

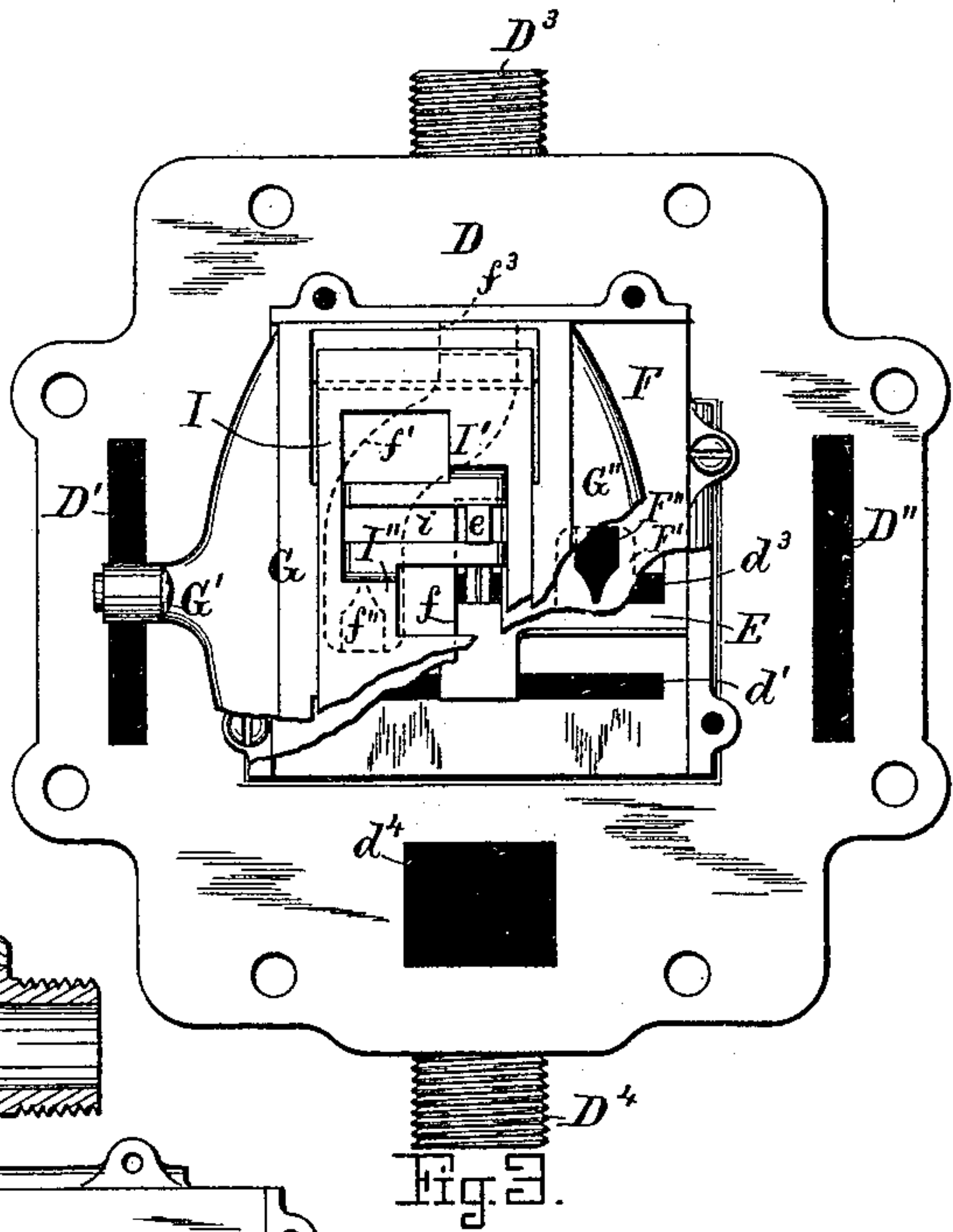
