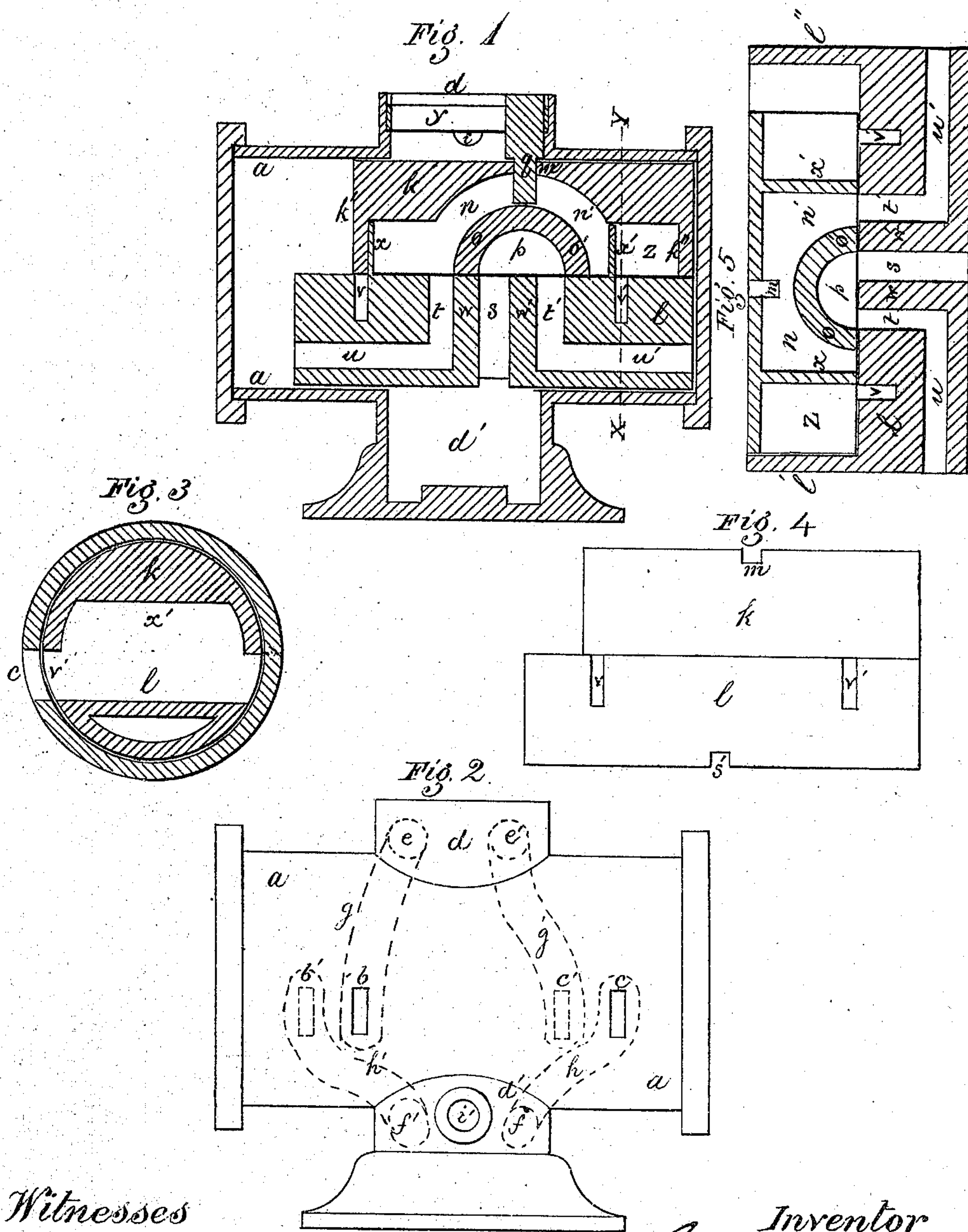


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Improvement in Liquid-Meters.

No. 131,633.

