H. Burt,

Piston Meter,

No. 37,658. Patented Feb. 10, 1863.

Fig. 2.

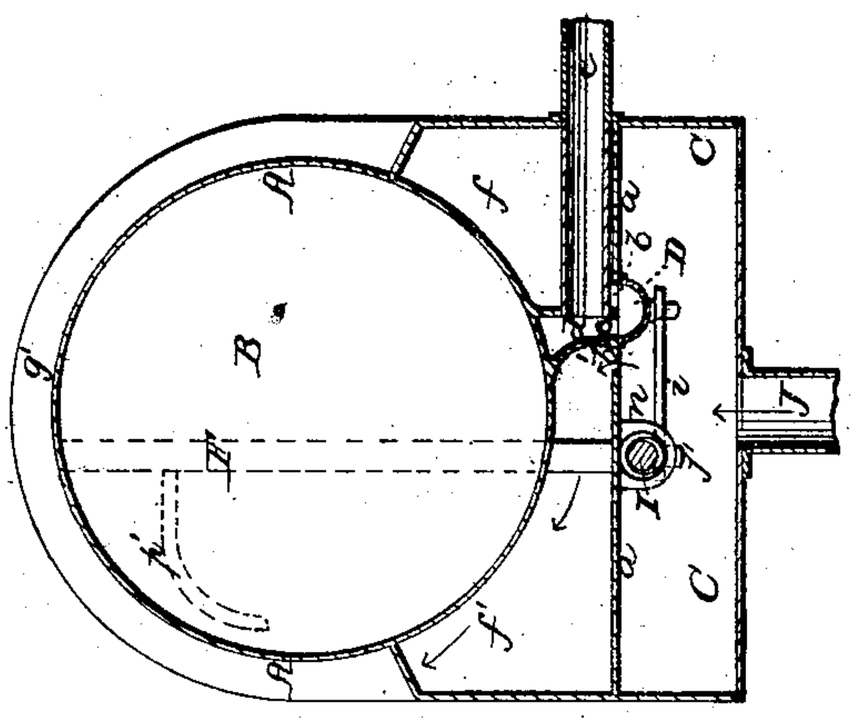


Fig. 1.

