J. R. NORFOLK.

Fluid-Meter.

No. 225,018. Patented Mar. 2, 1880.

Fig. 1

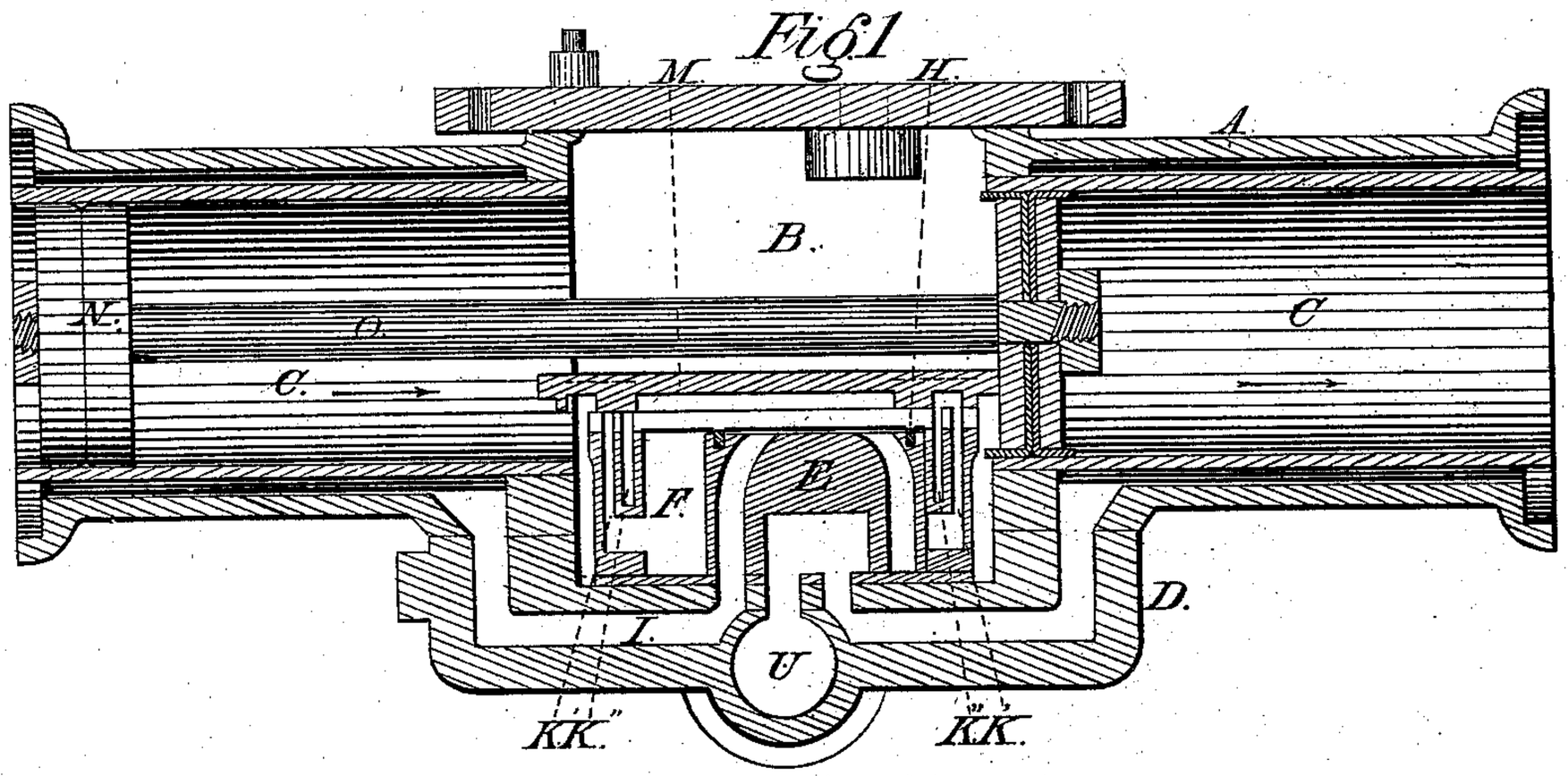


Fig. 2

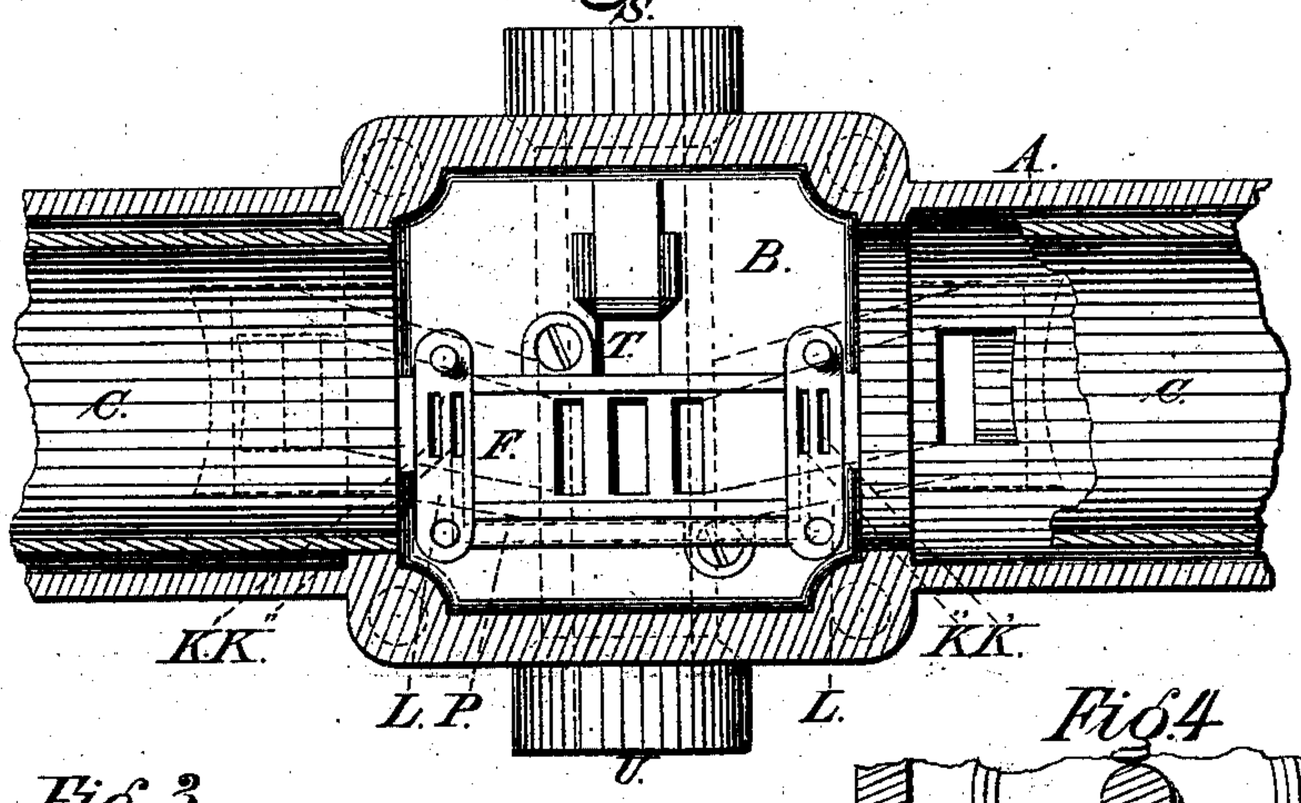


Fig. 3.

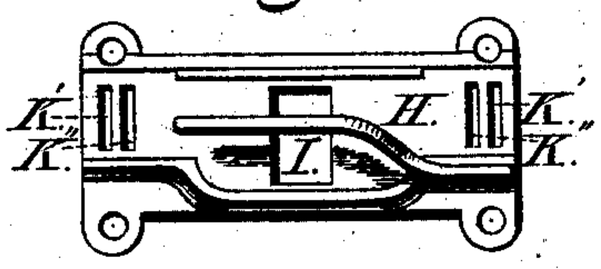
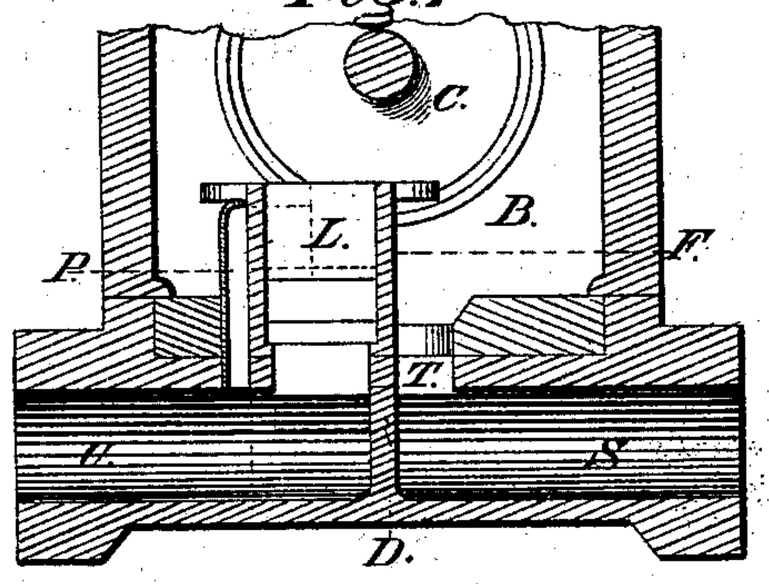


Fig. 4



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN R. NORFOLK, OF SALEM, MASSACHUSETTS.

FLUID-METER.

SPECIFICATION forming part of Letters Patent No. 225,018, dated March 2, 1880.

Application filed October 6, 1879.

To all whom it may concern:

Be it known that I, JOHN R. NORFOLK, of Salem, in the county of Essex and Commonwealth of Massachusetts, have invented a new and useful Improvement in Fluid-Meters, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

My invention relates to an improvement in fluid-meters of the general form described in my patent of December 5, 1876, which consists of a central valve-chamber and two cylinders, and in which the valve is actuated by the recoil of a spring moved by the piston.