Patented Sep. 24, 1872.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN LIQUID-METERS.

Specification forming part of Letters Patent No. 131,633, dated September 24, 1872.

*To all whom it may concern:*

Be it known that I, GERARD SICKELS, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Water or other Meters, of which the following is a specification:

Figure 1 in the drawing represents a central longitudinal vertical section; Fig. 2, a side view; Fig. 3, a transverse vertical section taken on the line X Y of my improved meter; Fig. 4 is a longitudinal view of the piston connected with the meter; and Fig. 5 is a central longitudinal vertical section of the piston embodying the same general principles as the above.

The present invention relates to certain new and useful improvements in water or other meters, having for its main objects simplicity of construction and operation, and economy in cost. My improvements consist in so arranging and operating a sliding valve, which is made a component part and horizontal half or other segmental portion of a piston, that stationary ports in a cylinder suitably connected with other ports in one-half of the piston, that water or other fluid, &c., entering through ports and channels connected therewith, cause one portion of a piston to slide longitudinally on the opposite or other portion of the piston, so as to change the current of water or steam, &c., from one end to the other of both, by which action the whole piston is operated alternately from one end to the other of the cylinder.

*a a* in the drawing represent a cylinder provided on each side with ports *b c* and *b' c'* arranged alternately with and at a proper distance from each other, for the purpose hereinafter explained, and as shown in dotted lines of drawing, Fig. 2. Connecting with the cylinder *a a* is a vertical passage or induction-chamber, *d*, and an eduction passage or chamber, *d'*, each supplied with ports *e f* and *e' f'*, which connect by conduits *g h* and *g' h'* cast on the cylinder *a a*, and shown by the dotted lines, Fig. 2, with the ports *b c* and *b' c'*. The induction-chamber *d* is provided with an induction-pipe, *i*, and the eduction-chamber *d'* is furnished with an eduction-pipe, *i'*. Traveling longitudinally within the cylinder *a a* is a piston of two horizontal parts or segments, *k* and *l*, either in half or other segmental por-

tions, one portion or segment acting as a valve for the other portion or segment. The former segment *k* is arranged with a port, *m*, in its top, which opens into conduits *n n'* formed by the bridge *o o'* of a **D** or dome valve, *p*, arranged below the port *m*, transversely with the piston, and which forms, with the bridge *o o'*, part of the casting of the upper segment *k*. In the port *m* a stem, *q*, is fitted so as to travel longitudinally in a slotted bar, *r*, connected with the induction-chamber *d*, for the purpose of preventing the rocking of the piston. The stem *q* only pertains to this model, as I propose in a working-meter to set the port *m* longitudinally and insert a small vertical shaft down from the register, said shaft serving the purpose of steadying the piston, while at the same time the longitudinal vibrations of the piston rotate the shaft, and thereby the register. The upper portion or segment *k* of the piston finds a seat on a lower portion or segment, *l*, of the piston, which is provided with an eduction-port, *s*, that connects with the eduction-chamber *d'*, and is separated by partitions *w w'* from two side vertical ports, *t t'*, which connect with horizontal conduits, *u* and *u'*, which extend longitudinally to the end of the lower segment *l*, where they find an outlet into the cylinder *a a*. Near the ends of the segment *l*, extending transversely across it, and downward a sufficient distance to connect with the ports *b c* and *b' c'*, are formed slots *v* and *v'*, which, in connection with the segment *k*, form ports, two on each side, connecting with the cylinder-ports *b c* *b' c'*, and one at each end communicating with chambers *z* formed by the partitions *x x'* and the ends *k' k''* of the upper segment *k*. These partitions *x x'* may be differently arranged, as shown in Fig. 5. It will be observed that in Fig. 1 the partitions *x x'* are permanent projections formed on the lower segment *l*, and extending upward, and that the upper segment *k* is arranged with closed ends *k' k''* extending downward and forming chambers *z* between them and the partitions *x x'* at either end, while in the modification, as shown in Fig. 5, the above arrangement is reversed and the partitions *x x'* are formed on the upper segment *k* and extend downward, and the ends *l' l''* of the lower segment *l* extend upward, so as to fill the main cylinder *a a*,



which forms the outer wall of the chamber  $z$ , thus obtaining the same result, a chamber,  $z$ , between the end and partition, as in the former arrangement.

