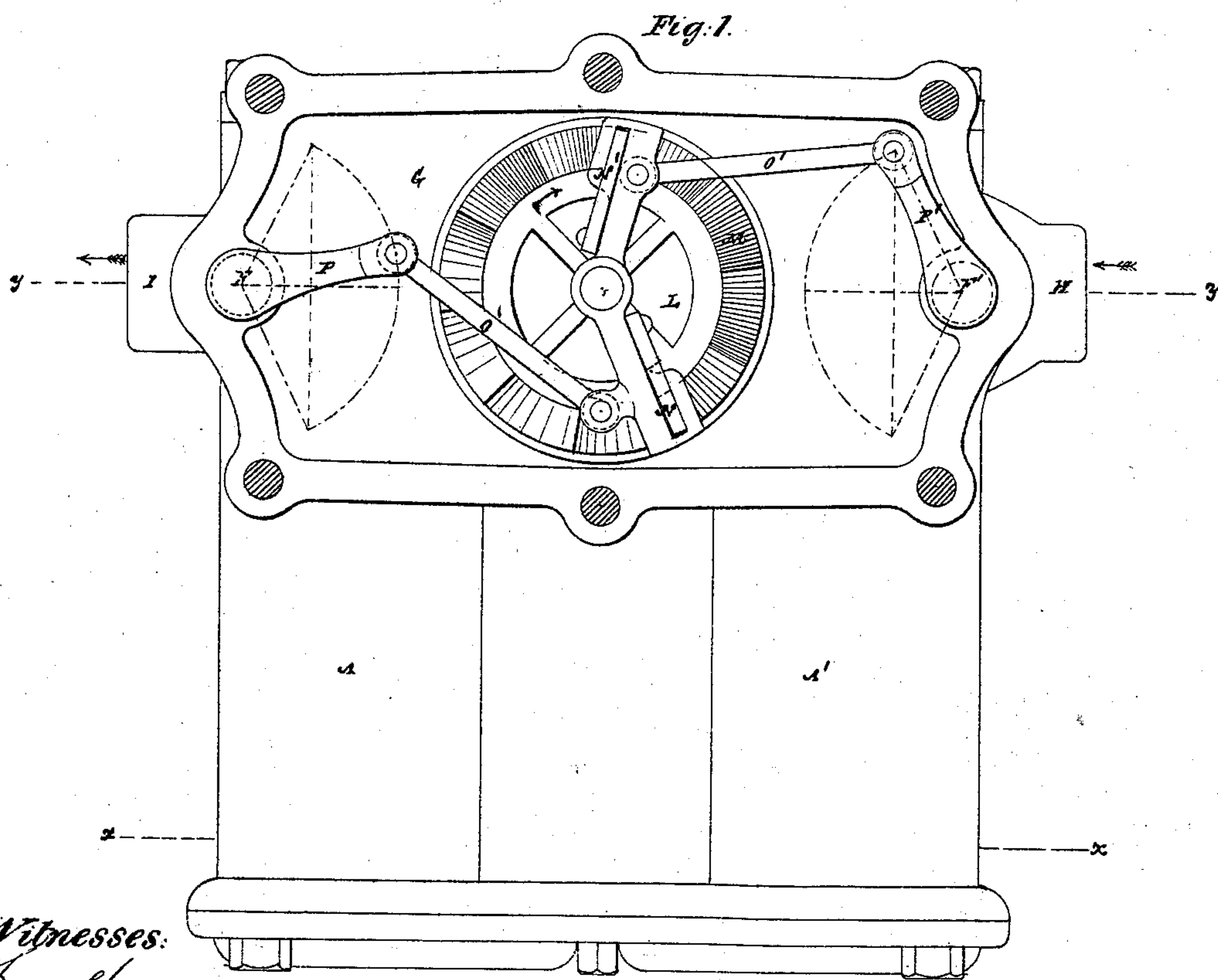
