(No Model.)

G. S. FOLLANSBEE.

PISTON WATER METER.

No. 354,124. Patented Dec. 14, 1886.

Fig. 1.

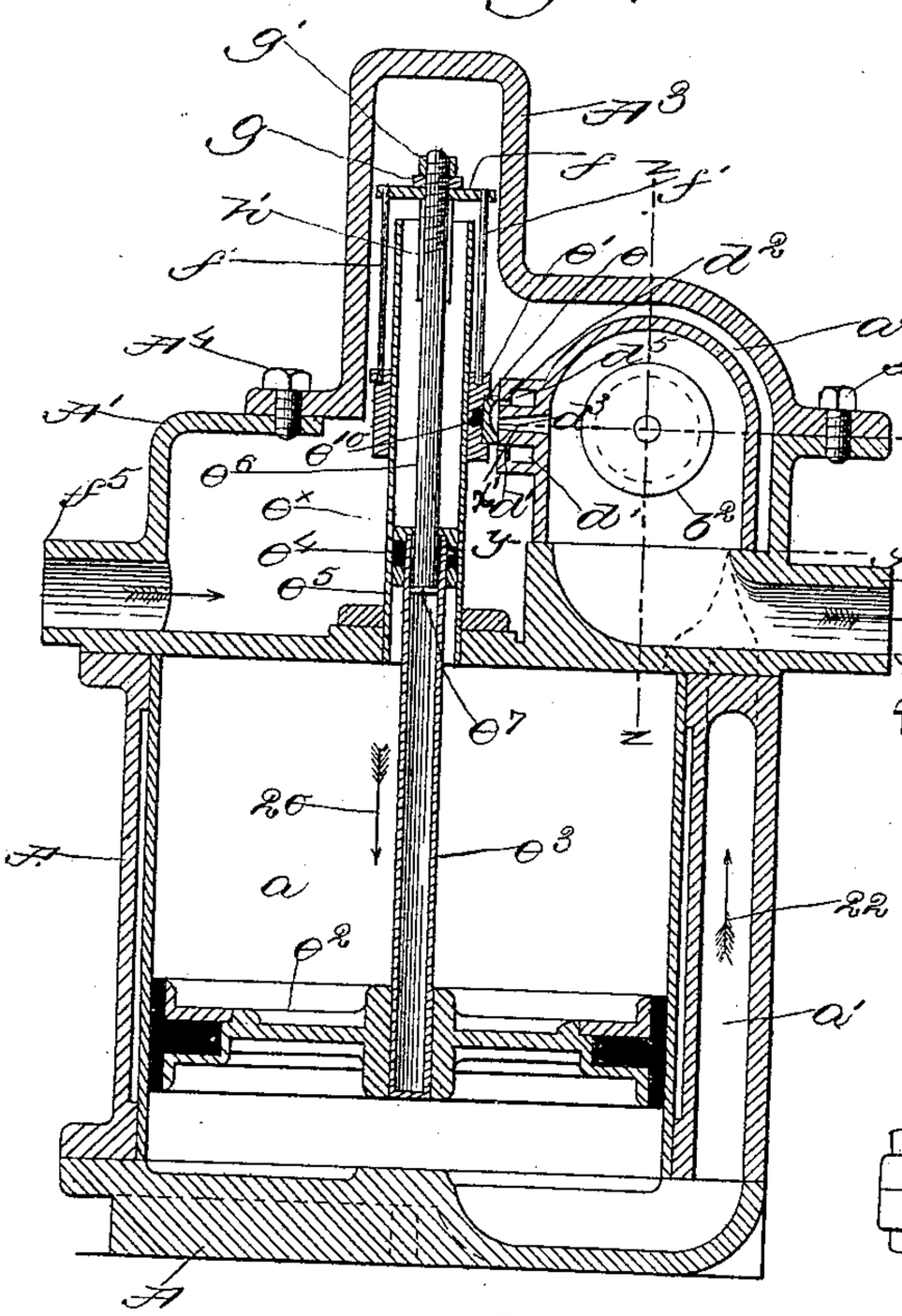

Fig. 2.

