(No Model.)

M. P. FREEMAN.

PISTON METER.

No. 374,530. Patented Dec. 6, 1887.

Fig. 1.

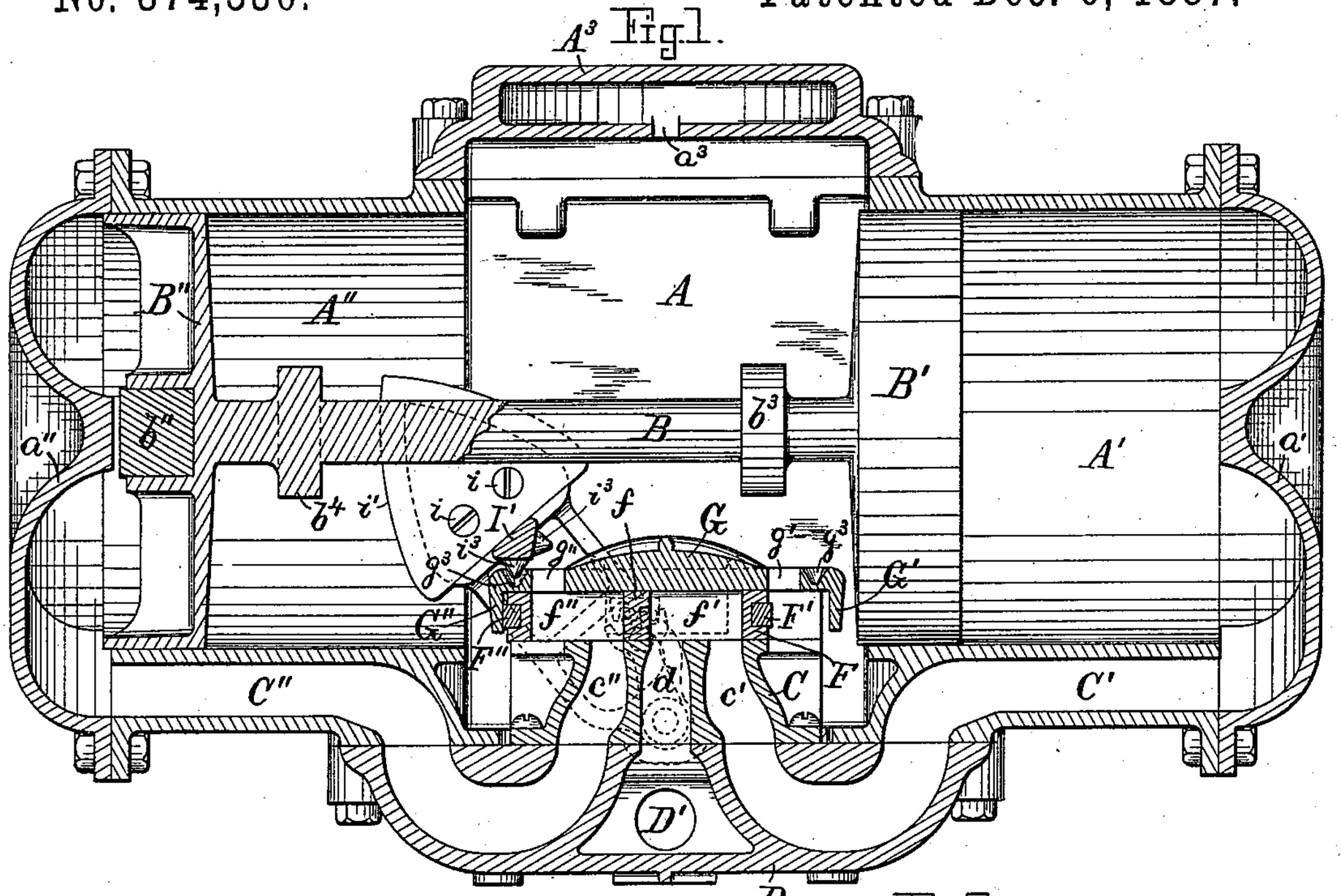


Fig. 3.