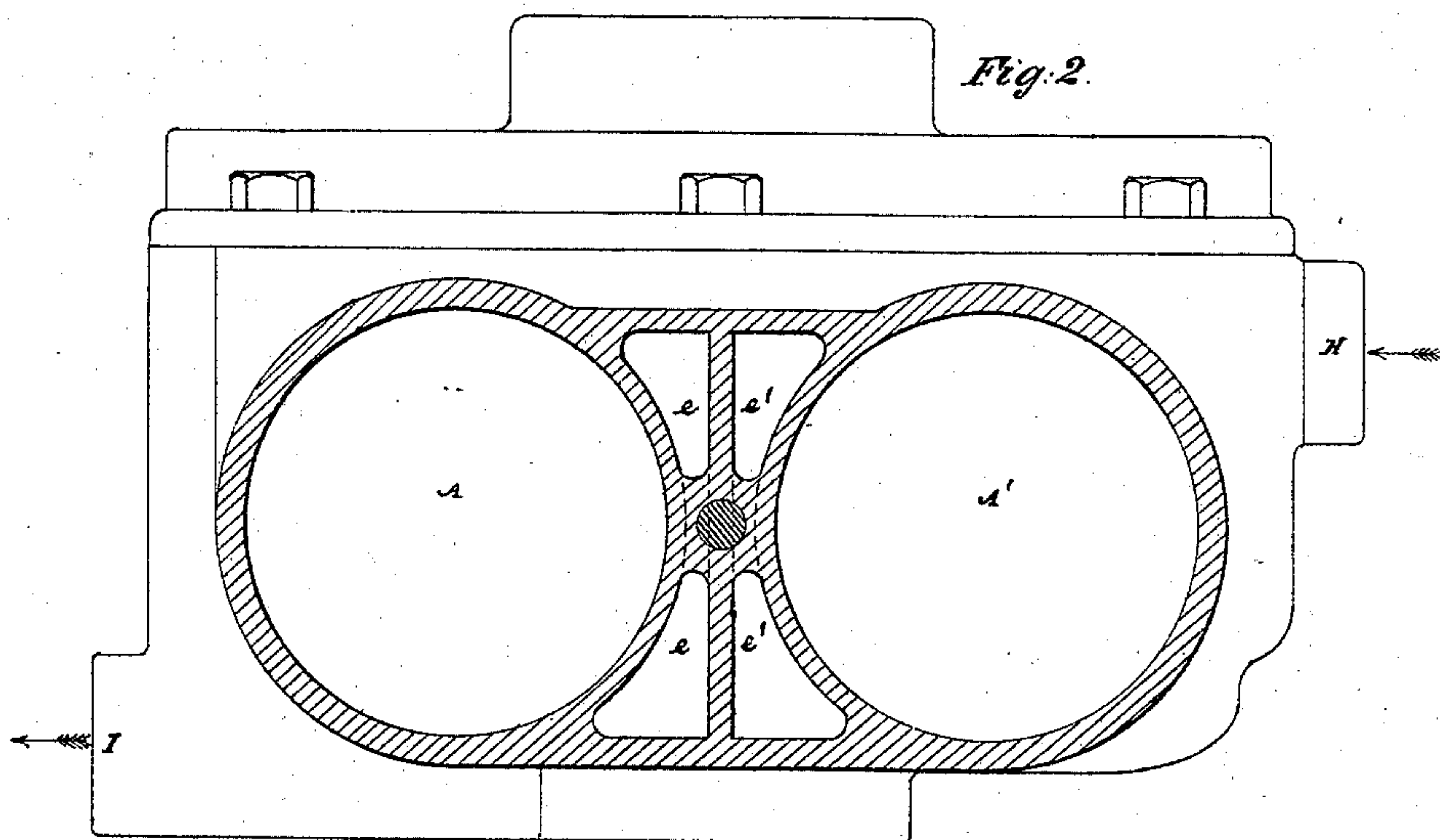