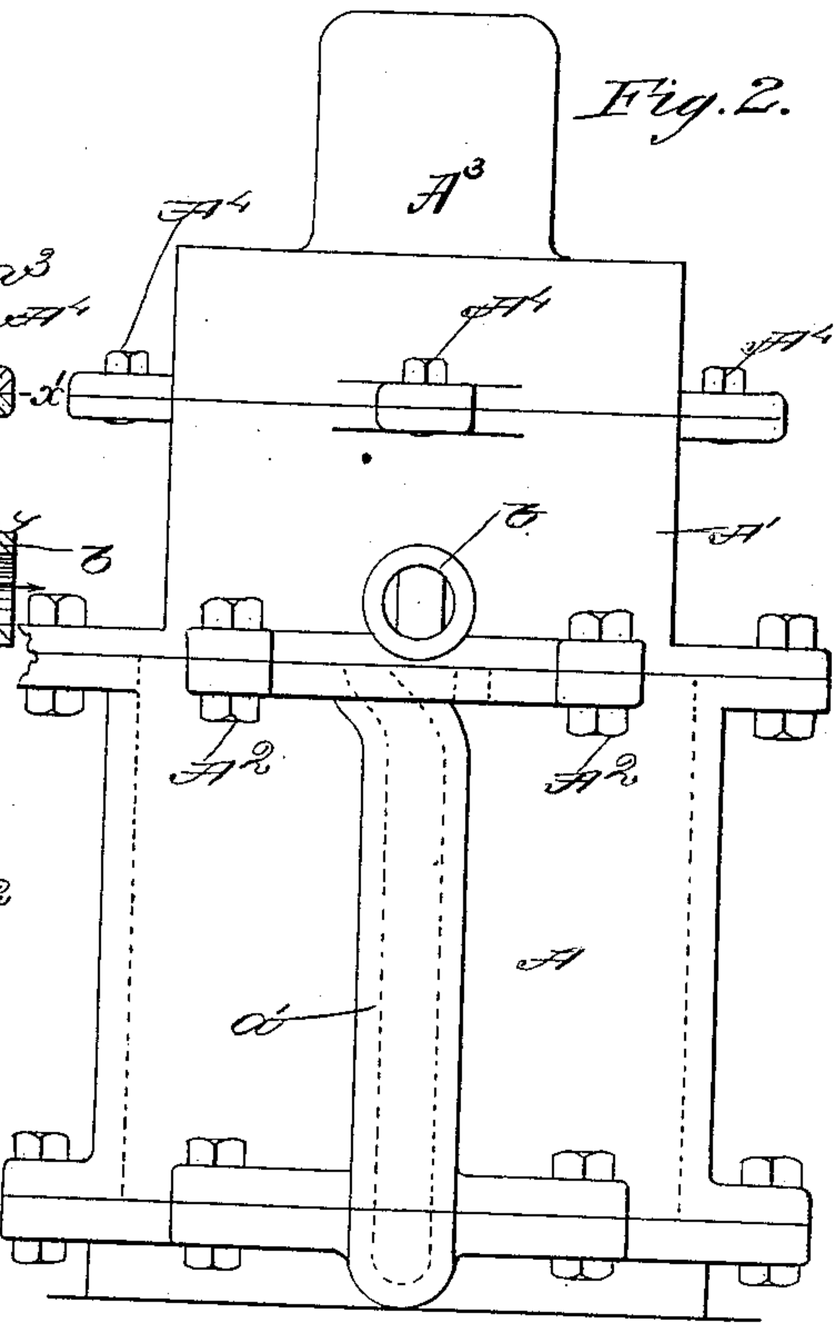

Fig. 3.