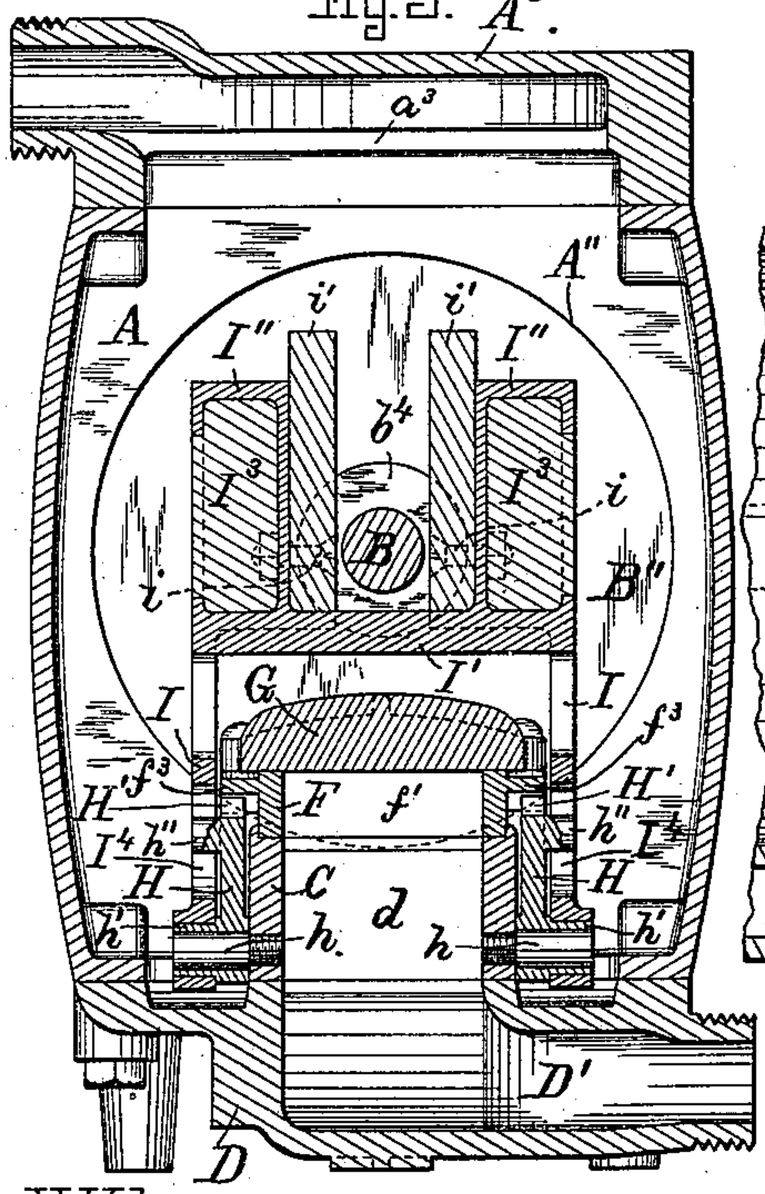