In the invention herewith described the springs are dispensed with, and the valve is moved solely by the pressure of the fluid, which is admitted alternately to the ends of the valve by the movement of a supplementary valve actuated directly by the movement of the pistons; and in carrying this invention into effect it further consists in the combination and arrangement of the inlet and outlet ports and passages for transmitting the fluid for the movement of the valves in order to render their action positive.

My meter consists of two cylinders inclosed in a case, A, having a valve-chamber, B, between the cylinders C C. The valve-chamber and case constitute one casting, in which the cylinders and valve mechanism are placed, as described in my patent before named.

The valve-chamber B is covered by two plates, the bottom plate of which I denominate the "valve-plate," D, and to which the valve mechanism is attached with the ports and passages connected therewith.

E is the main valve, which is a casting of brass or other suitable material, having two end and one central ports, corresponding with passages at the bottom of the valve-casing F. The casing F completely incloses the valve, being of sufficient length to permit the proper movement of the same. The ends and top plate of the casing F form the valve-seat and passages for the supplementary valve M, by which the water is admitted to actuate the main valve E. The main valve E is carefully fitted into the valve-casing F at the sides, bottom, and top, forming a ground joint with the valve-seat and sides, and at the ends of the valve on the top, and under the top of the casing, a packing of any suitable character may be used to prevent the water from passing over the ends of the valve E into the space between the ends of the valve and the ends of the case F.

H is a plate forming the top of the case F. This plate is provided with a port, I, for the main valve and with valve-seats K for the supplementary valve M.

The ends of the case L L are formed of a casting sufficiently thick to make the passages K, communicating with the ports K in the plate H, and the inlet and exhaust ports and passages for said valve. For this purpose the plate H is extended over the ends of the case F, so as to cover and open a passage into and through each of them.

The top plate, H, is arranged in such relation to the valve E that, as before described, a tight sliding joint is made at each end; but at the middle, over and between the port I, a space may be left, as it is not essential that the valve and casing should be in contact at these points.

The supplementary valves M M are made in one casting, connected with each other, and having a projection at each end, against which the piston strikes at each reciprocation. The valve slides on the seats formed on the plate H. The plate is provided with pins or projections to adjust the length of the movement of the valve, and a spring may be used to insure perfect contact with the seat and to prevent it from being displaced by accident.

The ends L of the valve-case F are each provided with two passages, K K, one of which communicates with the interior of the case F, and the other with a passage open to each end, which enters the exhaust-outlet of the meter. The direction of the currents of fluid is shown by the arrows.

The pistons N N are connected together by a piston-rod, O, and are of the usual form and construction.

The operation of my meter may be thus described: Referring to the drawings, the pistons N N are shown near the end of the stroke and moving in the direction of the arrow. The supplemental valve is in the position shown—that is, the port K′ is open, establishing com-

munication with the water in the valve-chamber B and the interior of the main-valve casing F. The port K″ is closed. At the other end the ports K′ and K² are in communication with each other and the exhaust-outlet U. The main valve is at the end of the stroke, having been forced over by the pressure of the water admitted through the port K′, which, while admitting the water and moving the valve to its proper position, has driven the water out at the other end of the valve, through the port K², into the exhaust-port P.

This position of the valve allows the water to pass through the port and passage I′ to the cylinder, moving the piston N, until it reaches the point where it strikes the end of the supplementary valve M. This movement of the supplementary valve reverses the currents of water, and drives the main valve in the opposite direction, and changes the current of water to the other piston. This operation is repeated at each reciprocation.

The water-inlet is shown at S. The water enters and fills the valve-chamber B through the passage T, and then passes through the various ports and passages to and from the cylinders to the outlet U.

The advantage of this form of valve mechanism is that the motions of the main and supplementary valves are positive, and so long as the pistons continue to move the valves will be operated with certainty.

The arrangement of the outlet-ports of the supplementary valves with the exhaust-outlet insures a lower pressure at the end of the valve which is in communication with the exhaust, and this always being counterbalanced by a higher pressure at the end of the valve which is in communication with the valve-chamber insures a positive motion of the main valve, and it is thus enabled to be operated under any and varying pressures of water. The small amount of water required to move the main valve is not lost, but passes with the main body of water from the cylinders into and through the outlet of the meter.

It is important in the construction of the main valve to secure an area on the ends of the valve larger than the area of any other part of the valve exposed to the pressure of the water in the valve-chamber.

In the drawings, Figure 1 represents a vertical longitudinal section of my meter. Fig. 2 represents a plan view of same, the top plate of valve-chamber left off, the main-valve casing being exposed. Fig. 3 is a plan view of the top plate of valve-casing. Fig. 4 is a sectional elevation through the line of the inlet and outlet of the meter, showing the ports, passages, and valve-casing.

Similar letters of reference indicate like parts in all the figures.

I claim as my invention—

In a fluid-meter, the valve mechanism shown and set forth, the same consisting of the combination of the main valve E, casing F, and supplementary valve M, arranged to operate in the valve-chamber B in the manner and for the purpose substantially as described.

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Witnesses:
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