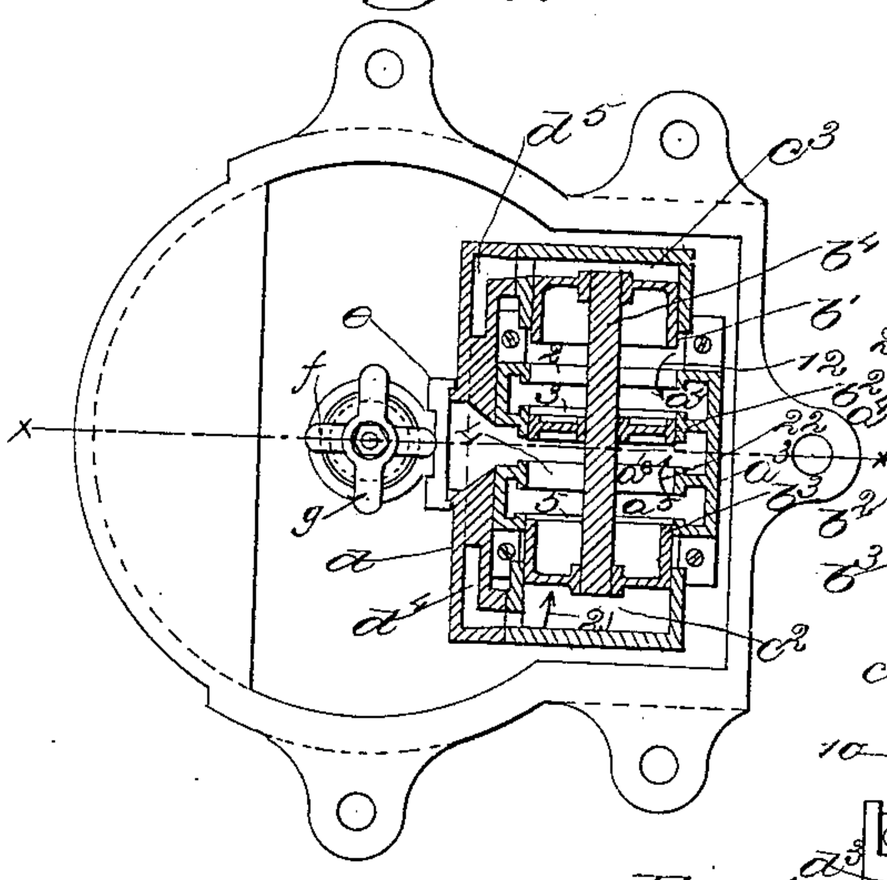

Fig. 8.

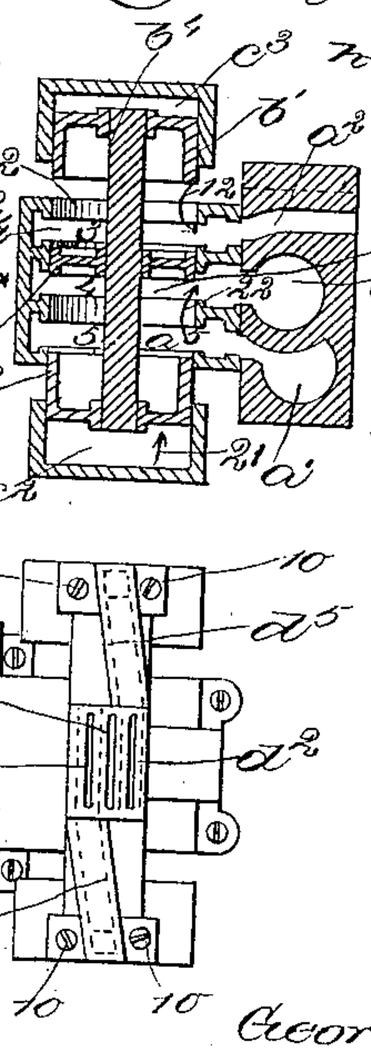

Fig. 5.

