(No Model.)

2 Sheets—Sheet 1.

T. L. CALKINS.

PISTON METER.

No. 262,735. Patented Aug. 15, 1882.

Fig. 1.

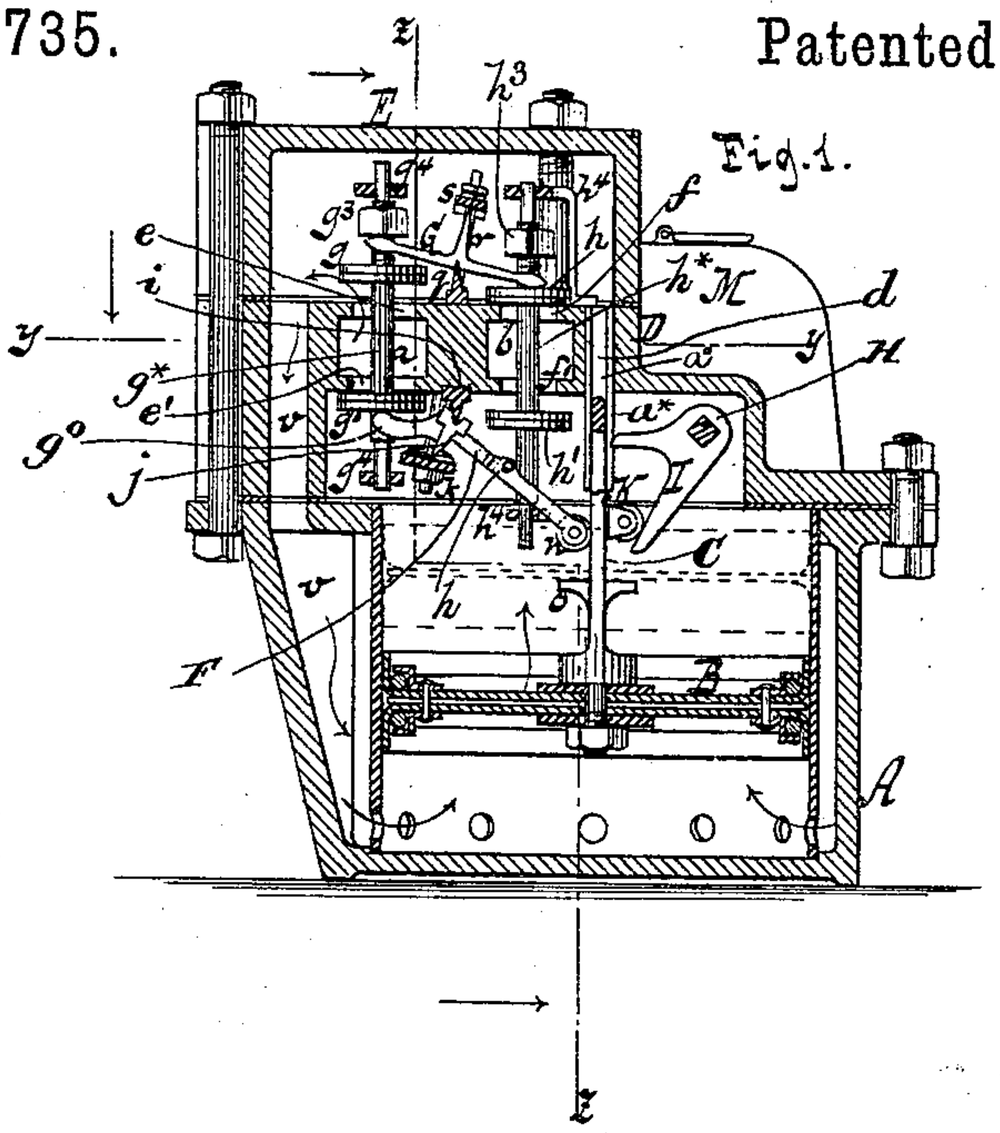
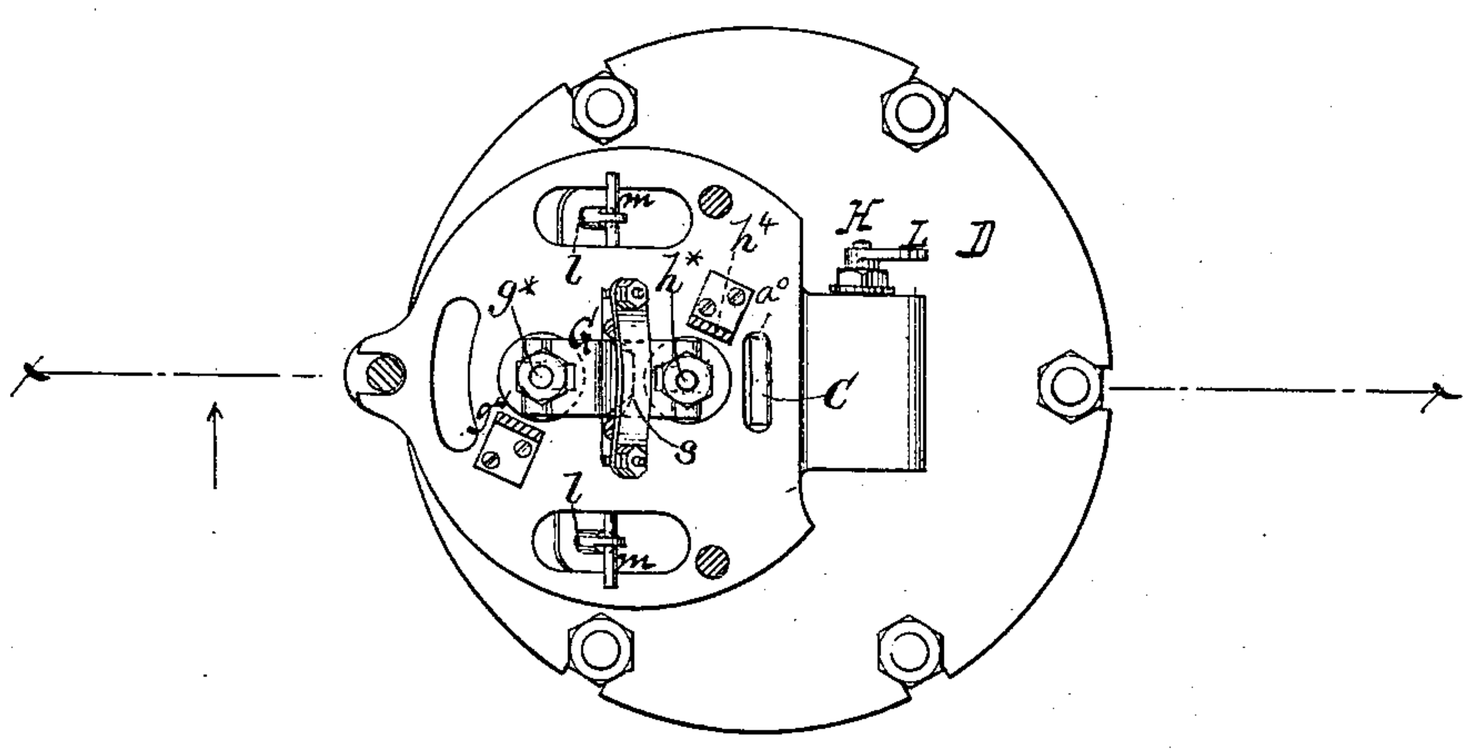


