D. B. SPOONER.

LIQUID METER.

No. 287,587. Patented Oct. 30, 1883.

Fig. 1.

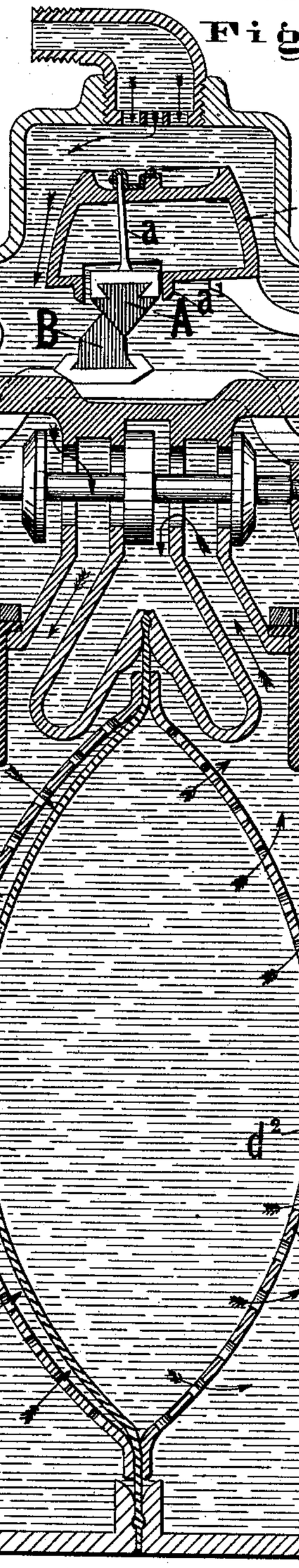


Fig. 2.

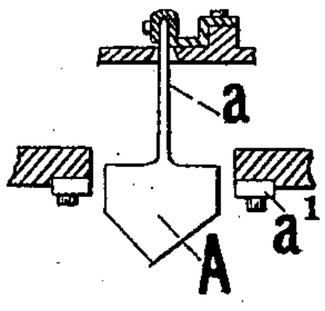
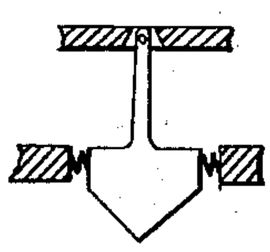


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

D. BRAINERD SPOONER, OF NEW YORK, N. Y.

LIQUID-METER.

SPECIFICATION forming part of Letters Patent No. 287,587, dated October 30, 1883.

Application filed December 31, 1879.

To all whom it may concern:

Be it known that I, D. BRAINERD SPOONER, of the city and State of New York, have invented new and useful Improvements in Liquid-Meters; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

This invention relates in part to that class of water-meters which is represented by my Letters Patent No. 132,496; and it consists, mainly, first, in so constructing the prismatic projection of the apex-weight therein described that it is capable of an independent lateral vibration; second, in the combination of unattached diaphragm-disks having bearing-sleeves projecting therefrom, with a casing having journals or bearings for supporting and guiding the disks exactly in right lines, and, third, in such a construction and arrangement of parts that the movement of the diaphragm or other water-measuring part is arrested by the action of the mechanism for changing the direction of the water-flow, as will be fully described hereinafter.

In the drawings, Figure 1 represents a vertical sectional elevation of my improved meter, and Figs. 2 and 3 modified forms of the prismatic projections having a capacity for lateral vibration.

To enable others skilled in the art to make my invention, I will proceed to describe fully the construction of the same.

The first part of my invention will now be described.

A, Fig. 1, represents a prismatic projection, which by itself is like that rigidly attached to the apex-weight described in my patent before referred to.

a represents an elastic tongue, suitably secured in any proper manner to what may be termed its "base," which tongue, extending in an upward direction, is itself secured in any proper manner to the apex-weight C, as shown.

a' represents a stop-shoulder for limiting in one direction the independent lateral movement of the projection A. This part *a'* may be a solid portion of the apex-weight C, as shown in Fig. 1, or an independent piece capable of adjustment, as shown in Fig. 2.

B represents a prismatic projection, the base of which is rigidly secured to the carrier-frame, as described in my patent before referred to.

The operation of the prismatic projection A, having a capacity for independent lateral vibration, will now be described, this constituting the novel feature of this part of my invention.

