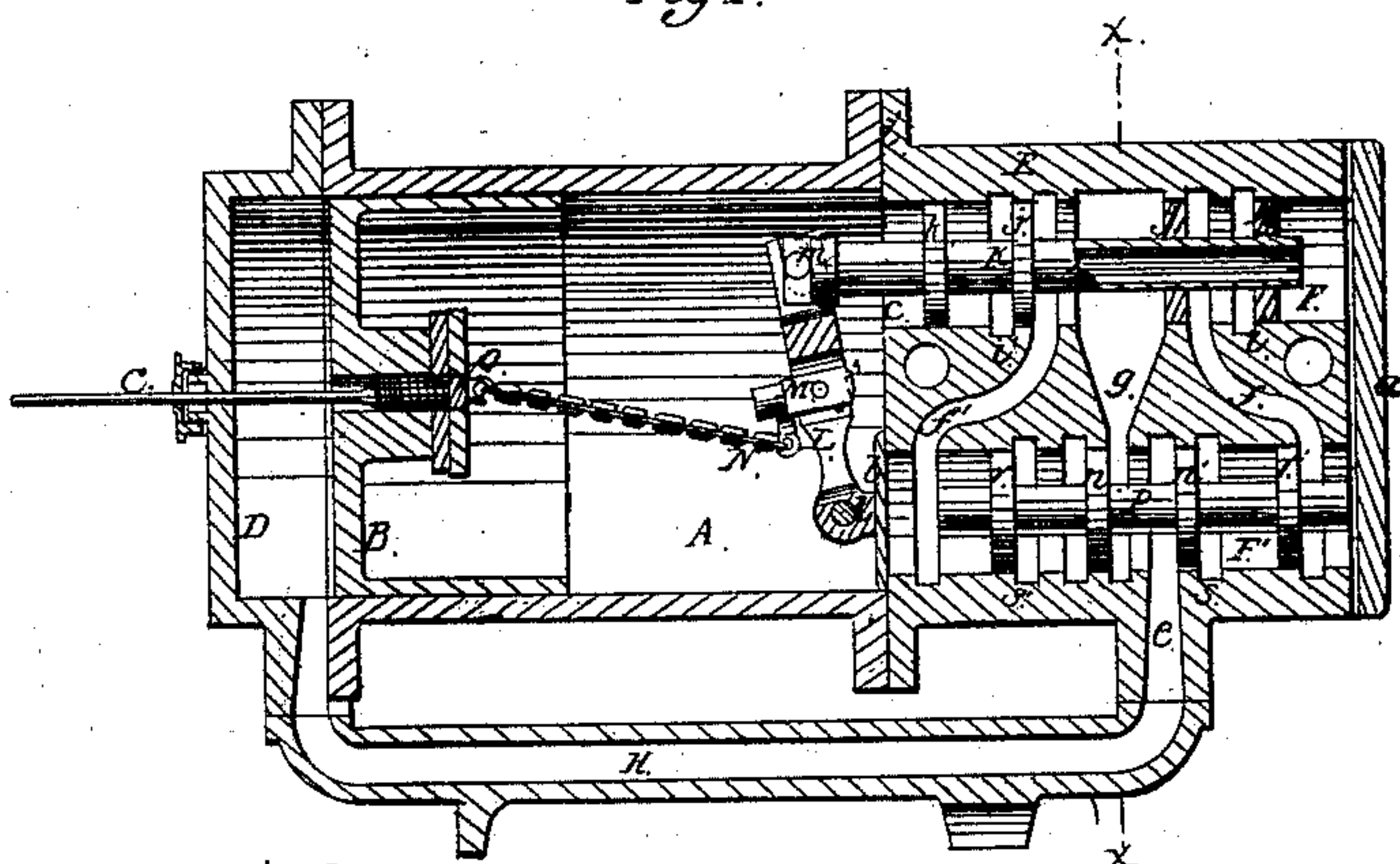


*J. Mason,*  
*Piston Meter.*

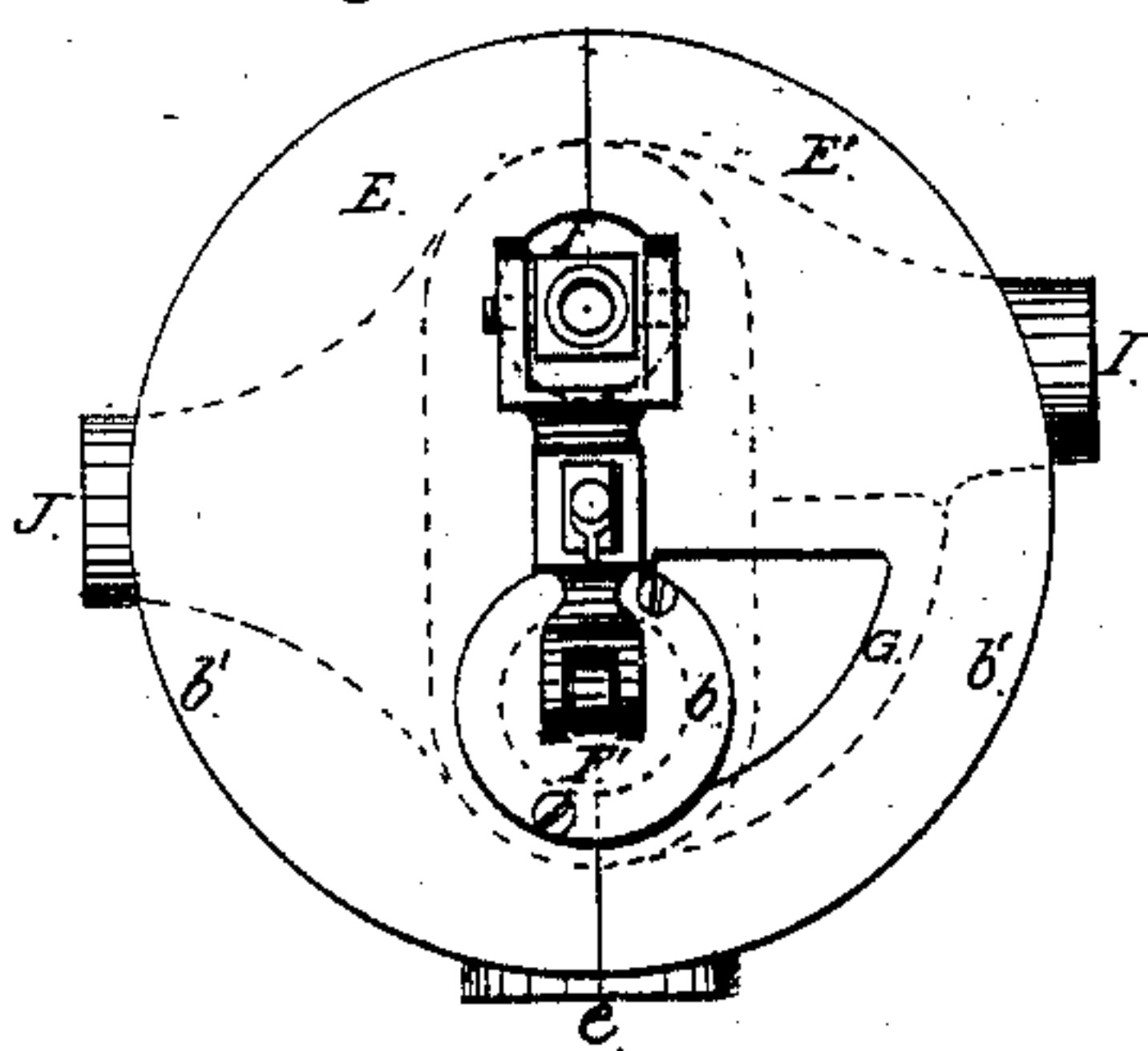
*N<sup>o</sup> 82,138.*

*Patented Sept. 15, 1868.*

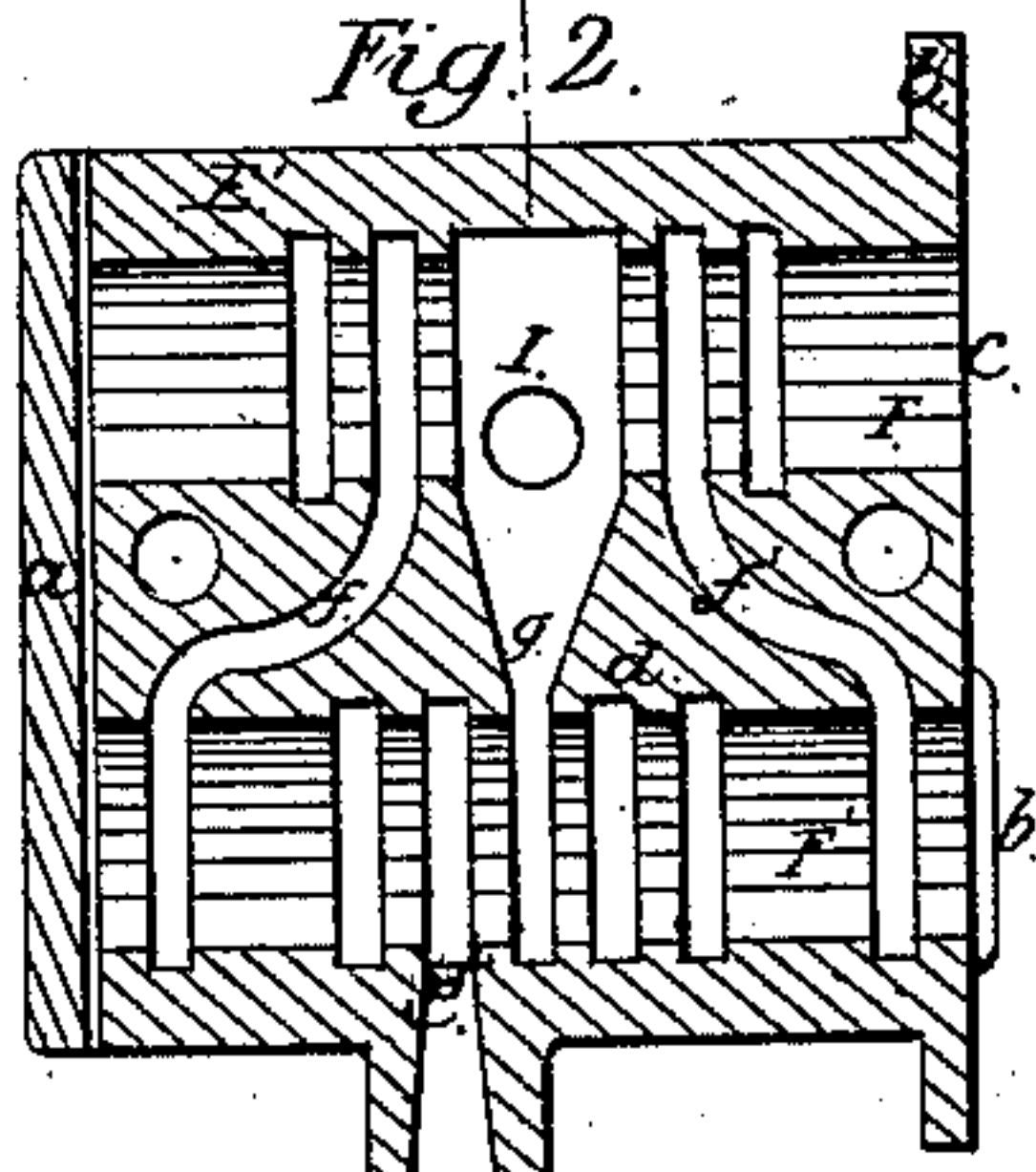
*Fig. 1.*



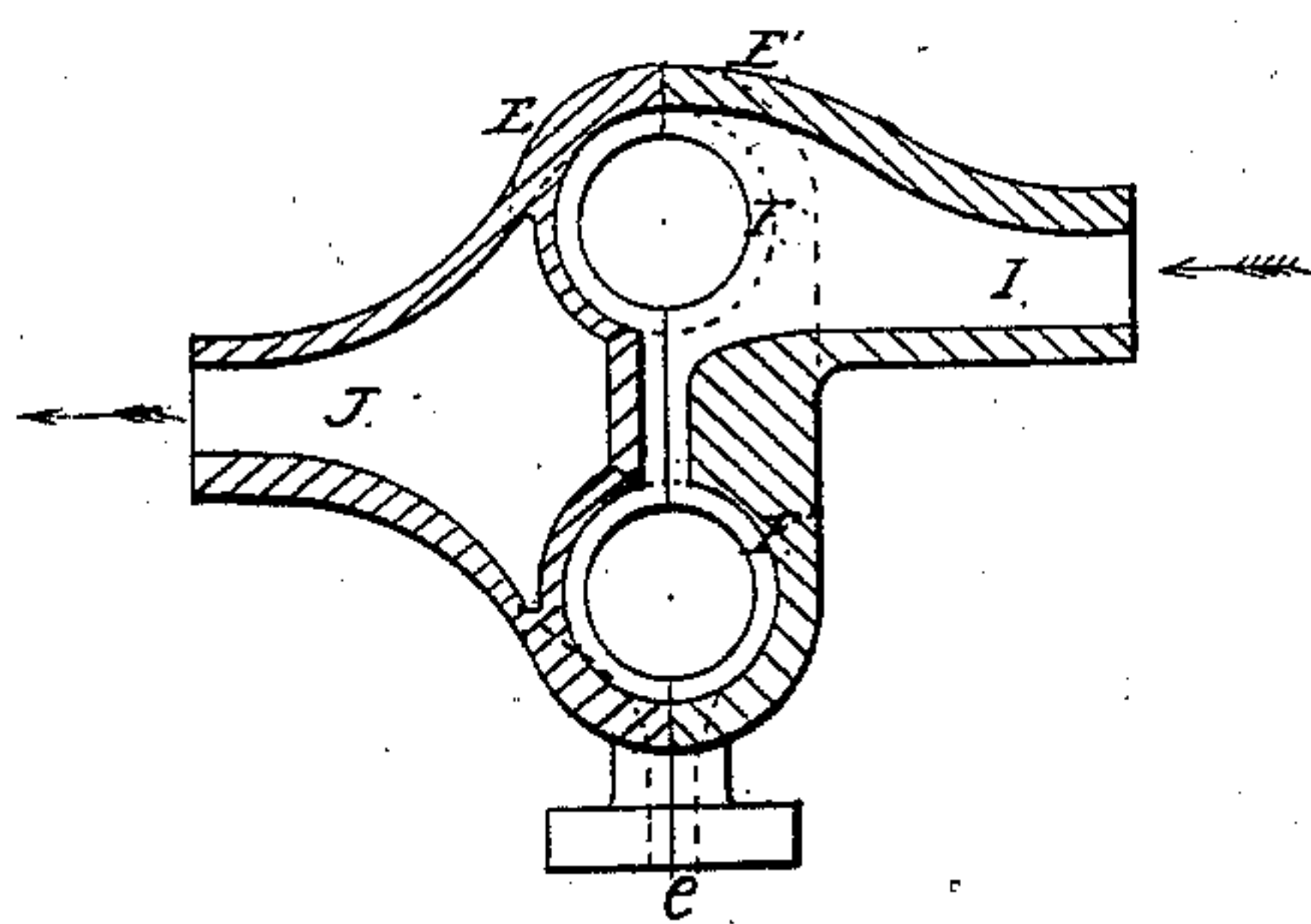
*Fig. 3.*



*Fig. 2.*



*Fig. 4.*



*Witnesses:*

*Abellere*  
*E. P. Dray*

*Inventor:*

*Joshua Mason*



# United States Patent Office.

JOSHUA MASON, OF PATERSON, NEW JERSEY.

*Letters Patent No. 82,138, dated September 15, 1868.*

## IMPROVEMENT IN LIQUID-METERS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOSHUA MASON, of Paterson, in the county of Passaic, and State of New Jersey, have invented a new and useful Improvement in Water or other Liquid-Meters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a central longitudinal section of a meter constructed in accordance with my improvement.

Figure 2, a longitudinal interior view of the opposite half of the valve-case to that shown in fig. 1.

Figure 3, a face view of the inner end of the valve-case, with the device for operating the primary valve attached; and

Figure 4, a transverse section of the valve-case, taken as indicated by the line *x x* in figs. 1 and 2.

Similar letters of reference indicate corresponding parts.