H. C. SERGEANT.
Liquid Meter.

2 Sheets--Sheet 1.

No. 125,848.

Patented April 16, 1872.



Witnesses:
J. C. Humes
R. H. Rabecun

Henry C. Sergeant

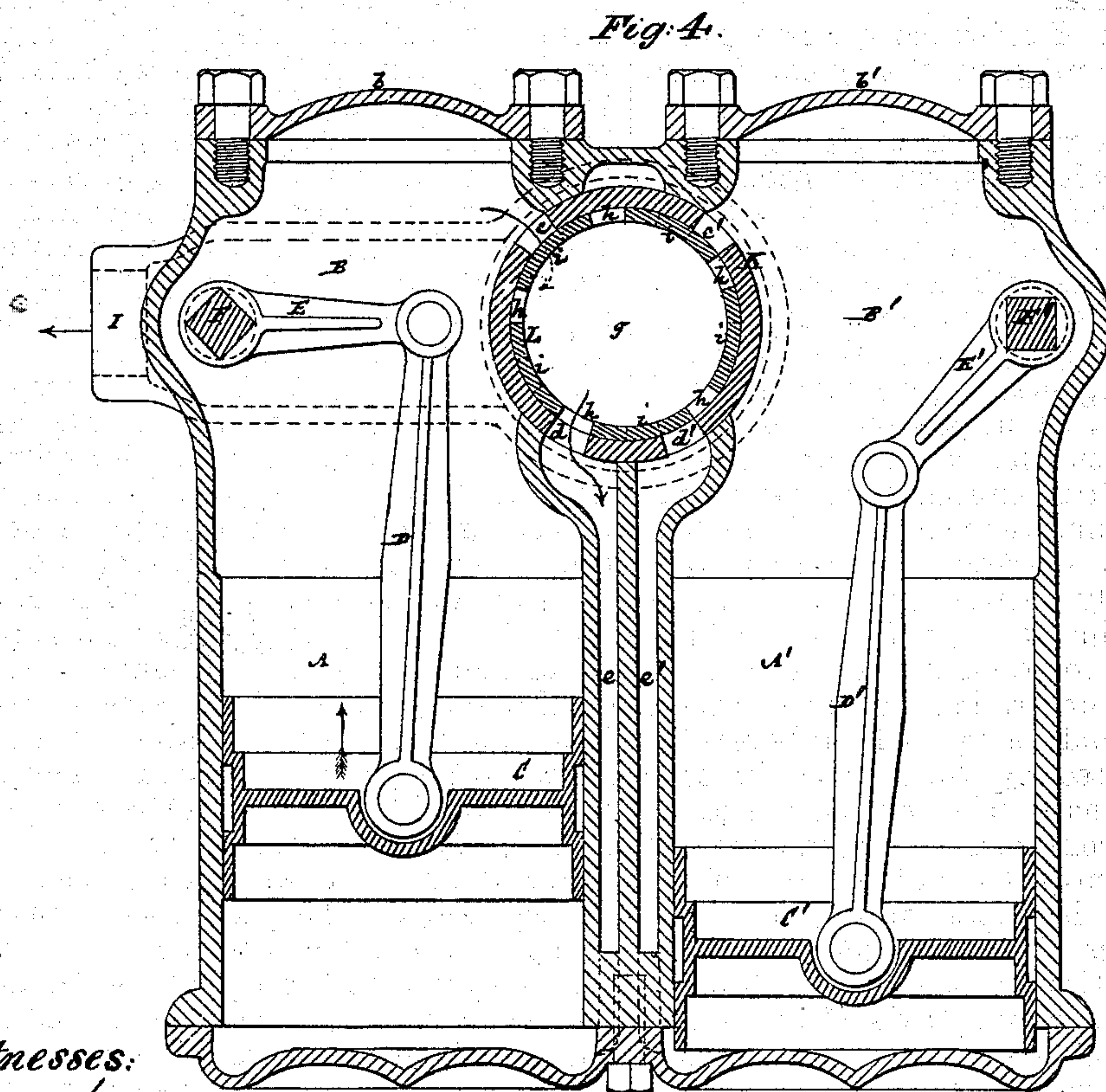
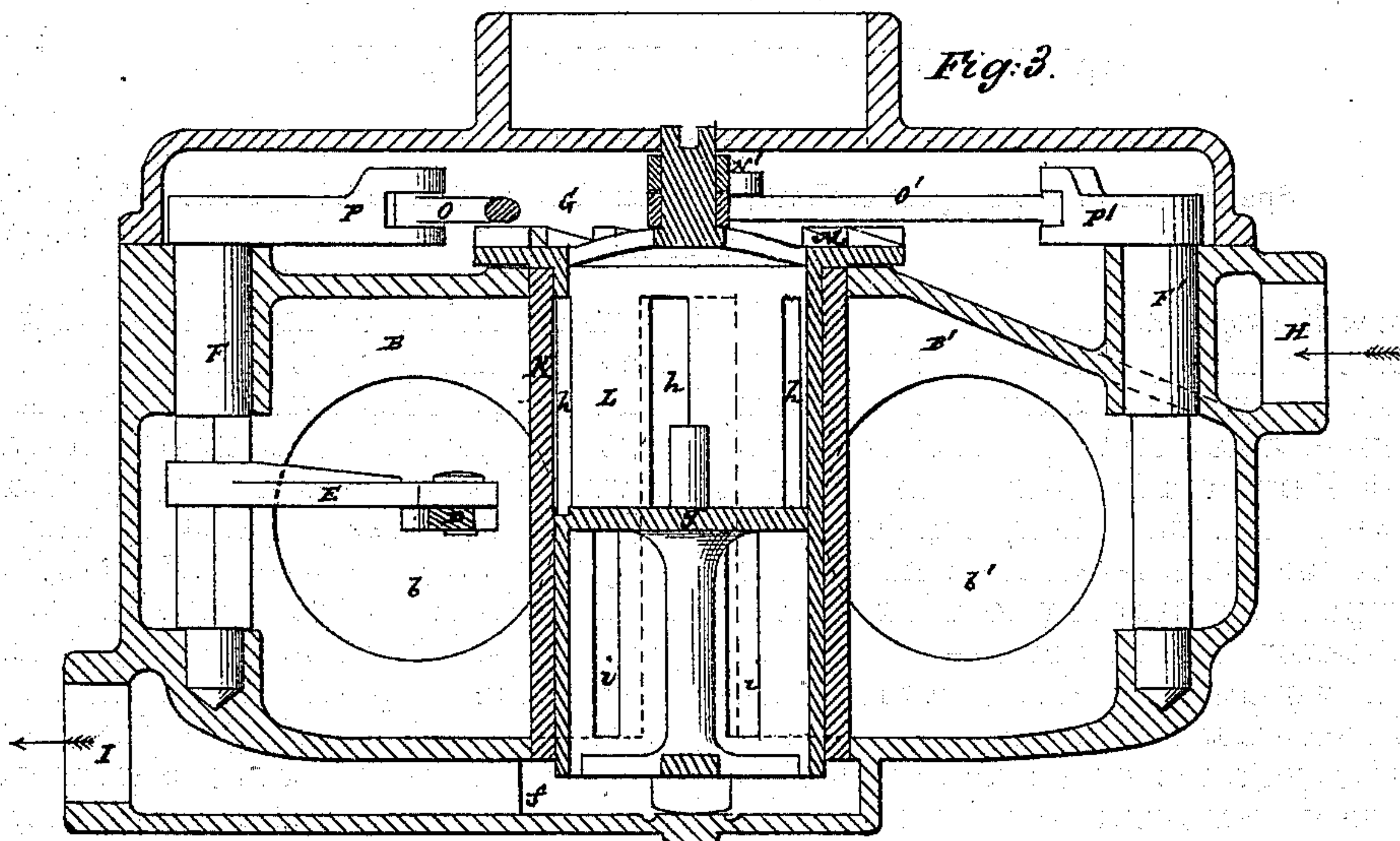
H. C. SERGEANT.