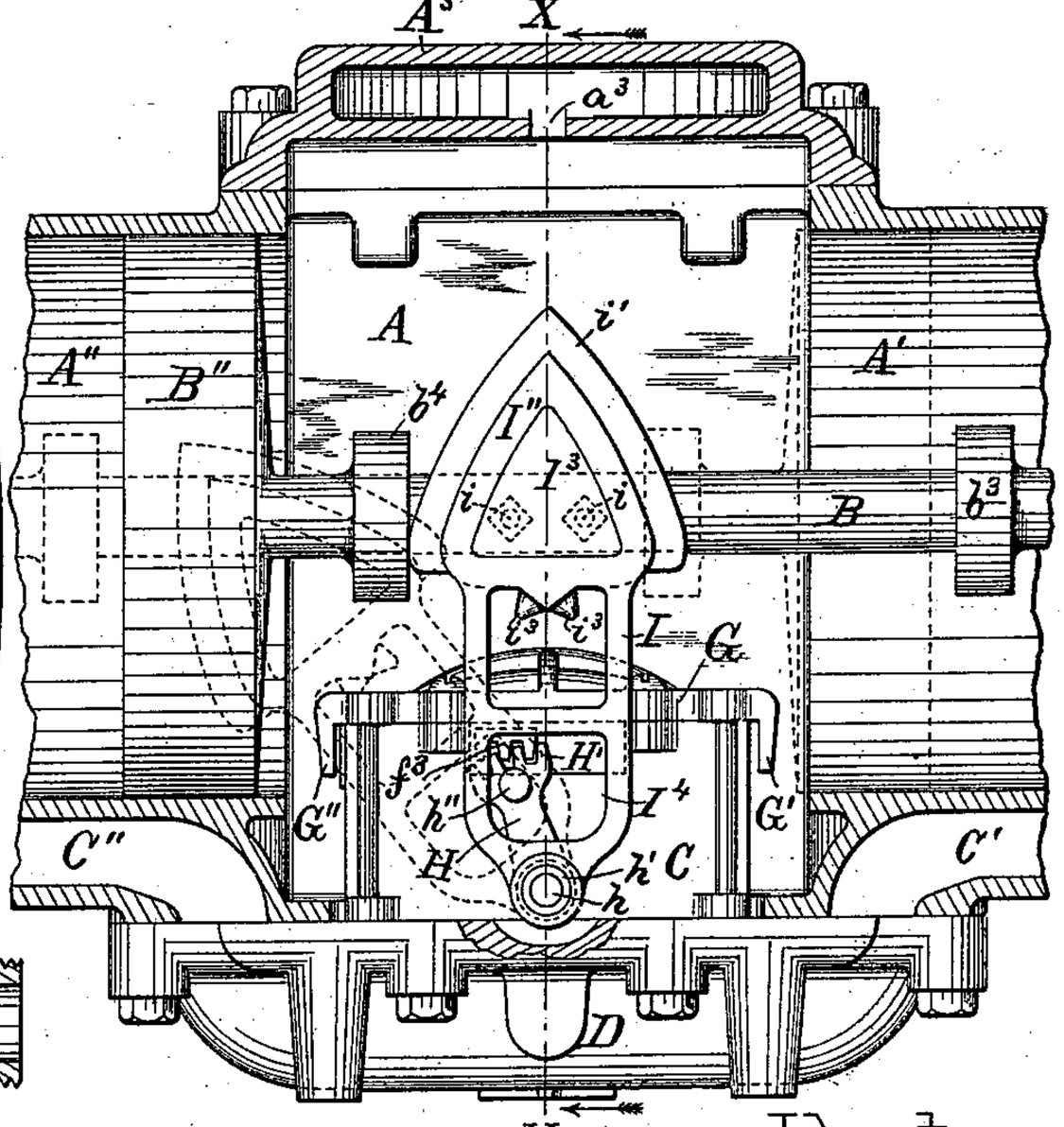