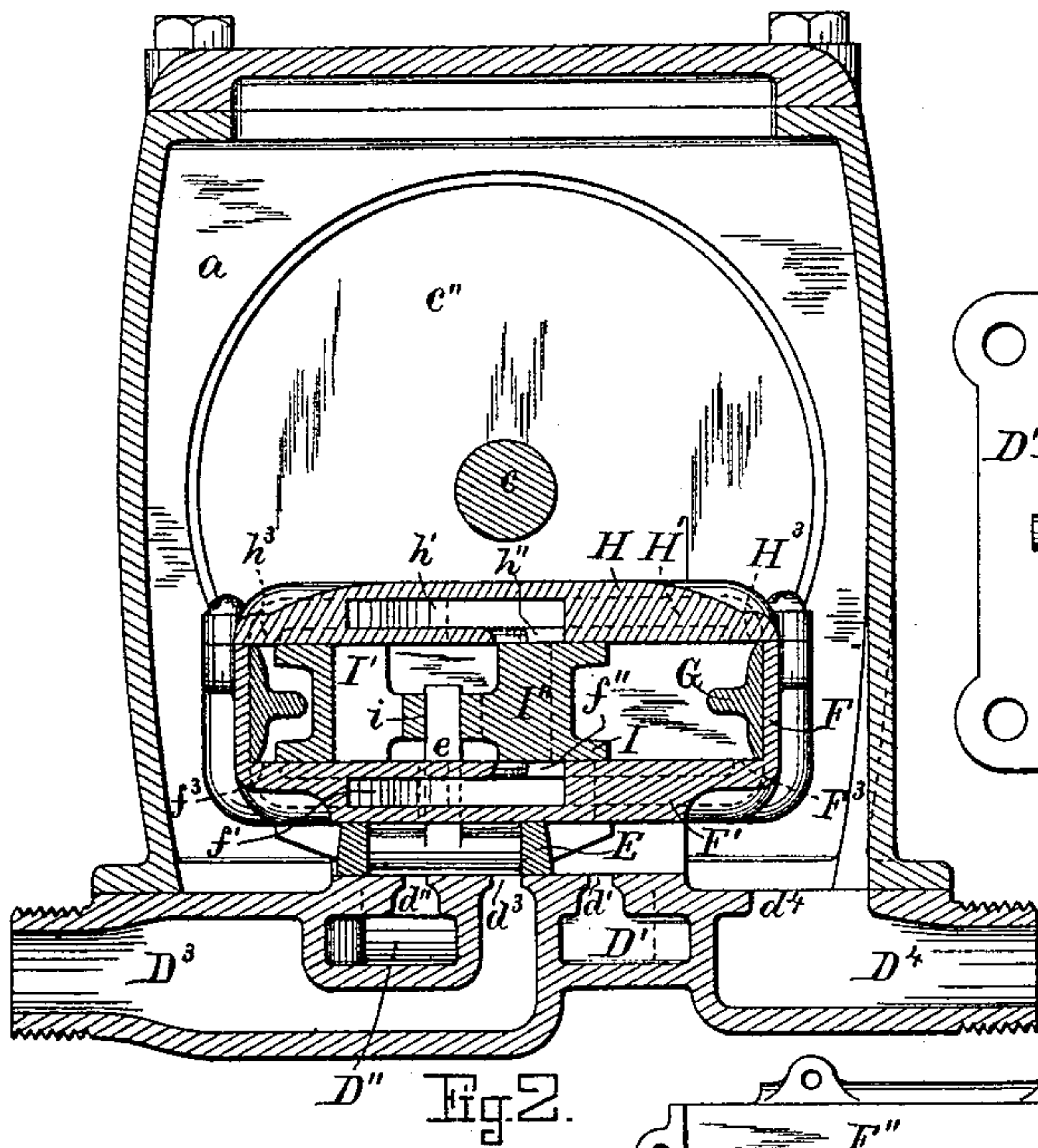