As the disks and lever-arms vibrate in unison under the flow of the water, as described in my patent before referred to, the following action results from the specific construction described: The upper prismatic projection, A, ascends the incline upon one side of the lower prismatic projection, B, until the apex is reached, and then, descending upon the other side, shifts the delicately-suspended valve-carrier, and causes the valve upon one side to close its port and the valve upon the other side to open its port. By means of the reaction of the elastic tongue, which is under tension when the prism A ascends the incline, the shifting is instantaneously and positively performed when the apex is reached, because the ascending prism cannot rest on the top of the fixed prism, but must be on one side or the other. Without this construction it is possible, under certain circumstances, for the upper prismatic projection to rest upon the top edge of the lower, and thus fail to shift the valves.

If desired, instead of the elastic tongue, an equivalent device (shown in Fig. 3) may be employed, the same consisting of a pivoted tongue which is actuated by means of side springs, as shown.

The second part of my invention will now be described.

D represents one of the diaphragm-disks, of dish-shaped form, having perforations like a colander, which is essentially provided with the sleeve *d*, having a hard-rubber bearing or bushing, *d'*, and a vertical slot, d^2, for the projection through it of the disk-arm, as shown. The disk or lever arm, although engaged with the disk in such manner as to move in unison therewith, is not attached thereto in any manner.

E, Fig. 1, represents the case having the recessed projection *e*, with threaded opening *e'*, as shown.

e^2 represents a stud screwed into the opening, as shown, which is adapted, when in place, to hold the sleeve of the disk and accurately guide the same in its movements. By means of this construction the disks are rigidly held against movement in any direction, excepting a lateral one, and accurately guided in this movement, so that the edges exactly coincide with each other in their contact with the diaphragm.

The third part of my invention will now be described.

The disks, the disk-lever arms, and carrier-frame are all moved in unison by the pressure of the incoming water-volume forcing the diaphragm against one of the disks. The movement of the disk, however, in this connection, is not limited by the contact of the disks or any portion of them with the casing, but by the change of the direction of the water-flow, the construction and arrangement of the parts being such that the valve is shifted to change the direction of the flow before it is possible for any of the moving parts to come in contact with the casing or other abutment. In Fig. 1 the position of the parts is shown just after a vibration to the left has been completed and the valve has been shifted to admit the flow of water through the opposite port. In this position it will be observed that, although the disk and lever on the left side are in their nearest position to the casing, they are not in contact with it, nor do they at any time in their movement bring up against any stops or abutments.

The general operation of the meter is as follows: The water, being introduced into the meter through the supply-pipe at the top, fills the upper chamber containing the valves, and, passing through the port, is delivered first to one side of the diaphragm and then to the other, according to the shifting of the valves. As the incoming water-volume presses upon one side of the diaphragm, as indicated by the arrows in Fig. 1, the water-volume upon the other side of the diaphragm is forced out through the exhaust-port, as shown.

Some of the advantages of the described construction are as follows: By the employment of the prismatic projection having a capacity for vibration, the parts are caused to shift with absolute certainty at the proper time and change the valves. By the employment of the sleeve and guiding-stud, the disks are securely held and properly guided in their movement without bringing the slightest strain upon the diaphragm. By arranging the valve mechanism so that the valve will be changed before the vibrating parts strike the case, the noise and wear resulting from contact are avoided. Any tendency, also, to rupture the diaphragm by concussion when the limit of movement is reached is avoided.

I do not limit myself to the precise construction shown. If desired, the projection A and tongue *a* may be formed of a single solid piece of rubber, as shown in Fig. 2, in which case the tongue will have in itself sufficient elasticity to answer the desired purpose. If desired, the bearing-studs may be located on the disks and the sleeves upon the casing. If desired, also, a wheel having a capacity for lateral vibration may be substituted for the upper prismatic projection. If desired, also, the lower prismatic projection may be given a capacity for vibration instead of the upper one.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a diaphragm-meter, a prismatic projection having an elastic tongue, *a*, as described.

2. In combination with the prismatic projection B, rigidly fixed to the carrier-frame, the prismatic projection A upon the apex-weight C having a lateral vibration independent of the weight.

3. In combination with a casing having bearing-studs, substantially as described, the independent diaphragm-disks supported and guided by the studs in right lines, as described.

4. In a diaphragm-meter, the arrangement of the valve system, the disk system, and diaphragm in such relation to each other that the valves are shifted to change the direction of the liquid before the disk system and diaphragm have reached the extreme limit of their movement.

This specification signed and witnessed this 23d day of December, 1879.

D. BRAINERD SPOONER.

Witnesses:
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