My invention relates to that description of liquid-meters in which a reciprocating piston is used within a measuring-cylinder, and made to operate a primary valve, that serves to control the passage of the liquid, to operate a secondary valve, for the purpose of reversing the action of the piston within the measuring-cylinder or chamber; and my invention consists in a novel and advantageous end-arrangement of said valves with their chambers, relatively to the measuring-cylinder; also in a peculiar construction of the valves, of a multiplied head or disk-form, in combination with the passages which they control; and in an arrangement of certain of the ports and passages, whereby not only is the secondary valve kept shut by the pressure of the fluid, in a static relationship or action upon it, but also by the flow of the liquid through it; likewise, said invention further covers a chain or link-like pulling-connection and thrusting-action of the piston in the measuring-cylinder with and on the primary valve, and tubular-stem construction to the latter, to give to the valve a balance character, as it were, that is, to relieve it of objectionable end-resistance or pressure.

Referring to the accompanying drawing, A represents the measuring-cylinder or chamber of the meter, and B its piston, arranged to reciprocate therein, by the pressure of the water or other liquid to be measured, alternately acting on opposite sides or faces of it. C is a rod attached to the piston B, and which may be used to work any suitable indicator for registering the amount of liquid passed through the meter.

The outer or back end of the cylinder A is closed by a lid or bonnet, D, while its inner or front end has connected with it, or bolted on to it, a valve-box or case, made, say, in halves or sections, E E', bolted or otherwise secured together, and constructed to form cylindrical valve-chambers, F F', arranged parallel to the axial line of the cylinder A, and which may be closed at their outer ends by a cap-plate, *a*, while the inner end of the one valve-chamber, F', may be closed by a plate or disk, *b*, and the corresponding end of the other valve-chamber, F, left in open communication at *c* with the cylinder A. Flanged face-plates or formations, *b' b'*, to the sections E E', form a lid or cover to the inner end of the measuring-cylinder. The one-half, E', of the double-valve case, communicates, by a passage-way, G, with the measuring-cylinder A, on the front or inner side of the piston B. This passage-way connects, by an opening, *d*, made in the one section, E', of the valve-case, with the one or lower valve-chamber F', which latter has a passage-way and branch, *e*, that connects, by a lower passage, H, with the back or outer end of the cylinder A, in rear of the piston B. The valve-chamber F' is also connected, by passages, *f f'* and *g*, with the other or upper valve-chamber F, the passage *g* communicating by a branch, I, with any suitable inlet-pipe, and said valve-chamber F' being further connected by ports *s s'*, made in the one valve-case section, E, with an outlet branch, J. The upper valve-chamber F has openings *i i'*, made in section E of the valve-case, said openings connecting said valve-chamber with the outlet-branch J.

Arranged within the valve-chamber F is the primary valve K, made up of disks or piston-heads, *j j'* and *k k'*, attached to a tubular stem, and working or reciprocating in a close manner, to throw its disks or heads *j j'* over and to opposite sides alternately of the passages *f f'*, but not crossing by any of its heads *j j'* and *k k'*, the ports or openings *i i'*, said valve K being thus operated by the piston B, as it approaches and finishes its strokes in opposite directions, and which may be effected as follows: L is a jaw-shaped lever, working on a ful-



crum, as at *l*, and coupling or gearing at its upper or jaw-shaped extremity, through a cross-pin, *m*, with the end of the stem to the valve *K*, that enters, say, the cylinder or chamber *A*. Pivoted to the lever *L* is a stud, *M*, connected by a chain or chains, *N*, with the piston *B*, on opposite sides of a central steel disk or block, *O*. The chains *N* are of sufficient length to remain slack till the piston *B* approaches the back end of its stroke, when they pull on the lever *L*, to throw the valve *K* to the position represented for it in fig. 1, while, on the piston *B* returning and approaching the opposite end of its stroke, the disk or block *O* strikes the stud *M*, to shift the valve *K*, so as to give its heads *j j'* a reversed position relatively to the passages *f f'*.

*P* is a secondary and free or independent valve, arranged to play or reciprocate within the valve-chamber *F'*, and constructed with close-fitting heads or disks, *n n'* and *r r'*, the disks *r r'* playing up to but not crossing the passages *f f'* and ports *s s'*, and the disk *n'* crossing alternately to opposite sides of the passage-way or branch *e*, while the other disk, *n*, crosses to opposite sides of the port or opening, *d*. This valve *P* may be thus limited in its throw, by its stem striking the closed ends of its chamber *F'*.