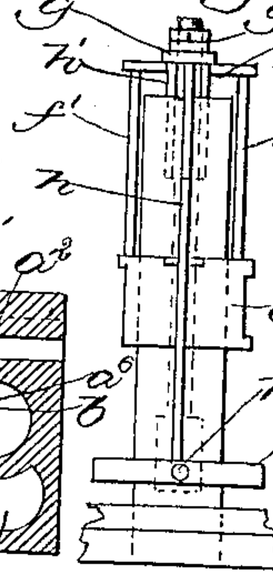

Fig. 6.

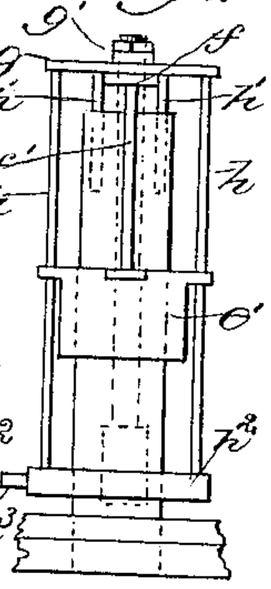

Fig. 4.

Fig. 7.

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UNITED STATES PATENT OFFICE.

GEORGE S. FOLLANSBEE, OF BOSTON, MASSACHUSETTS.

PISTON WATER-METER.

SPECIFICATION forming part of Letters Patent No. 354,124, dated December 14, 1886.

Application filed July 31, 1886. Serial No. 209,634. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. FOLLANSBEE, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Meters, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to fluid-meters of that class known as "piston meters," and has for its object to improve and simplify the construction of the same.

My invention has for its primary object to increase the capacity of the meter without increasing its size, and I accomplish this feature of my invention by making the piston-rod of the piston in the fluid-measuring cylinder hollow, and extending into the said hollow piston-rod a rod connected, as will be described, with and so as to actuate the mover for the valve controlling the auxiliary pistons.

The especial features in which my invention consist will be hereinafter described in detail, and be pointed out in the claims at the end of this specification.

Figure 1 is a vertical section in the line $x\ x$, Fig. 3, of a fluid-meter embodying my invention; Fig. 2, a side elevation, seen from the right hand of Fig. 1; Fig. 3, a partial top and sectional view, the section being on line $x'\ x'$ of Fig. 1, to clearly show the construction of the valve; Fig. 4, a side view of the valve shown in Fig. 1; Figs. 5 and 6, details to be referred to; Fig. 7, a plan of the ported head on line $y\ y$ of Fig. 1, looking down to show the ports in said ported head; and Fig. 8, a section through the valve-chest on line $z\ z$, Fig. 1.

The metallic outer casing, A, containing within it a measuring-cylinder, a, has a ported head, A′, secured thereto by suitable bolts, A^2, the said head being surmounted by a cap, A^3, secured thereto by bolts A^4, and forming a chamber, into which the water is first admitted. The cap A^3 is shaped, as shown in the drawings, to serve as a cover for a valve-chest, a^3, containing a piston-valve, as will be described.

The valve-chest a^3 (see Figs. 1 and 3) is divided to constitute passages $a^4\ a^5\ a^6$ in communication with passages in the ported head A′, the passage a^4 being in communication with a port, a^2, (see Figs. 7 and 8,) leading from the ported head into the upper end of the measuring-cylinder a, the passage a^5 being in communication with a passage, a', leading from the ported head to the lower end of the casing A, (see Fig. 1,) while the passage a^6 communicates with the outlet-port b of the meter. The walls of the valve-chest a^3 are provided with apertures to form ports 2 3 4 5, which are closed by means of valves, herein shown as cylinders or pistons $b'\ b^2\ b^3$, mounted in suitable manner upon a common valve-stem, b^4.