2 Sheets--Sheet 2.

Liquid Meter.

No. 125,848.

Patented April 16, 1872.



Witnesses:

Geo. H. Hume
R. R. Hume

Henry C. Sergeant

UNITED STATES PATENT OFFICE.

HENRY C. SERGEANT, OF NEW YORK, N. Y., ASSIGNOR TO JOSÉ F. DE NAVARRO, OF SAME PLACE.

IMPROVEMENT IN LIQUID-METERS.

Specification forming part of Letters Patent No. 125,848, dated April 16, 1872.

To all whom it may concern:

Be it known that I, HENRY C. SERGEANT, of the city, county and State of New York, have invented a new and useful Improvement in Liquid-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 drawing forming part of this specification, and in which—

Figure 1 represents a plan of a meter constructed in accordance with the invention having the indicating mechanism, and bonnet covering the valve removed; Fig. 2, a transverse section at the line *x x*; Fig. 3, a transverse section at the line *y y*; and Fig. 4, a horizontal section of the meter.

Similar letters of reference indicate corresponding parts throughout the several figures of the drawing.

This invention relates to duplex cylinder-meters provided with independent pistons and employing a revolving valve for controlling both pistons; and consists in a novel connection of said pistons with the valve, whereby the latter is revolved by vibrating or reciprocating devices set in motion by the pistons in place of revolving shafts or devices operated thereby. The invention also consists in a connection of both pistons in a free or independent manner with an intermittently-revolving valve for controlling the motions of both pistons; likewise in a certain combination with the independently-reciprocating pistons; of independent reciprocating valve-drivers having two strokes for each one of the pistons; a ratchet-wheel or driving device operated by said pawls, and an intermittently-revolving valve actuated by the ratchet for controlling both pistons. The invention also includes a peculiar construction of intermittently-revolving valve provided with a series of inlets and outlets, in combination with fixed ports or passages of less number than there are inlets and outlets in the valve, and independent pistons controlled by said valve. By this invention, each piston is made to control the ports of its own cylinder, and the valve is operated both jointly and independently by the pistons under different heads or pressures, thereby insuring the pistons making a full stroke under all heads, and maintaining a con-

tinuous action of the meter; also whereby other advantages are attained.

In the accompanying drawing, A A' represent the measuring chambers or cylinders of a duplex cylinder-meter, said cylinders being horizontally arranged side by side, although they may be otherwise disposed. These cylinders are closed at their ends, which lie on the one and same side of the meter, but are open at their opposite ends to liquid chambers or spaces B B', closed by end lids or caps *b b'*. C C' are the reciprocating pistons within said cylinders. These pistons are connected by rods D D' with levers E E', fast to vertical shafts F F', for the purpose of vibrating the latter; said shafts being arranged within the chambers B B', and extending up into a liquid-receiving chamber, G. H is the inlet for the water or other liquid to the receiving-chamber G, and I the outlet-pipe or passage from the meter. K is a vertical cylindrical valve-case or chamber arranged intermediately of the shafts F F', and serving to receive within it an intermittently-revolving cylindrical valve, L. Said valve-case K, which is open top and bottom, is provided with longitudinal passages *c c'* and *d d'*, the one pair, *c c'*, of which communicate, respectively, through the chambers B B' with the open ends of the cylinders A A', and the other pair, *d d'*, of which connect, by passages *e e'*, with the opposite or closed ends of said cylinders. The valve L is open at its top to the receiving-chamber G, and at its bottom to an exhaust-passage, *f*, which is in communication with the main outlet I. A diaphragm, *g*, divides the valve transversely into upper and lower sections, which have lateral openings or ports *h* and *i*, in or through their walls. The upper ones, *h*, of these ports pass the liquid through the valve to the cylinders A A', and the lower ports *i* pass it from said cylinders. The ports *h* will, consequently, be termed inlets, and the ports *i*, outlets. The outlets *i* are arranged intermediately of the inlets *h*, but beneath them, and the disposition of the passages *c c'* and *d d'*, in the valve-case is such that as the valve is rotated at only a slow rate in proportion to the strokes made by the pistons C C', liquid will be passed to and exhausted from opposite sides of said piston in due course—that is as they reach the