Fig. 2.



WITNESSES:

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William Miller

INVENTOR

Thomas L Calkins

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ATTORNEYS

(No Model.)

2 Sheets—Sheet 2.

T. L. CALKINS.

PISTON METER.

No. 262,735. Patented Aug. 15, 1882.

Fig. 3.

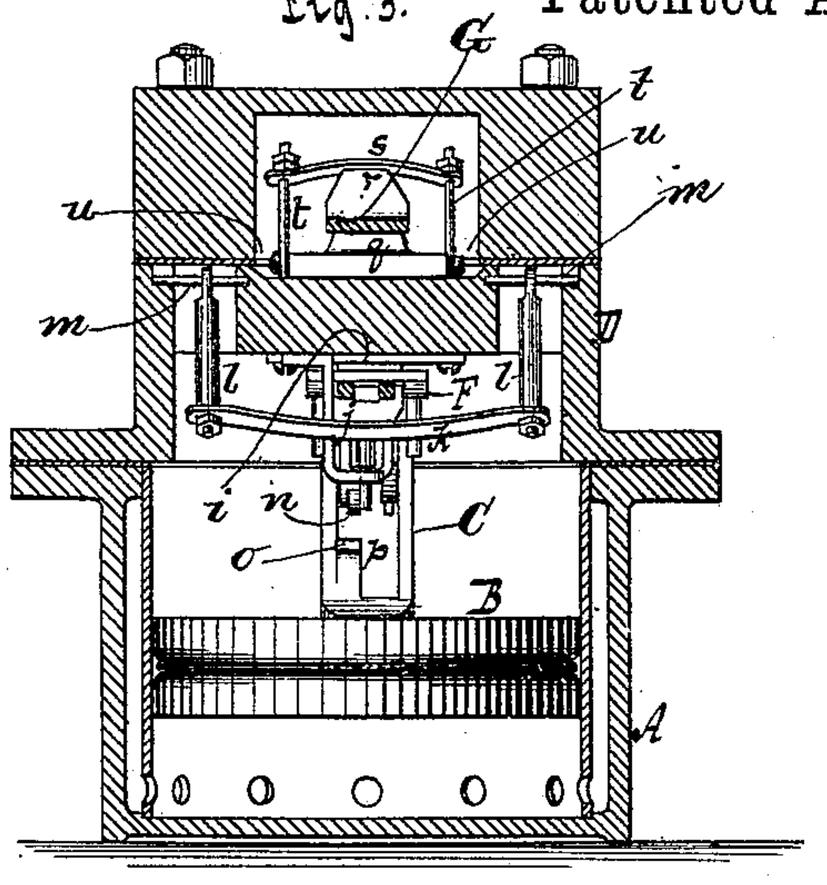


Fig. 4.

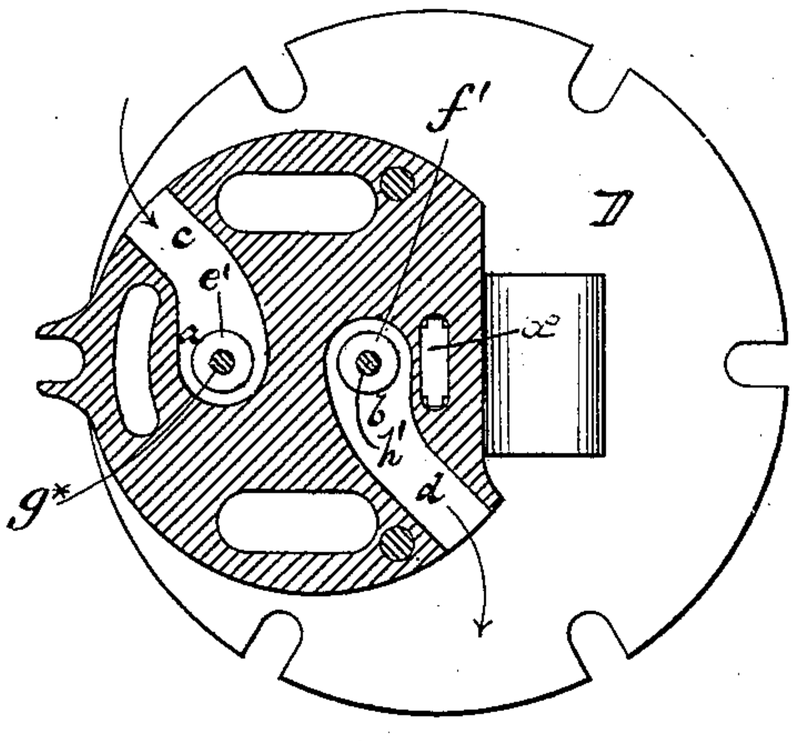
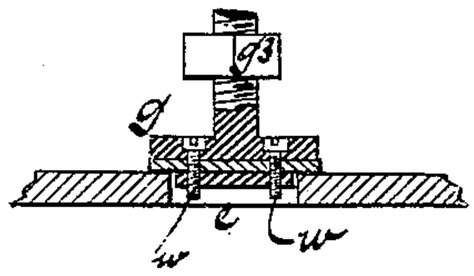


Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS L. CALKINS, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE UNITED STATES WATER METER COMPANY, OF NEW YORK, N. Y.