The pistons b' and b^3, as herein shown, are made of sufficient size to enter auxiliary cylinders $c^2\ c^3$, herein shown as attached by screws 10 to a second casing, d, which, as herein shown in Fig. 3, forms part of the valve-chest a^3, the valve b^2 being reciprocated across the passage a^6 to open the port 4 and close the port 3, and vice versa.

The casing d is provided with ports $d'\ d^2\ d^3$, (see Figs. 1 and 4,) the port d' being connected by passage d^4 (see full lines, Fig. 3, and dotted lines, Fig. 4) with the cylinder c^2, and the port d^2 by passage d^5 with the cylinder c^3, while the port d^3 is connected to the discharge-port b through the passage a^6. The ports $d'\ d^2$, communicating with the auxiliary cylinders $c^2\ c^3$, respectively, are opened and closed by an ordinary slide-valve, e, fitted into and actuated by a valve-mover, e', (see Fig. 1,) a piece of india-rubber, e^{10}, being herein shown as inserted between the said valve and its mover to keep the valve pressed upon its seat.

Within the cylinder a is a piston, e^2, the piston-rod e^3 of which is provided at its upper end with a packing, e^4, secured by a collar, $e^\times$, said packing being fitted to and moved in a tube, e^5, supported in the ported head A′. The piston-rod e^3 is made hollow to receive within it a rod, e^6, provided at one end with a collar, e^7, to be engaged by the collar $e^\times$ when the piston e^2 is at the bottom of its stroke. The rod e^6 has its other end extended through a plate, f, having depending from it rods f', which are secured to the valve-mover e'. (See Figs. 1 and 5.) The rod e^6 is also extended through a second plate, g, and is screw-threaded at its upper end to receive a nut, g', by which the length of the rod e^6 below the plate f can be

adjusted, thereby controlling the movement of the valve *e* and determining the length of the piston-stroke. The plate *g* supports rods *h*, which are connected at their lower ends to a collar, h^2, having a projecting arm, h^3, which in practice will be jointed with any usual registering mechanism common to piston meters, but not herein shown, as such registering mechanism does not form part of my invention. The rods *h* are extended through guides in the valve-mover *e'*, as shown in Fig. 6.

To the under side of the plate *g*, and extended into the tube e^5, are depending arms *h'*, (see Fig. 6,) against which the collar $e^\times$ strikes as the piston e^2 is moved on its upstroke, the said piston through the said arms moving the plate *g* upward, thereby actuating the registering mechanism to register the amount of fluid flowing through the meter in the usual manner. As the piston moves upward, and just before it reaches the end of its stroke, the collar $e^\times$ strikes against the plate *f*, lifting it and its attached rods *f'* upward a sufficient distance to move the valve *e* through the valve-mover *e'*, and thereby open the port *d'* and admit fluid through the passage d^4 to the cylinder c^2, and at the same time connect the cylinder c^3 with the exhaust or discharge pipe through the passage d^5.

In the operation of the meter, and as shown in the drawings, the piston e^2 is supposed to be on its downstroke, as indicated by the arrow 20, and the passage a^4, which communicates with the upper end of the cylinder through the passage a^2, is supposed to be open, as shown in Figs. 3 and 8, so that the water or other fluid from the inlet-pipe f^5 flows into the valve-chest a^3 through the passage a^4, and through the passage a^2 into the upper part of the cylinder *a*, as indicated by arrow 12, Figs. 3 and 8.

With the piston on the downstroke the port *d'*, communicating with the cylinder c^2, is open, as shown in Fig. 1, the water or other fluid flowing through said port and passage d^4 to the cylinder c^2, thus moving the piston b^3 outward or in the direction of arrow 21, Figs. 3 and 4, to close the port 5 by means of the valve b^3, the valve b^2 opening the port 4 and closing the port 3, and the valve *b'* opening the port 2. When the piston e^2 has reached the bottom of its stroke, the collar $e^\times$ engages the collar e^7 to move the valve *e* through the valve-mover, so as to open the port d^2 and connect the port *d'* with the exhaust d^3. The water flows through the ports d^2, passage d^5, into the cylinder c^3, moving the piston-valve *b'* to close the port 2 to the water-inlet, and open it to the exhaust *b*, and to open the port 5 to the water-inlet. As the piston e^2 is moved down, the water below it is forced out through the passages *a'* and a^5 to the exhaust *b*, as indicated by arrow 22, Figs. 1, 3, and 8.