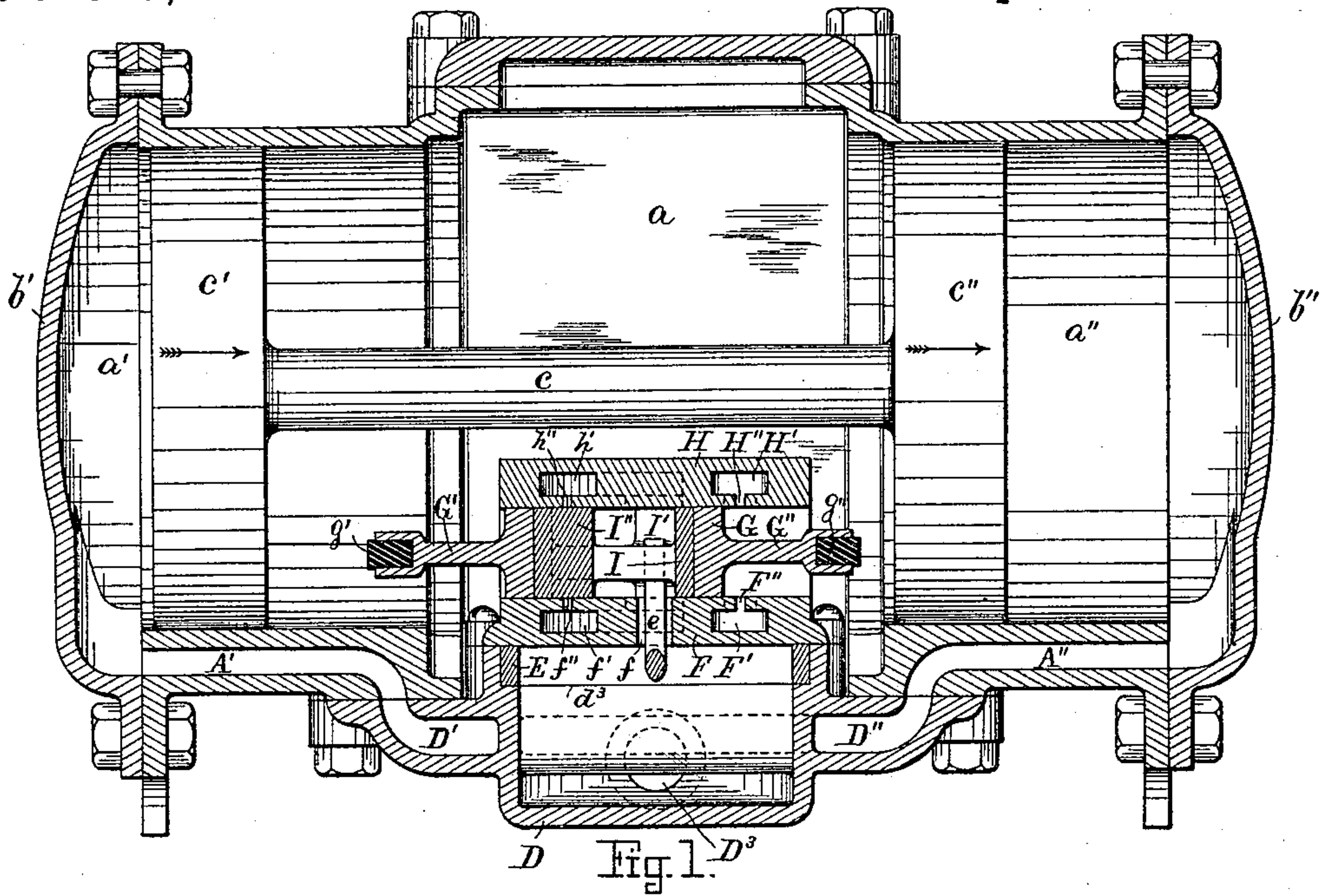
(No Model.)