PISTON-METER.

SPECIFICATION forming part of Letters Patent No. 262,735, dated August 15, 1882.

Application filed April 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, THOMAS L. CALKINS, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Liquid-Meters, of which the following is a specification.

This invention relates to certain improvements on water-meters of that class which is described in Letters Patent No. 221,147, granted Charles C. Barton and Jonathan B. West, November 4, 1879, and in Letters Patent No. 238,011, granted to Jonathan B. West, February 22, 1881. Two sets of puppet-valves are thrown in opposite direction by a spring-actuated lever and firmly retained in position after they have been thrown. With the two sets of puppet-valves and the spring-actuated lever for tripping said valves is further combined a locking-lever, which retains the valves firmly in position while the position of the tripping-lever is changed. On the stems of the puppet-valves are adjustable collars to regulate the action of the locking-lever. The valves are provided with projections on their inner surfaces, so that they are turned by the action of the liquid, and their upper surfaces, which are exposed to the action of the tripping and locking levers, are prevented from wearing unevenly. The counting mechanism is actuated directly from the piston-rod.

In the accompanying drawings, Figure 1 represents a vertical section in the plane *x x*, Fig. 2. Fig. 2 is a plan or top view when the cap is removed. Fig. 3 is a vertical section in the plane *z z*, Fig. 1. Fig. 4 is a horizontal section in the plane *y y*, Fig. 1. Fig. 5 is an enlarged section of one of the valves.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates the cylinder, in which is fitted the piston B. From the center of this piston extends the rod C, which is guided in a hole, a^{o}, in the bonnet D and in guides a^{*}, depending from said bonnet. On this bonnet is firmly secured the cap E, and in its interior are formed two chambers, *a b*, the chamber *a*, which may be termed the "supply-chamber," being in communication with the supply-pipe *c*, Fig. 4, while the chamber *b*, which may be termed the "discharge-chamber," is in communication with the discharge-pipe *d*. In the top and bottom of the supply-chamber are openings *e e'*, and in the top and bottom of the discharge-chamber are openings *f f'*, Fig. 1. The openings *e e'* are controlled by the puppet-valves *g g'*, which are mounted on a common stem, g^{*}, at such a distance from each other that if one valve is seated the other is open, and vice versa. In the same manner the openings *f f'* are controlled by puppet-valves *h h'*, mounted on a common stem, h^{*}. The stems g^{*} and h^{*} are guided in standards g^{4} h^{4}, respectively, (see Fig. 1,) so that they retain the valves in the proper position to close squarely on their seats.

From the bottom of the chambers *a b* projects a knife-edge bearing, *i*, which forms the fulcrum for a lever, F, one arm, g^{o}, of which is in position to act upon the puppet-valve *g'*, while its other arm, h^{o}, is in position to act upon the puppet-valve *h'*. From the lever F projects a knife-edge bearing, *j*, which is exposed to the action of a spring, *k*, mounted on the ends of rods *l l*, Fig. 2, which oscillate freely on pivots *m m*. In the outer end of the arm h^{o} of the lever F is mounted a roller, *n*, Fig. 1, and if the piston ascends the nose *o*, projecting from the piston-rod, comes in contact with this roller, the lever F is tripped, and the valves are changed. At the same time the arm h^{o} of said lever extends into a slot, *p*, formed in the piston-rod, and if the piston descends the upper edge of said slot strikes the roller *n* and trips the lever F, so as to change the valves back to the position shown in Fig. 1.

From the top of the chambers *a b* projects a knife-edge bearing *q*, which forms the fulcrum for a lever, G, which I term the "locking-lever." One arm of this lever acts upon the valve *g* and the other upon the valve *h*. From the upper surface of said lever projects a knife-edge bearing, *r*, which is exposed to the action of a spring, *s*, mounted on the ends of rods *t t*, which swing on pivots *u u*, Fig. 3. On the stem g^{*} of the valves *g g'* is secured a collar, g^{3}, and on the stem h^{*} of the valves *h h'* a collar, h^{3}, (see Fig. 1,) and these collars are adjustable by means of set-screws or otherwise, so that their distance from the valves *g* and *h* respectively can be regulated. The arms of