The operation of my invention is as follows: Water or other fluid, &c., being introduced in the induction-chamber  $d$  in the top of the meter, and the two segments  $k$  and  $l$  being placed at one extreme end of the cylinder  $a$ , the water or other fluid, &c., passes from the induction-chamber  $d$  through the ports  $e$   $b$   $v$  and conduit  $g$  on one side of the meter, and communicates with the exhausted chamber, (shown as closed in the drawing, Fig. 1, but formed between the segments  $k$  and  $l$  by the partition  $x$  and end  $k'$  of the upper segment  $k$ , and corresponding, when open, to the chamber  $z$ ), which is thereby filled, and at the same time the water &c., in the full chamber  $z$  is exhausted through the ports  $v'$   $c$   $f$  and conduit  $h$ , thus causing the two segments  $k$  and  $l$  to slide longitudinally one upon the other, and in so doing change the current of the induction-water, &c., to the opposite end of the whole piston in the main cylinder through the port  $t$  and conduits  $u'$  connecting with the conduit  $n'$  and port  $m$ , the water, &c., during the passage of the piston, finding an outlet through the port  $s$  into the eduction-chamber  $d'$ , from which it escapes through the eduction-pipe  $i'$ . The above operation of the piston has caused the lower segment  $l$  to open corresponding ports  $e'$   $b'$   $v'$   $c'$   $f'$  and channels or conduits  $g'$   $h'$  on the opposite side of the meter, these latter ports and channels bearing the same relation to and performing the same service of sliding the one segment on the other, and propelling longitudinally, backward or forward, the whole piston, but in a contrary direction to that produced by the passage of the water, &c., through the ports and conduits first referred to.

Having thus described my improvements, what I claim as my invention, and desire to have secured to me by Letters Patent, is—

1. A water or other meter having an outer cylinder,  $a$   $a$ , in which travels longitudinally a piston composed of two horizontal halves or other segmental portions,  $k$  and  $l$ , arranged not merely as a valve sliding on the piston within a cylinder, but constituting a component part of the piston, substantially as specified.

2. The cylinder  $a$   $a$ , provided with induction-chamber  $d$  and eduction-chamber  $d'$ , connecting with induction-pipe  $i$  and eduction-pipe  $i'$ , and formed with ports  $e$   $e'$ ,  $f$   $f'$ ,  $b$   $c$ , and  $b'$   $c'$ , and conduits  $g$   $g'$ , within which cylinder  $a$  operates longitudinally the segments  $k$  and  $l$  of a traveling piston, substantially as described.

3. The horizontal piston, composed of two horizontal halves or other segmental portions,  $k$  and  $l$ , the former of which is arranged with port  $m$ , conduit  $n$   $n'$ , chambers  $z$ , and dome or D-valve  $p$ , operating on and in connection with the lower half or segment  $l$  formed with ports  $t$   $t'$ , port  $s$ , conduits  $u$   $u'$ , slots or ports  $v$   $v'$ , and partitions  $x$   $x'$ , so as to travel longitudinally one on the other, and within the cylinder  $a$   $a$ , substantially as specified.

4. The partitions  $x$   $x'$  formed either on the upper or lower segments  $k$   $l$ , so as to form chambers  $z$  between themselves and the ends  $k'$   $l'$   $l''$ , either of the upper or lower segments  $k$   $l$ , in combination with the slots or ports  $v$   $v'$ , ports  $b$   $c$   $b'$   $c'$ , and cylinder  $a$   $a$ , substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GERARD SICKELS.

Witnesses:

SAML. M. BARTON,  
JESSE F. WHEELER.