Fig. 2.



Witnesses

Henry Chadbourn.

Charles H. Fogg.

Inventor

Melvin P. Freeman

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his atty.

UNITED STATES PATENT OFFICE.

MELVIN P. FREEMAN, OF SOMERVILLE, ASSIGNOR OF ONE-HALF TO FREDERICK L. PIERCE, OF BOSTON, MASSACHUSETTS.

PISTON METER.

SPECIFICATION forming part of Letters Patent No. 374,530, dated December 6, 1887.

Application filed April 25, 1887. Serial No. 236,030. (No model.)

To all whom it may concern:

Be it known that I, MELVIN P. FREEMAN, a citizen of the United States, and a resident of Somerville, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Water-Meters, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in water-meters; and it is carried out as follows, reference being had to the accompanying drawings, where—

Figure 1 represents a longitudinal section of the improved meter. Fig. 2 represents a side elevation of the valve mechanism, and Fig. 3 represents a cross-section on the line X Y shown in Fig. 2.

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

A is the middle portion of the water-meter shell, and A′ A″ represent the cylinders at opposite ends of said water-chamber A, as usual.

a′ and *a″* are the heads, respectively, secured to the ends of the cylinders A′ A″, as shown in Fig. 1.

B is the piston-rod, having attached to its ends the pistons B′ and B″, said pistons having in their outer ends the respective yielding bunters *b″*, to prevent metallic contact between the said pistons and the cylinder ends, as is common in meters of this kind.

A^3 is the top plate or cover, with its inlet a^3 leading to upper portion of central chamber, A, as shown in the drawings.

C is the valve-base secured to the cored-out bottom plate, D, said valve-base having ports *c′*, *c″*, and *d*, the two former communicating, respectively, by means of the passages C′ and C″, with the outer ends of the cylinders A′ and A″, as shown in Fig. 1. The port *d* is in direct communication with the outlet D′ in the base D.

F is the reciprocating slide-valve located on top of valve-base C and adapted to slide between it and the stationary valve-cover G, as shown. The valve F has a pair of vertical openings, *f′* and *f″*, made through it, such openings being separated from each other by means of the bridge *f*, as shown in Fig. 1. The valve F has in its ends the flexible bunters F′ and F″, adapted to stop against the respective downwardly-projecting lips G′ and G″ on the cover G when said valve is moved to its limit of stroke in either direction, and thus prevent metallic contact between the valve ends and the lips G′ G″ during the operation of the meter.

g′ and *g″* are perforations in the cover G for conducting the liquid from the central chamber, A, to the outer ends of the cylinders A′ A″.

b^3 and b^4 are collars on the piston-rod B for automatically operating the valve-levers during the reciprocating motion of the pistons B′ B″.

To opposite sides of the valve-base C are secured the studs or pins *h h*, to which are loosely pivoted the levers H H, having segmental teeth H′ H′ in their upper ends, as shown in the drawings, said teeth meshing in toothed racks f^3 f^3 on the sides of the valve F. To said pins *h h*, or upon sleeves *h′ h′* on the levers H H, are pivoted loosely the weighted levers I I, such levers being connected together above the valve-cover G by means of the cross-bar I′, and having chambered upper extensions, I″ I″, preferably loaded with lead I^3 I^3 or other heavy metal, as shown in Figs. 2 and 3. The cross-bar I′ is cast in one piece with the levers I I, by which great strength is obtained, and by which said levers are rigidly united, so as to cause them to work properly without danger of one getting loose from the other. To the upper extensions, I″ I″, of the weighted levers I I, I secure in a detachable manner, by means of screws or screw-bolts *i i*, the cam-plates *i′ i′*, which are preferably made of hard wood, such as lignum-vitæ or analogous material. As the piston-rod B reciprocates, its collars b^3 b^4 come in contact with the cam-plates *i′ i′* and turn the levers I I on their fulcra, and in so doing the sides of the slotted lower portions, I^4 I^4, of said levers come in contact with pins or side projections, *h″ h″*, on the toothed levers H H, and thereby cause the latter to be swung on the fulcra *h h*, by which the valve F is reciprocated.

Heretofore in meters of this kind the slide-valve has had side projections actuated directly by the slotted and weighted levers; but this is objectionable, as it is liable to cause undue friction between the valve and its seat by

the inclined pressure of the slotted levers on the said valve-pins, besides requiring unnecessary amount of power to operate the valve. Such objections are obviated by the construction as shown, and by these means I am able to move the valve in a true linear direction forward and back with a minimum of power and with the least amount of frictional resistance.