F. L. SYLVESTER.

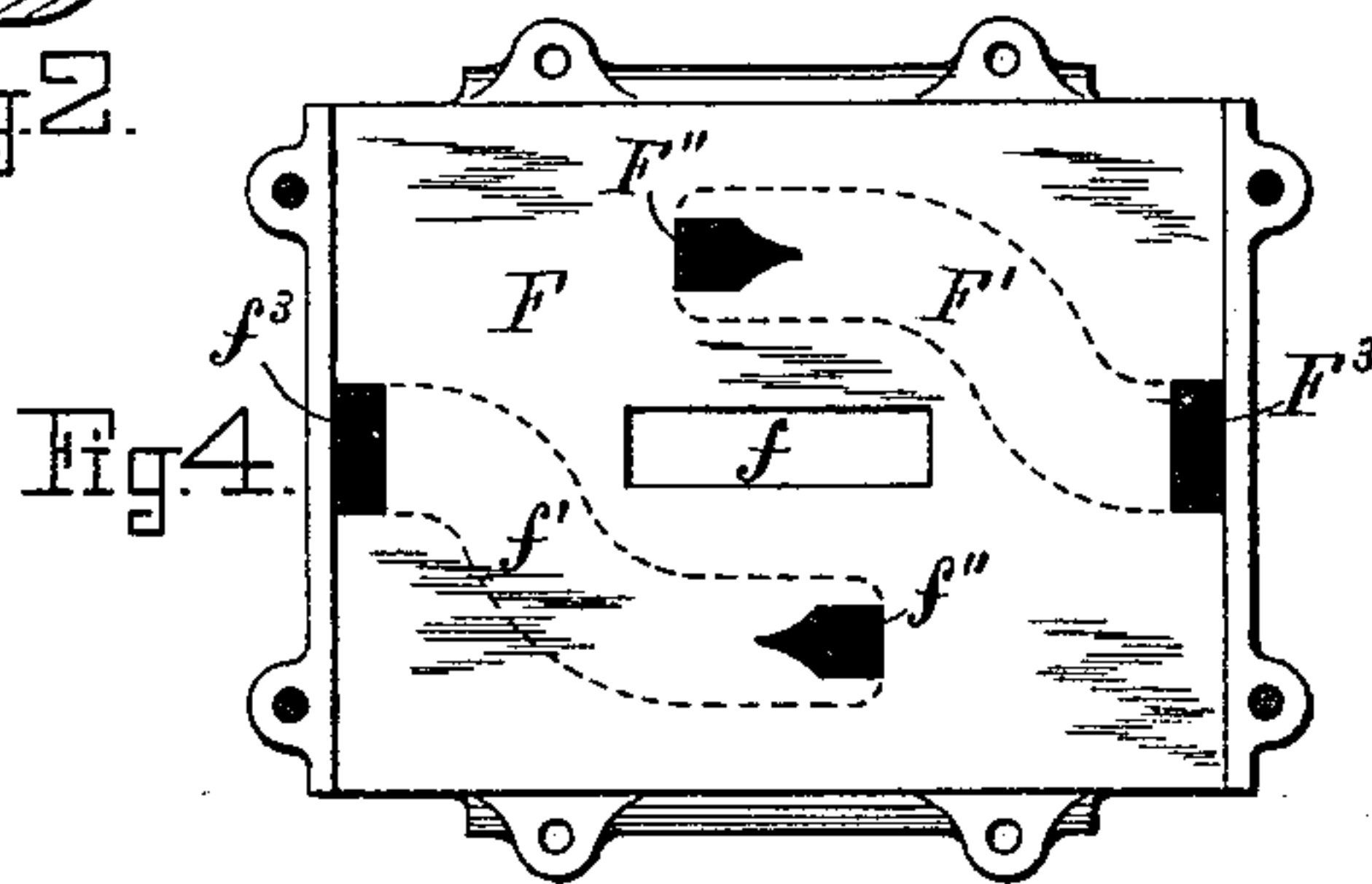
PISTON WATER METER.

No. 389,262.

Patented Sept. 11, 1888.



Witnesses,
Henry Chadbourne.
H. L. Chapin.



Inventor.
Fred. L. Sylvester.
by
Wm. Audren
his atty.

UNITED STATES PATENT OFFICE.

FRED L. SYLVESTER, OF CHELSEA, MASSACHUSETTS, ASSIGNOR TO W. ALLEN SYLVESTER, OF SAME PLACE.

PISTON WATER-METER.

SPECIFICATION forming part of Letters Patent No. 389,262, dated September 11, 1888.

Application filed January 16, 1888. Serial No. 260,814. (No model.)

To all whom it may concern:

Be it known that I, FRED L. SYLVESTER, a citizen of the United States, and a resident of Chelsea, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Piston Water - Meters, of which the following, taken in connection with the accompanying drawings, is a specification.