As the valves *K* and *P* are situated in the drawing, water entering by the inlet *I* is conveyed by the passage *g* between the heads *n* and *n'* of the secondary valve *P*, to the branch *e*, and along the passage *H* to the back of the piston *B*, to propel the latter to the right, the water previously supplied the cylinder *A* at the same time passing off from or in front of the piston, through the passage-way *G* and opening *d*, into the valve-chamber *F'*, between the heads *n* and *r* of the valve *P*; and out through the port *s'* into the general outlet *J*. On the valve *K* being reversed, which takes place when the piston *B* arrives at the opposite end of its stroke, water entering by the inlet *I* is conveyed by the passage *g* between the valve-disks *n n'*, and from thence, through the opening *d* and passage-way *G*, into the cylinder *A*, in front of the piston *B*, while the water in rear of the latter escapes by the passage *H*, branch *e*, and through the port *s*, into the general outlet *J*.

The secondary valve *P* is thus suddenly changed or reversed, to alternate in opposite directions the flow of water through the meter, and to keep up the action of the latter by means of the primary valve *K*, as it is operated by the piston *B*, said primary valve alternately connecting, first, the one passage, *f*, with the water-inlet passage *g*, and passage *f'* with the outlet-port *i'*, to enter water at back of the valve-head *r'*, and pass it from in front of the opposite head, *r*, to throw the valve *P* to the left, and afterwards connecting the passage *f'* with the inlet-passage *g*, and passage *f* with the outlet-port *i*, to reverse the position of the valve *P*.

Though the valves, it will be seen, are of what may be termed a balance character, while moving, by reason of the incoming and outgoing water acting on opposite sides of their heads or disks, the hollow stem to the valve *K* favoring such action, so far as that valve is concerned, yet the free or independent valve *P*, once shot, is subjected to the static pressure of the water on the outer surface of either of its end disks alternately, to keep said valve in the position to which it has been thrown; also the water, in passing through said valve, has the direction of its current so established as to aid in producing a similar effect of keeping the valve closed to the position it has been shot, by reason of the relative arrangement of the passages *g e*, and ports or openings communicating therewith. Thus, supposing water to be entering the branch *e* from the passage *g*, it, in flowing obliquely through the valve, acts upon the disk *n'* to keep the valve *P* shot to the right; or, supposing the position of the valve *P* to be reversed, the entering water, in working its way obliquely through the valve, from the passage *g* to the opening *d*, acts upon the disk *n* to keep the valve *P* shot to the left. In this way the flow of the water through the valve acts in a direction to which the valve has been last moved, and this, aided by the pressure of the water on the outer end disks *r r'* alternately, as hereinbefore referred to, prevents all shifting of the valve by suddenly checking the flow.

What is here claimed, and desired to be secured by Letters Patent, is—

1. The combination, with the measuring-cylinder *A* and its reciprocating piston *B*, of primary and secondary valves *K* and *P*, when arranged for operation in relation to the measuring-cylinder, substantially as shown and described.

2. The primary and secondary valves *K* and *P*, formed with disks or heads *j j'*, *k k'*, and *n n'*, *r r'*, for operation within valve-chambers *F F'*, in combination with ports and passages *f f'*, *i i'*, inlet-passages *g*, branch *e*, passage-way *H*, ports *s s'*, and passage *G*, with its opening *d*, essentially as specified.

3. The arrangement of the ports or passages which control the ingress and egress of liquid through the secondary valve, and of the passages in connection therewith, in such manner as that the flow of the liquid through the valve acts on the latter in the same direction as that to which it has been last shot, and so that said valve is kept shot or thrown in opposite or reverse positions by the pressure of the fluid on its opposite heads alternately, substantially as herein set forth.

4. The primary valve *K*, operated by the piston of the measuring-cylinder, essentially as described, and having an open tubular stem in open communication with the latter, as and for the purpose specified.

Witnesses:

A. LE CLERC,  
E. P. TRACY.

JOSHUA MASON.