

J. F. DE NAVARRO & H. C. SERGEANT.
Liquid Meter.

No. 125,793.

Patented April 16, 1872.

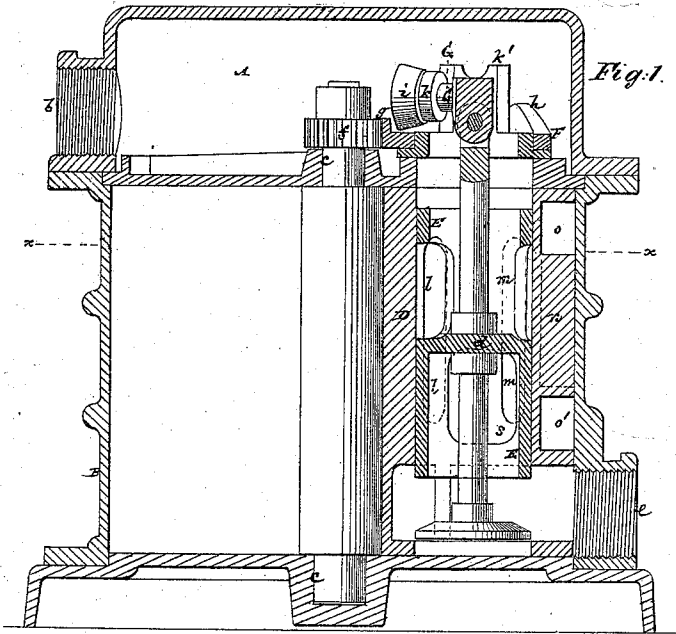


Fig. 1.

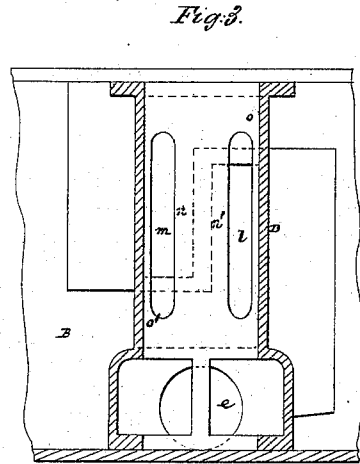


Fig. 3.

Fig. 2.

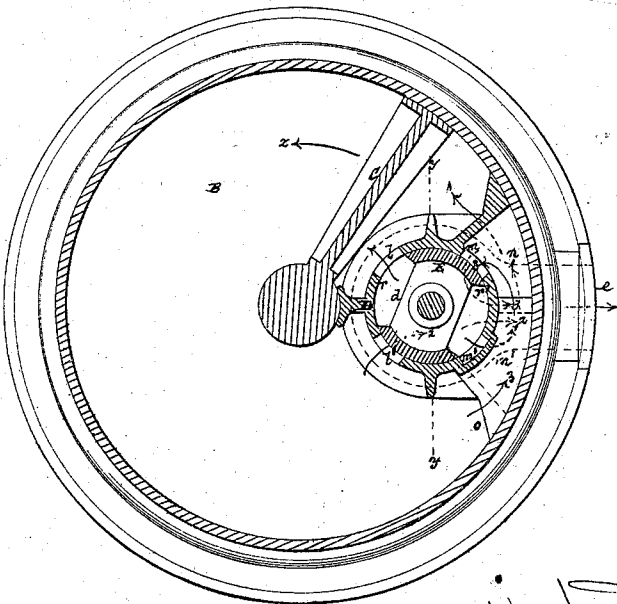
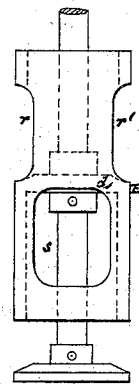
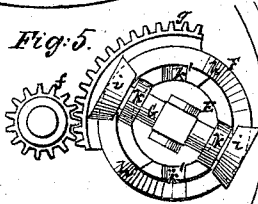


Fig. 4.



Witnesses:
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Fig. 5.



J. F. De Navarro
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UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. 125,793, dated April 16, 1872.

DIVISION A.

Specification describing a certain Improvement in Liquid Meters, invented by JOSÉ F. DE NAVARRO and HENRY C. SERGEANT, both of the city, county, and State of New York.

This invention relates to water or other liquid meters, in which a swinging or reciprocating piston is controlled by a valve of cylindrical construction, having both a vibratory motion about its axis and a longitudinal movement in direction of the length thereof, within a fixed abutment provided with ports or passages arranged to conduct the liquid to and pass it from opposite sides of the piston alternately, said valve being hollow and formed with side inlets and outlets in upper and lower or divided sections of it. The improvement consists in a novel construction or arrangement of fixed ports or passages, in combination with a certain construction of inlets and outlets in the valve, whereby the latter is balanced or relieved from one-sided pressure, so that after being lifted it is free to drop, unrestrained by lateral pressure.

Figure 1 of the drawing represents a vertical section of a meter having our improvement applied to it; Fig. 2, a horizontal section on the line *x x*; Fig. 3, a vertical section at *y y*, Fig. 2, mainly of the chamber in which the valve works; Fig. 4, a longitudinal view of the valve detached; and Fig. 5, a plan of the valve motion.