10 This invention relates to improvements in piston-meters, and particularly to automatic valve mechanism for the same, and it is carried out as follows, reference being had to the accompanying drawings, wherein—

15 Figure 1 represents a central longitudinal section of my improved meter, and Fig. 2 represents a central cross-section of the same. Fig. 3 represents a plan view of the bottom plate and the valve mechanism, and Fig. 4 represents a plan view of the ported valve-carrier-supporting plate.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

25 *a* in Fig. 1 is the central water-chamber, and *a' a''* are the bored-out cylinders, as usual, constituting the shell of the meter.

b' and *b''* are the heads secured to the ends, respectively, of the cylinder *a'* and *a''*, as usual.

30 *c'* and *c''* are the reciprocating pistons, secured to the piston rod or connection *c*, as is common in piston-meters of this kind.

To the under side of the shell of the meter is secured in a suitable manner the bottom plate, *D*, having exhaust-pipe *D³*, communicating with the perforated main slide-valve *E* by means of the exhaust-port *d³*, and having supply-pipe *D⁴*, with opening *d⁴* leading to the central chamber, *a*, as shown in Fig. 2.

40 *A'* and *A''* are passages leading from the outer ends of the cylinders *a' a''*, respectively, to the respective passages *D'* and *D''* in the bottom plate, *D*, which passages terminate as ports *d'* and *d''*, respectively, in the top of the

45 bottom plate, *D*, as shown in Figs. 1, 2, and 3. The main slide-valve *E* is automatically reciprocated in a plane at a right angle to the axis of the meter by means, as will hereinafter be described, so as to conduct the liquid from the
50 central chamber, *a*, alternately to the outer

ends of the cylinders *a' a''*, and from them to the exhaust *D³*.

To the top of the bottom plate, *D*, is secured the stationary casing *F*, in which the reciprocating frame or block *G* is free to move forward and back in a line parallel with the axis of the meter. The under side of the casing *F* is properly finished, so as to serve as a seat for the top of the main slide-valve *E*, as shown in Figs. 1 and 2. The bottom of the casing *F* has two horizontal cored-out passages, *F'* and *f'*, the ends of which terminate, respectively, as ports *F'' F³* and *f'' f³*, as shown in the drawings, and arranged relative to each other, as shown in Fig. 4, such ports and passages serving to alternately conduct the liquid from the central chamber, *a*, to and from the ends of the valve-carrier *I*, that is movable in the same direction with and carries the main slide-valve *E*, as will hereinafter be described.

H is a cover secured to the top of the casing *F* in any suitable manner, and at a distance above the lower portion of said casing to permit the block *G* and valve-carrier *I* to move freely between said parts, as shown in Figs. 1 and 2. Like the casing *F*, the cover *H* has also two cored-out horizontal passages, *H'* and *h'*, terminating in ports *H'' H³* and *h'' h³*, precisely like and located centrally above the respective ports *F'' F³* and *f'' f³* and for the same purpose.

The slide-valve *E* is provided with a vertical projection, *e*, extending upward through a slotted perforation, *f*, in the casing *F*, as shown, and the upper end of such projection *e* is made to enter a slot, *i*, in the valve-carrier *I*, as shown in Figs. 1, 2, and 3. The slot *i* in the valve-carrier *I* is made in a line parallel with the axis of the meter, and the slot *f* is made at a right angle thereto, as shown, to permit the valve carrier to be actuated by the reciprocating block *G* without changing the position of the slide-valve *E*, and to cause the latter to partake of the motion of the valve-carrier when said valve-carrier is actuated and moved by the liquid-pressure from the central chamber, *a*, in a direction at a right angle to the axis of the meter.

The block *G* is actuated by the reciprocating pistons *c' c''*, and has for this purpose arms or

projections $G' G''$ in its ends, preferably provided with elastic bunters $g' g''$, as shown in Figs. 1 and 3, although the latter may be dispensed with without departing from the essence of my invention.

The ports $F'' f'' H'' h''$ are made tapering, as shown in Fig. 4, for the purpose of causing the valve-carrier I to come gradually to a standstill as it reaches the end of its stroke in the direction in which it is reciprocated by the pressure of the liquid in the meter-chamber a . This is accomplished by the valve-carrier gradually cutting off the liquid-pressure that actuates it as it passes by the said tapering ports, the said valve-carrier having for this purpose corner projections, $I' I''$, on its interior portion, as shown in Figs. 1, 2, and 3.

