing the induction pistons or valves as used with weights for controlling the induction of the fluid. Fig. 4 is a sectional elevation of the meter with a double swinging valve for controlling the induction of the fluid.

Corresponding letters denote corresponding parts in all of the figures.

In constructing meters of the type shown in the drawings, I use a case, A, of cast-iron, or of any other suitable metal, said case being provided with a cavity, A^1, for the reception of a wheel, B, said wheel being stepped in the bottom of case A, and having a shaft, B^1, which extends upward to, and has a bearing in, the cap C, which is made to fit the upper surface of the case A, a suitable elastic packing being placed between the two for the purpose of making a tight joint. Upon the upper portion of the shaft B^1 there is placed a worm-wheel, B^2, which meshes into and turns a pinion, B^3, upon a horizontal shaft, upon which there is another worm-wheel, B^4, which meshes into a wheel upon the lower end of a vertical shaft, B^5, which passes up through the cap C, and operates any suitable registering mechanism. Upon one side of the case A there is placed a projection, A^2, which serves as an induction-nozzle and as a receptacle for the induction pistons or valves. The liquid to be measured may be inducted from the bottom of the piston or valve chamber, as shown in the drawings, or it may be through the side of said case; but in either case it should be admitted below or outside of the pistons or valves, in order that the important feature of my invention may be realized. In the bottom or in the side of the case A there is formed an aperture for the reception of a piston or valve chamber, D, the lower end of which, in the example shown, is provided with a screw-thread for the attachment of the induction-pipe; and it is also provided with a

flange by which to attach it to the case A. Upon that portion of the chamber D which is immediately within the case A there is a seat, D′, upon which a piston or valve, E, rests when the meter is not in operation. A short distance above or within the seat D′ there is formed another seat, E^1, upon which a piston or valve, E^2, rests when in a state of rest. The pistons E and E^2 may be of the form shown in Fig. 1, and be guided in their movements by a rod, F, and springs F^1 F^2, as shown in Fig. 1; or they may be held to their seats by their own weight, or by additional weights F^3, as shown in Fig. 3, they being applied by being passed upon the rod, one or more, above each of the pistons or valves. In the drawing, the chamber D, the rod F, and the pistons or valves are shown as in a vertical position, but it is apparent that they may be placed in a horizontal position, if found necessary; but I prefer the position shown, because of the fact that there will be less friction upon the parts when thus arranged, and because of the further fact that they will not be so liable to become choked with matter deposited from muddy water when in the vertical position. Whatever position these pistons or valves may be made to assume, it is of the first importance that they be so arranged that, as the liquid to be measured is admitted below or outside of them, the one lettered E, or the one which controls the first induction of the liquid, shall rise from or leave its seat before the larger or outer one does, in order that a small amount of the liquid may pass to the measuring mechanism, said quantity being at all times sufficient to move such mechanism, so that no water or other liquid can pass without being registered; and, in order that this result may be accomplished with certainty at all times, the piston or valve E is made of a certain weight in proportion to its area, so as to insure its remaining upon its seat until the pressure is relieved in front of it by opening an aperture in the eduction-pipe sufficiently large to admit of the passage of sufficient water to insure the movement of the registering mechanism. The water thus admitted constitutes what I have termed the first induction, and it will be seen that, until this induction takes place, no water can pass the pistons or valves, and consequently no water can be drawn from the meter that is not registered. The devices which I have chosen to illustrate my invention are shown in Figs. 1 and 3, where it will be seen that there is placed in the chamber D a piston or valve, which is free to move up and down, or out and in, in said chamber, and that a seat is provided for its lower or inner end to rest upon, so that when it is in the position shown in the figures just alluded to, no water or other liquid can pass it. Within this piston or valve there is a cavity, in which another and smaller piston or valve moves, the seat of which is also within the chamber, but nearer to the induction-aperture than the larger one, in order that, as the liquid enters, it shall press first upon said smaller piston or valve, and raise it from its seat and admit a small quantity of liquid, as and for the purpose above described. Upon referring to the drawing, it will be seen that there is an aperture in the wall of the chamber D, into which a small pipe, G, is secured, which, when the piston or valve E has been raised so as to come in contact with the one E^2, or so as to uncover the aperture in the chamber, will conduct the liquid admitted through said valve E directly to the measuring mechanism, and that, when used in a current-wheel meter, the direction given to the jet is such as to cause it to form a current around the outer portion of the space A^1, in which the wheel revolves. After the piston or valve E has been raised to its full extent, and upon causing a larger opening to be made in the eduction-pipe by opening a larger cock, or by increasing the opening in the one already opened, and a consequent further reduction of the pressure or resistance upon the eduction side of the pistons or valves, the liquid presses upon the pistons or valves E and E^2, and carries them both up or open to such an extent as to cause the meter to discharge the full amount of liquid which it is made to pass, and thus the second induction is provided for.

I have shown that the control of the pistons or valves, so far as relates to their movements up and down, and the pressure at which they shall rise from their seats, may be controlled either by weights or by springs; but I prefer the former, as less liable to derangement.

In Fig. 4 of the drawing there is shown a modified form of the induction-valves; but it will be observed that the double-induction principle is maintained by providing a small valve in a larger one, so arranged that it may be adjusted to open at any required pressure less than that which is required to open the larger one, and thus provide for the first induction, and for the passage of a sufficient amount of water to insure the moving of the registering medium, and that upon the further relief of the pressure or resistance on the eduction side of said valves the large one will open and admit of the second induction taking place, a weight being provided for the purpose of regulating said second induction.

The arrangement of the pistons or valves in both of the examples shown is such that their action is to a great extent independent of each other, and may be made entirely so by fastening either of the pistons or valves upon their seats by springs or weights, and allowing the other to perform its functions, as usual.

The position of the induction-pipe with reference to the eduction is shown in Figs. 2 and 4, where it will be seen that the eduction-passage is nearly at a right angle to that of the induction, the object being that the peculiar form of the passage from the piston or valve chamber to the wheel-chamber may be enabled to form a current, which shall extend around a considerable portion of said chamber, and thus cause the water to remain longer in con-

tact with the buckets of the wheel, and insure the coincident movement of both, as a consequence of which a perfect, or nearly perfect, registration will take place.

The examples given in this case all show a current-wheel meter as being used in connection with the double induction of the liquid; but it is not intended thereby to limit the use of this improvement to such meters, as it is equally applicable to meters which have pistons, or are provided with different forms of wheels, or any other devices for measuring the fluid which passes them, and the governing-pistons, valves, or other equivalent mechanism, may be placed in the eduction-pipe, and be made there to perform the same functions as are herein described.

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

1. The combination, with a fluid-meter, of induction pistons or valves E E^2, they being arranged substantially as set forth, whereby to cause a double induction of the fluid, as specified.

2. The combination and arrangement of the piston or valve E, which controls the first induction of the liquid, and the pipe or aperture G, said pipe being arranged upon the inner or eduction side of the piston or valve, whereby it is made to conduct all of the fluid admitted by the first induction-valve directly through it to the wheel-chamber, thereby strengthening the current that acts upon the wheel, substantially as and for the purpose set forth.

3. The combination, in a water-meter, of the pistons or valves E E^2, springs or weights F^1 F^2, case A, and wheel or piston B, substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES M. BLANCHARD.

Witnesses:
B. EDW. J. EILS,
A. RUPPERT.