ends of their stroke. The pistons are set quartering, or thereabout, in relation with each other. The valve *L* is intermittently revolved in a direct manner by the pistons, through the intervention of a ratchet or driving-wheel, *M*, attached to the valve; said pistons operating the ratchet by means of free or independent pawls or drivers *N N'*, or independently-swinging levers carrying the pawls, and actuated by rods *O O'* and levers *P P'*, attached to the vibrating-shafts *F F'*, set in motion by the pistons. Each pawl *N N'* makes two strokes, while the piston operating it travels one, by reason of said pawls being worked from the versed sines of the arcs described, by the vibrating-levers *P P'*. There are as many combined inlets *h* and outlets *i*, in the valve as there are teeth in the ratchet *M*, and an excess of either of such inlets or outlets over the number of ports or passages *c c'* and *d d'*, in valve-case. For instance—though such numbers may be changed—there are ten teeth in the ratchet, five valve-inlets *h*, a corresponding number of valve-outlets *i*, and four fixed ports or passages, *c c'* and *d d'*, in the valve-case. The pawls *N N'* are so set on the ratchet that each piston controls the ports to its own cylinder in the valve-case, shutting off the supply when said piston reaches the end of its stroke, and opening the exhaust on the opposite side of said piston. This, at least, is the action for each pawl, alternately and independently of the other, when the meter is working under a full head or pressure, no joint action of the pawls *N N'* then taking place, but each piston traveling to the end of its stroke, and operating the valve to shut off further supply to it, and open the exhaust on the opposite side thereof, without the aid of the other piston. When working under a low head or pressure, however, both pawls *N N'*, are caused to work in unison on the ratchet to operate the valve to bring either piston alternately to the end of its stroke. Thus the piston which is making its stroke, and is then exposed to supply through a large valve-port opening, operates the valve, while the other piston, which is completing its stroke, and is exposed to supply from a much smaller area of valve-port opening, is relieved of the load of the valve by the piston having a larger supply, and consequently is free to travel to the end of its stroke. At other periods and under other circumstances both pawls operate conjointly on the ratchet, or may do so for a limited distance only.

It is an important feature of the action above described, however, that the independent pawls or drivers have two strokes for one of the pistons. The action, too, it will be seen, is a varied one—that is, the intermittently-revolving valve that serves to control both pistons is actuated both conjointly and independently by the pistons; also said valve is revolved by a reciprocating instead of a revolving motion derived from the pistons, and the valve has a reduced number of evolutions as compared with the number of strokes of the pistons, which slow motion of the valve admits of a simple registering mechanism being worked therefrom. The certainty of the pistons making their full stroke under all heads or purposes, and of a continuation of action of the pistons being maintained, without possibility of failure, are however, the principal advantages of this invention.

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

1. In a duplex cylinder-meter provided with independent reciprocating pistons, and a revolving valve for controlling both pistons, the employment for rotating the valve, of vibrating or reciprocating devices operated by the pistons, substantially as specified.

2. The connection of the pistons of the meter in a free or independent manner, with an intermittently-revolving-valve for controlling the motions of both pistons, essentially as described.

3. The combination with the independently-reciprocating pistons *C C'*, of the independent pawls or reciprocating drivers *N N'*, having two motions for each motion of the pistons, the ratchet or driving-wheel *M*, and an intermittently-revolving valve operated by said ratchet for controlling the motion of both pistons, whereby each piston is made to control the ports of its own cylinder, and the valve is operated both jointly and independently by the pistons under different heads or pressures, substantially as specified.

4. The intermittently-revolving valve *L*, provided with a series of inlets *h* and outlets *i*, in combination with the fixed ports *c c'* and *d d'*, of less number than the inlets and outlets in the valve, and the independent pistons controlled by said valve, essentially as described.

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Witnesses:

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W. MORRIS SMITH.