The operation of the apparatus is as follows: As the pistons $c' c''$ reach the end of their stroke in an opposite direction to that indicated by arrows in Fig. 1, the piston c'' comes in contact with the bunter g'' and forces the frame G and valve-carrier I to the position shown in Figs. 1, 2, 3, and during such motion the main slide-valve E remains stationary. This movement of the frame G opens the ports $F'' H''$, admitting the liquid-pressure from the central chamber, a , through the passages $F' H'$ and ports F^3 and H^3 to one end of the valve-carrier I , causing it to move at a right angle to the axis of the meter to the position shown in Figs. 2 and 3, and thereby carrying the main slide-valve E with it to the position shown in Fig. 2, causing the outer end of cylinder a'' to be in communication with the main exhaust D^3 by the medium of the passages $A'' D''$, port d'' , the perforation in the main valve E , and exhaust-port d^3 , and also causing the outer end of the cylinder a' to be in communication with the central chamber, a , by the medium of the port d' , passages D' and A' allowing the liquid-pressure from the supply-pipe D^4 to force the pistons $c' c''$ toward the right, as shown by arrows in Fig. 1.

During this movement of the valve-carrier the water at the opposite end of it is exhausted through the ports $f^3 h^3$, channels $f' h'$, and tapering ports $f'' h''$, communicating with the slot f by means of the perforation through the valve-carrier, and through said slot f and main valve E to the exhaust-port d^3 and main exhaust D^3 , and during such motion of the valve-carrier the exhaust is gradually cut off by means of the tapering ports $f'' h''$ being covered by the inwardly-projecting corner I' of the valve-carrier, thereby causing the valve-carrier to come to a gradual standstill without the aid of bunters. When the pistons $c' c''$ reach the end of their stroke in the direction shown by arrows in Fig. 1, the piston c' comes in contact with the bunter g' and actuates the frame G and the valve-carrier I , causing the valve-carrier and valve E to be moved in an opposite direction to reverse the respective supply and exhaust, and so on.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by letters patent and claim—

1. In a piston-meter, the frame or block G , having a reciprocating motion imparted to it by the pistons $c' c''$, and the valve-carrier I , arranged within said block and moved by it, as described, combined with the ported casing and cover $F H$ and the main slide-valve E , constructed and arranged as and for the purpose set forth.

2. In a piston-meter, the following elements: a valve-carrier inclosed within a reciprocating frame, said valve-carrier being coupled to the main slide-valve, and a ported shell or case, the whole being so constructed and arranged relative to the pistons and water-pressure in the meter as to cause the said frame and valve-carrier to reciprocate in the direction of the axis of the meter by the movements of the piston, and to cause the valve-carrier to be reciprocated in a right angle to such piston movements by the liquid-pressure in the meter, substantially as set forth.

3. In a piston-meter, the stationary shell and cover $F H$, having ports $f^3 F^3$ and $h^3 H^3$ in their ends, and tapering ports $f'' F''$ and $h'' H''$, as described, combined with the reciprocating frame G , actuated by the reciprocating pistons, and the valve-carrier I , arranged within said frame and actuated by it forward and back in the direction of the axis of the meter and at a right angle thereto by the liquid-pressure in the meter in a manner, as described, so that the motion of the valve-carrier in one direction shall reverse the liquid-pressure to it and its motion in a direction at a right angle thereto shall cause a gradual closing of the tapering ports $f'' F'' h'' H''$, as and for the purpose set forth.

4. In a piston-meter, a stationary ported case and cover, $F H$, a reciprocating frame, G , arranged within said case and cover, and a valve-carrier, I , coupled to the main slide-valve in a manner, as described, so as to cause the said slide-valve to remain stationary during the reciprocating motion of the frame and carrier in a direction parallel with the axis of the meter, and to impart a reciprocating motion to the valve and its carrier in a direction at a right angle to the axis of the meter by the liquid-pressure in the meter exerted against the ends of the valve-carrier, while its carrying-frame remains stationary, substantially 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, on this 2d day of January, A. D. 1888.

FRED L. SYLVESTER.

Witnesses:

ALBAN ANDRÉN,
HENRY CHADBURN.