the locking-lever play between the valve *g* and collar g^3 and the valve *h* and collar h^3, respectively. In the position shown in Fig. 1 the locking-lever acts upon the collar g^3 so as to hold the valve *g'* up against its seat, and also upon the valve *h* so as to depress this valve upon its seat, and it continues to do so during the times when the valves are released by the tripping-lever. For instance, if the piston ascends and the nose *o* strikes the roller *n*, the tripping-lever releases the valves until the piston has moved up high enough to trip said lever, and during that time the valves are retained solely by the action of the locking-lever. As soon as the tripping-lever passes its center of motion the valves are changed and the locking-lever is tripped so as to act at one end upon the valve *g* and at its opposite end upon the collar h^3.

It will be readily seen from this description that the collars g^3 h^3 must be adjusted accurately in the proper position so that the locking-lever will be enabled to exert the required action upon both sets of valves. In the position shown in Fig. 1 the liquid which enters the supply-chamber *a* passes up through the opening *e* and down through the channel *v* into the lower portion of the cylinder A, the piston is forced upward and the liquid contained in the upper portion of the cylinder is forced out through the opening *f'* into the discharge-chamber *b*, whence it escapes through the discharge-pipe. When the valves *g g' h h'* have been changed by the action of the tripping-lever the liquid from the supply-chamber *a* passes through the opening *e'* into the upper part of the cylinder, the piston moves down, and the liquid contained in the lower part of the cylinder is forced out through the channel *v* and opening *f* into the discharge-chamber *b*.

By referring to Fig. 1 it will be seen that the arms of the tripping-lever and of the locking-lever act upon the backs of the valves *g g' h h'*, and if these valves are not turned round from time to time their backs wear out rapidly. For the purpose of turning the valves automatically, I provide the same on their inner surfaces with projections *w*, (see Fig. 5,) so that the liquid in its passage through the valve-seats strikes the projections in an oblique direction, and the valves, together with their stems, are thereby caused to turn slightly at every stroke of the valves.

In the bonnet D is mounted a rock-shaft, H, (see Figs. 1 and 2,) and on the inner end of this rock-shaft is secured a bell-crank lever, I, Fig. 1, which is actuated by a roller-stud, K, secured to the piston-rod. On the outer end of the rock-shaft H is mounted a lever, L, Fig. 2, which actuates the counting mechanism, so that for each up-and-down stroke of the piston the counting mechanism is propelled one step, and consequently the number of times the cylinder has been emptied is registered. The counting mechanism is inclosed in a case, M, and may be of any suitable construction.

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

1. The combination, substantially as hereinbefore described, of the two sets of puppet-valves controlling the flow of liquid from and to the chambers *a b*, the independently-movable valve-stems, each carrying one set of said valves, and a spring-actuated tripping-lever having two arms for alternately moving the sets of valves in opposite directions, substantially as described.

2. The combination, substantially as hereinbefore described, of the two sets of puppet-valves controlling the flow of the liquid from and to the chambers *a b*, the independently-moving valve stems, the spring-actuated tripping lever for alternately moving the sets of valves in opposite directions, the piston-rod which actuates said tripping-lever, and the locking-lever above the valves.

3. The combination, substantially as hereinbefore described, of the two sets of puppet-valves controlling the flow of the liquid from and to the chambers *a b*, the independently-moving valve-stems, the spring-actuated tripping-lever, the piston-rod which actuates said tripping-lever, the locking-lever above the valves, and the adjustable collars g^3 h^3.

4. The combination, substantially as hereinbefore described, of the two sets of puppet-valves controlling the flow of the liquid from and to the chambers *a b*, the spring-actuated tripping-lever acting upon the backs of the valves *g' h'*, the piston-rod which actuates said tripping-lever, and the projections *w* on the inner surfaces of the valves.

5. The combination, substantially as hereinbefore described, of the case A, the bonnet D, having the hole a^0, the piston having a vertically-projecting rod, C, guided in the opening of the bonnet and provided with a lateral stud, *k*, bell-crank lever I, the transverse rock-shaft H, on which said bell-crank lever is mounted, and mechanism for transmitting the motion of the rock-shaft to the counting mechanism.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

THOS. L. CALKINS. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.