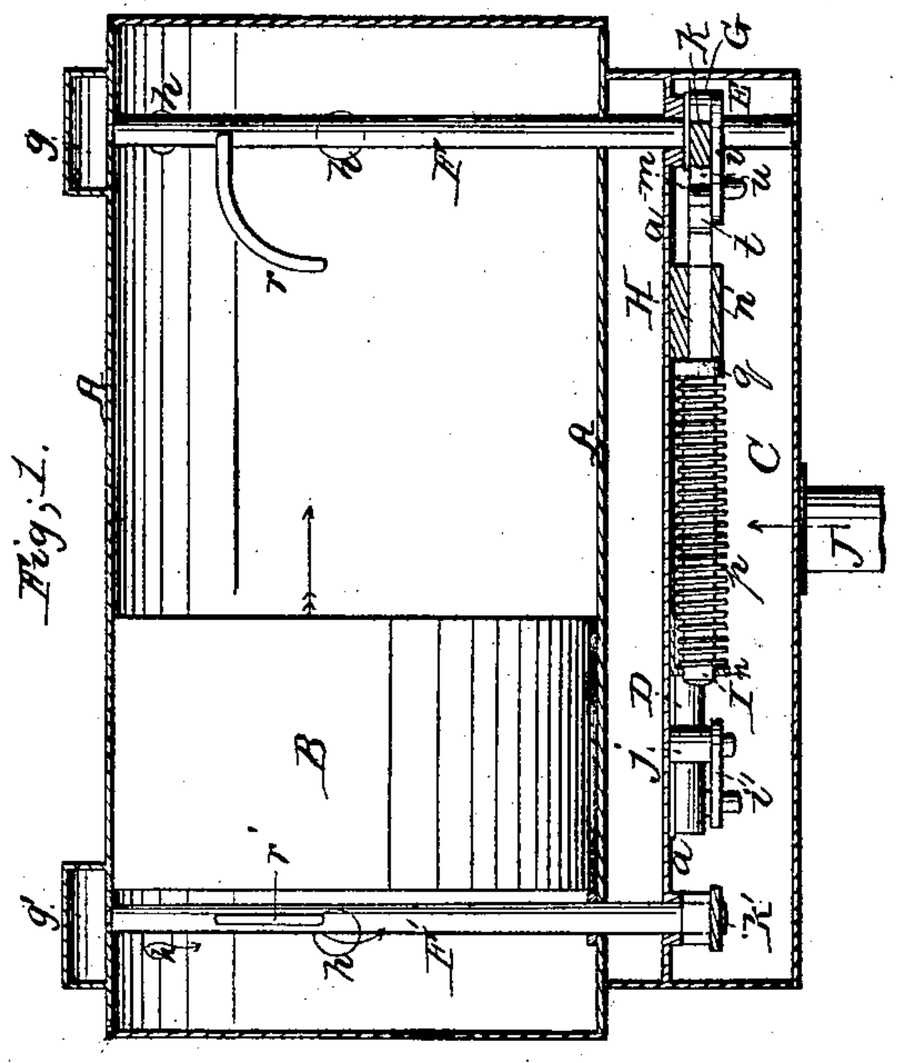
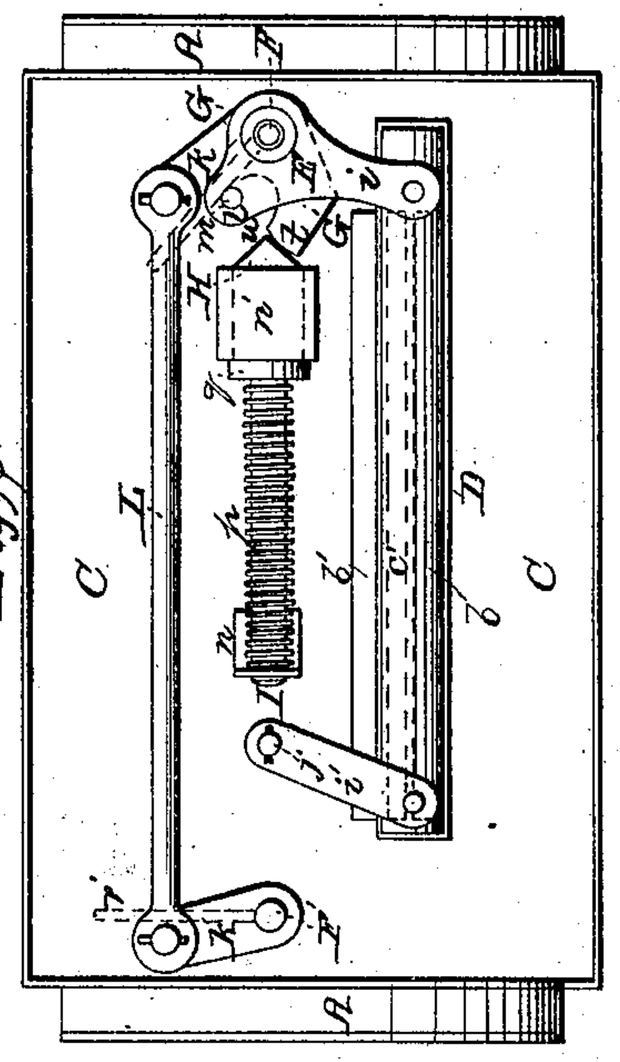


Fig. 3.



Witnesses;
J. W. Coombs

Inventor;
H. Burt
Per Munn & Co.
Attorneys

UNITED STATES PATENT OFFICE.

HENRY BURT, OF NEWARK, NEW JERSEY, ASSIGNOR TO HIMSELF, CALEB S. FITSWORTH, AND THOMAS W. LOWEREE, ALL OF SAME PLACE.

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. **37,658**, dated February 10, 1863.

To all whom it may concern:

Be it known that I, HENRY BURT, of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Water-Meters; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a central longi udinal vertical section of a water meter with my improvement. Fig. 2 is a transverse vertical section of the same. Fig. 3 is an inverted plan of the same with the bottom removed to expose the valve and its operating mechanism to view.

Similar letters of reference indicate corresponding parts in the several figures.