The improvement is here shown as applied to a meter similar to that described in Letters Patent No. 111,134, dated the 24th day of January, 1871, and the means employed for operating the valve are of a like description to the devices there shown for such purpose. Thus, A is an outer chamber, to which the water or other liquid is admitted as by an inlet, *b*, and from which it is passed through the valve to opposite sides of the piston alternately. B is the measuring cylinder or chamber, and C its piston, arranged to swing or work by or in upper and lower pivots or bearings *c c*, toward and from opposite sides, alternately, of an abutment, D. Said abutment is made hollow and with a cylindrical recess to receive down within it the cylindrical valve E that controls the motion of the piston. This valve has a vibratory motion about its axis, and an up-and-

down movement in direction of the length of it to reverse the action of the piston. To this end, the valve is vibrated in part by its own weight and in part by the pressure of the water, operating to drop it by means substantially similar to those described in patent No. 111,134, hereinbefore referred to, and the valve, like that therein described, is constructed open, top and bottom, and divided intermediately of its length by a partition, *d*, into an upper receiving-chamber or section and lower discharging-chamber, the latter being in communication with a main outlet, *e*; but the inlets and outlets in the valve and ports or passages in the abutment are differently constructed to those described for the valve in said patent, as hereinafter explained.

As already specified, however, the motion of the present valve is similar, and the means employed for operating it may be the same. Thus, on the upper pivot of the swinging piston C is a pinion, *f*, arranged to gear with a toothed sector, *g*, that forms a lateral projection from a hollow cam, F, which allows of the passage of the liquid through it to the valve, and is arranged so as to turn independently of the valve, over which it is concentrically disposed, and forms an open eye to the moving sector. This cam is constructed on its opposite sides with reversely-arranged or double inclines *h*, that serve, as the cam is vibrated by the action of the pinion *f* on the sector *g*, in or during the motion of the piston C, to lift the valve by means of a cross-bar, G, attached to the valve-spindle, and resting, by bevel-rollers *i*, on opposite sides of the cam F. The highest elevation of the valve takes place as the piston C approaches the end of its stroke in either direction, after which the slightest continuation in the vibratory motion of the cam F leaves the valve at liberty to drop, by its bar G or rollers *i*, down either two of the opposite inclines *h*, according to the direction in which the cam is being vibrated. This reverses in a rapid manner the valve, which, in dropping, has its turning motion, as produced by the inclines of the cam, restricted by the bar G or rollers *k* thereon, striking oppositely-disposed stops *k'*, that also serve, in conjunction with the inclines *h*, to keep the valve to its turned

position during the reverse movement of the cam. Said valve drops, when released from lift by the cam, to effect the turning or reversal of it, as described, in part by its own weight and in part by the inlet fluid rushing down through and pressing on it. The valve-stem may be provided with a plunger at its lower end for entry within a dash-pot, to prevent concussion of the valve in dropping.

The valve-seat portion of the abutment is provided with four oppositely-disposed vertical ports, $l\ l'$ and $m\ m'$, through either two opposite ones, l and m or l' and m' , of which the liquid is alternately admitted to and passed from the cylinder by the operation of the valve to keep up the swinging or reciprocating action of the piston. The two front ports $l\ l'$ open directly within the cylinder B, but the rear ports $m\ m'$ communicate with vertical spaces or passages $n\ n'$ in the abutment, the one passage n of which connects with the cylinder by an upper opening, o , on the one side of the abutment, while the other passage n' connects with the cylinder by a lower opening, o' , on the opposite side of the abutment. The valve E is provided, above the partition d , with oppositely-disposed inlets $r\ r'$, and below said partition with oppositely-disposed outlets s , arranged at right angles with the inlets relatively to the axis of the valve. These inlets and outlets, as also the lateral portions of the valve separating them, are of an enlarged width as compared with the ports $l\ l'$ and $m\ m'$.

By means of the rear fixed ports $m\ m'$, in combination with the valve, constructed as described, said valve is balanced, as regards any lateral pressure of the fluid, inasmuch as it is exposed to the same pressure at either port m or m' that it is at the opposite port l or l' . This

balancing of the valve gives it a freedom in dropping which effectually prevents sticking.

Supposing the valve to be in the position represented for it in Fig. 2, the piston is caused to travel in direction of the arrow 2, water entering the cylinder B from the upper section of the valve through the port l , also through the lower opening o' by the passage n' , as indicated by the arrows 1 1 1 in Fig. 2. At the same time the exhaust-water passes off by the port l' into the lower or discharging section of the valve, and out to the outlet e through the valve-ports s , as indicated by the arrows 2 2, also through the upper opening o , down the vertical passage n , and out through the valve to the exhaust, as indicated by the arrows 3 3 3. In this way the valve is exposed on its sides to opposite or counteracting pressures, both of the incoming and outgoing fluid, and a like balancing exposure takes place under a reversed position of the valve also, during the whole action of the valve. This prevents sticking of the valve, and allows it to drop as required to effect reversal of the ports. When the valve is reversed the port l' and opening o become the inlets for the fluid, and the port l and opening o' the outlets therefor.

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

The combination, with the valve E constructed and operating substantially as described, of the ports $m\ m'$, the passages $n\ n'$, the openings $o\ o'$, and the ports $l\ l'$, the whole being arranged in relation with each other and the abutment D of the cylinder, essentially as specified.

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