By having the cam-plates i' i' made of lignum-vitæ or equivalent or analogous material the levers I I are operated by the collars b^3 b^4 without the metallic click or blow usually occurring where both collars and cam-plates are made of metal. During the rocking motion of the weighted levers I I, and after they pass by their central position, they are moved to the limit of their stroke by the momentum and gravity of their upper weighted ends, and for the purpose of arresting them gradually and to prevent their vibration or shaking when brought to a stop against the cover G, I make on the cross-bar I a pair of projections, i^3 i^3, (one or more on each side of such cross-bar,) which are caused to enter recesses or dash-pots g^3 g^3 in the top of cover G, as shown in Fig. 1. Such recesses or dash-pots g^3 being normally filled with the liquid in chamber A, it will be seen that such liquid will act as a cushion when the projections i^3 fall into the dash-pots g^3, and thus gradually and noiselessly arrest the fall of the levers I without any jar or shock. The projections i^3 may be made of any desired form, as may best suit the purpose for which they are intended, and they may be made of any desirable material and secured to the bar I' or other portions of the levers I, as may be found practicable, without departing from the spirit of my invention. The recesses or dash-pots g^3 may be made tapering, as shown in Fig. 1, or of other shape, as may be desired.

The operation of this my improved meter is as follows: The different parts being in their respective positions, as shown in Fig. 1, the liquid under pressure in chamber A passes through opening g'' in cover G, as well as from below the left end of the valve F, into valve-opening f'', and thence through port c'' and channel C'' to the rear end of cylinder A'', causing the pistons B'' B' and piston-rod B to move toward the right, during which the liquid in cylinder A' is forced through passage C', port c', valve-opening f'', and port d out through the delivery-pipe D'. As the pistons B'' B' continue to move onward in said direction, the collar b^4 comes in contact with the cam-plates i' i' and causes the levers I I to be swung on their fulcra h h to the central position shown in Fig. 2 and a little beyond such central position, after which the weighted levers I I are caused by their own gravity to swing to the limit of their stroke, and during such latter movement of said levers they come in contact with the pins h'' h'' on the toothed levers H H, causing the latter to turn around the fulcra h h in the same direction, and by the engagement of the teeth H' on said levers in the toothed racks f^3 f^3 on the slide-valve F the latter is moved in a linear direction to the limit of its stroke, and is stopped noiselessly by its bunter F' coming in contact with the lip G' on the end of cover G, and the weighted levers I I, gradually stopped by the projection i^3, entering the dash-pot g^3 at the right end of cover G, and by the reversal of the said valve F the motion of the pistons B' B'' in the direction mentioned is gradually stopped and their motion reversed with a corresponding reversal of the flow of the liquid, and so on.

What I wish to secure by Letters Patent, and claim, is—

1. In a water-meter, the valve mechanism, as described, consisting of the oscillating weighted levers I I, pivoted in their lower ends, and the pivoted toothed levers H H, having the respective toothed ends H' H' and projections h'', combined with the valve F, having teeth or projections f^3 intermeshing with the toothed levers H, as and for the purpose set forth.

2. The slide-valve F, having teeth or projections f^3, and the pivoted levers H H, having teeth or projections H' H' intermeshing with the teeth on the valve and having projections h'' h'', combined with the weighted pivoted levers I I, adapted to actuate the toothed levers H H, as set forth.

3. In a water-meter, the reciprocating pistons B' B'', piston-rod B, and projections thereon, as described, combined with the weighted levers I I, pivoted in their lower ends and provided with the detachable cam-plates i' i', made of lignum-vitæ or analogous material, as and for the purpose set forth.

4. In a water-meter, the weighted pivoted levers I I, having stop projections or plungers i^3 i^3, combined with the plate G and its recesses or dash-pots g^3 g^3, as and for the purpose set forth.

5. The cylinders A' A'' and the reciprocating pistons B' B'', with the piston-rod B and projections thereon, combined with the weighted levers I I, pivoted in their lower ends, the pivoted toothed levers H H, actuated by said weighted levers, as described, and having teeth or projections intermeshing with teeth or projections on the slide-valve F, as and for the purpose set forth.

6. The ported cover G, stationary ported valve-base C, and ported slide-valve F, having teeth or projections f^3 f^3, combined with the pivoted toothed levers H H, meshing into the teeth on the valve, and the pivoted levers I I, for actuating the levers H H and valve F, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 21st day of April, A. D. 1887.

MELVIN P. FREEMAN.

Witnesses:
ALBAN ANDRÉN,
HENRY CHADBOURN.