This invention consists in a certain novel system of valve-operating mechanism, whereby a slide-valve is moved very quickly to change the openings of the ports after the stroke of the piston in either direction has terminated.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the measuring-cylinder, arranged horizontally and fitted with a piston, B, which, having no rod, allows the cylinder to be perfectly closed at both ends. C is the valve-box, constituting a base for the cylinder to rest upon. *a a* is the valve-seat, extending nearly the whole length of the cylinder, and having provided in it three parallel ports, *b b'*, and *c*, the outer ones, *b b'*, communicating with opposite ends of the cylinder, and the middle one with the outlet-passage *d*, to which the outlet-pipe *e* is attached. These ports are arranged lengthwise of the cylinder and extend nearly three-fourths of the length thereof, and hence they only require to be very narrow to give them the requisite area, and can be closed and opened by a very short movement of the valve. The communication between the ports *b b'* and the cylinder are made through two chambers, *f f'*, and hollow bands *g g'*, which partly encircle the cylinder, several openings, *h h*, being made from each band to the cylinder. D is the valve, constructed like the ordinary three-port valve used in steam-engines, except that its proportions of length and width are very different from those of the steam-engine valve, owing to the extreme length and narrowness of the ports *b b' c*. This valve, owing to the arrangement of the ports lengthwise of the cylinder, is arranged to work transversely to the axis of the cylinder, and owing to the valve box being below the cylinder it is arranged in an inverted position, as shown in Fig. 2. It is connected at one end by a vibrating bridle-arm, *i'*, with a fixed stud, *j*, and at the other end with the longer arm *i* of an elbow-lever, E, which is fitted to work loosely upon a fulcrum consisting of an upright oscillating shaft, F, passing through the cylinder near one end thereof and working in suitable bearings therein, the length of the said arm of the elbow-lever corresponding with that of the bridle-arm *i*. The shaft F has secured to it, within the valve-box, a second elbow-lever, G, one arm, *k*, of which is connected by a rod, L, with the arm *k'*, of similar length, also within the valve-box fast upon an upright oscillating shaft, F', passing through the cylinder near the opposite end to the shaft F. The shorter arm *l* of the elbow-lever E has secured in it a pin, *m*, which enters a recess, *u*, formed between the two arms *k* and *t* of the elbow-lever G. The arm *t* is made with a V-shaped end to operate in combination with a V-shaped piece, H, attached to a rod, I, which is arranged within the valve-box in guides *n n'*, which keep it parallel with the length of the cylinder, and this rod I has applied to it a spiral spring, *p*, which tends to force it toward the elbow-lever G, as far as permitted by a shoulder, *q*, on the said rod, which comes in contact with the guide *n'*. The shaft F is furnished within the cylinder with a rigidly-attached arm, *r*, and the shaft F' with a similar arm, *r'*.

J is the inlet-pipe, connected with the valve-box C, and keeping it always full of water. This pipe is supposed to be always open. When the outlet-pipe is open, the pressure from the main operates against the valve and keeps it to its seat; but when the outlet-pipe is closed the valve is in equilibrio and is free to fall away from its seat by gravitation, and any dirt is allowed to subside into the valve-box, from whence it can be easily drawn off through a cock or valve provided for the purpose.

The operation of the meter is as follows:

When the pipe *e* is opened to draw water, the water from the main flows into the valve-box and through the open port *b* or *b'* into the cylinder, and forces the piston toward one or other end. As the piston approaches near to either end of the cylinder, it strikes the arm *r* or *r'*, and by its pressure against the said arm turns the two shafts F F', the two being connected by the arms *k k'* and rod L. The shaft F carries with it the elbow-lever G, the V-shaped end *t* of which acts against one face of the V-shaped end H of the rod I, so forces back the rod H, and compresses the spring *p* until the point *t* passes the point of H, the pin *m* in the meantime remaining undisturbed, owing to the lost motion provided for by the room in the recess *u*, and the lever E consequently remaining stationary. The spring *p* is then allowed to expand and press forward the rod I, and cause H to press upon the opposite side of *t*, and so continue the movement of lever G very quickly; and in this continued movement, one or other side of the recess *u* being in contact with the pin, the lever G carries with it the lever E, and gives the valve, very quickly, the necessary movement to bring the previously-open port *b* or *b'* into communication with the port *c*, and open the other port *b* or *b'* to the ingress of water from the valve-chest, thus causing the water to be shut off from one end of the cylinder and admitted to the other, and the piston to have its movement reversed and to expel the water in front of it through the port *c*. In this operation it will be understood that the valve is not moved by the direct action of the piston, which would move it very slowly and could not complete its movement, but by the expansion of the spring *p*, the compression of which is produced by the movement of the piston operating through the V-shaped ends *t* H of the lever G and rod I, which are the means of determining the length of stroke of the piston. Fig. 3 represents the position of the parts during the movement of the piston, to the right.

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

1. Effecting the movement of the valve by means of two pieces with V-shaped ends and a spring, combined with the piston, to operate substantially as herein described.

2. Combining the valve with the lever G, or its equivalent, on which one of the V-shaped ends is formed, or to which it is attached, and which is subject to the direct action of the piston, by means of a lever E, between which and the said lever G, or its equivalent, lost motion is provided in order to effect the whole movement of the valve very quickly, substantially as herein described.

HENRY BURT.

Witnesses:

HENRY POWLES,

W. H. FRANCIS.