With the piston e^2 at the bottom of its stroke and the port *d'* communicating with the exhaust-passage d^3, and the port d^2 communicating with the inlet f^5, as above described, the water first flows through the port d^2, passage d^5, into the cylinder c^3 to move the piston-valves b' b^2 b^3 toward the other end of the valve-chest from the position shown in Figs. 3 and 8—that is, cutting off the passage a^5 from the exhaust and opening it and the passage *a'* to place them in communication with the outside of the valve-chest a^3—that is, with the inlet f^5. As the passage a^5 is cut off from the exhaust the passage a^4 is connected therewith, thereby connecting the passage a^2 with the exhaust, so that the water above the piston e^2 may be discharged on the upstroke of the piston. The piston e^2 at the end of its upstroke strikes the plate *f* and moves the valve *e* into the position shown in Fig. 1, as above described. The piston-rod being hollow and receiving within it the rod e^6 permits of a longer stroke of the piston than if the rod e^6 formed an integral part of the piston-rod, thereby increasing the capacity of the meter without increasing its size.

I do not wish to limit myself to the means herein shown for connecting the rod e^6 with the valve *e*, as other suitable means might be employed; but I prefer the construction shown.

I claim—

1. In a fluid-meter, the measuring-cylinder *a*, a valve-chest containing a valve to control the admission of fluid to the measuring-cylinder, an auxiliary valve to control the admission of fluid to said valve-chest, the piston e^2 in the measuring-cylinder, having the hollow piston-rod e^3, and the rod e^6, extended within the said hollow piston-rod, and upon or over which the latter slides on the movement of the piston e^2, combined with means, substantially as described, to connect the rod e^6 with the said auxiliary valve, as and for the purpose specified.

2. In a fluid-meter, a measuring-cylinder, a valve-chest communicating with said measuring-cylinder, and having passages a^4 a^5 a^6 and ports 2 3 4 5, a piston-valve to co-operate with said ports, an auxiliary valve to control the admission of fluid to said valve-chest, a piston in the measuring-cylinder, having a hollow piston-rod, and a second rod extended within the said hollow piston-rod, and upon or over which the latter slides on the movement of the piston e^2, combined with means, substantially as described, to connect the said second rod with the said auxiliary valve, as and for the purpose set forth.

3. In a fluid-meter, a measuring-cylinder, a valve-chest communicating with said measuring-cylinder, and having passages a^4 a^5 a^6 and ports 2 3 4 5, auxiliary cylinders *c c'*, an auxiliary valve to control the admission of fluid to the said auxiliary cylinder, a piston in the measuring-cylinder, having a hollow piston-rod, and a second rod extended within the said hollow piston-rod, and upon or over which the latter slides on the movement of the piston e^2, combined with means, substantially as described, to connect the second rod

with the said auxiliary valve, as and for the purpose set forth.

4. In a fluid-meter, a measuring-cylinder, a valve-chest, piston-valves located therein, auxiliary cylinders *c c'*, in which the piston-valves are reciprocated, an auxiliary valve to control the admission of fluid to the said auxiliary cylinders, a piston in the measuring-cylinder, having a hollow piston-rod, and a second rod extended within the said hollow piston-rod, and upon or over which the latter slides on the movement of the piston e^2, combined with means, substantially as described, to connect the second rod with the said auxiliary valve, as and for the purpose set forth.

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

GEORGE S. FOLLANSBEE.

Witnesses:

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J. H. CHURCHILL.