D. B. SPOONER.

Actuating Fluid-Meter Valves.

No. 107,830. Patented Sept. 27, 1870.

Fig. 1.

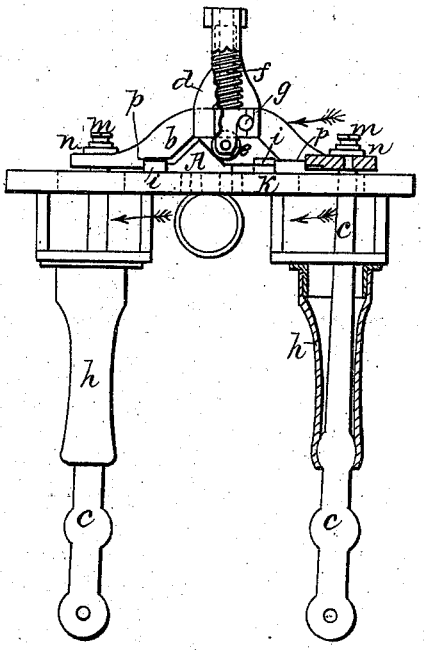


Fig. 2.

Fig. 3

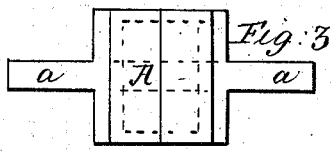
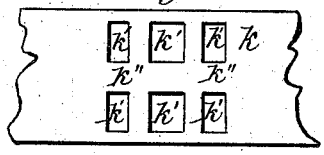


Fig. 4



Witnesses
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D. BRAINERD SPOONER, OF SYRACUSE, NEW YORK.

IMPROVEMENT IN DEVICES FOR ACTUATING THE VALVES OF FLUID-METERS.

Specification forming part of Letters Patent No. **107,830**, dated September 27, 1870.

To all to whom these presents shall come:

Be it known that I, D. BRAINERD SPOONER, of Syracuse, in the county of Onondaga and State of New York, have invented a new and Improved Device for Actuating the Valves of Meters for Measuring Liquids or Gas; and I hereby declare and ascertain my said invention, referring to the accompanying drawing, making a part of the description, in which—

Figure 1 is a vertical elevation of the working parts. Fig. 2 is a sectional elevation of the valve. Fig. 3 is a plan of the valve. Fig. 4 is a plan of the valve-seat.

It has been heretofore essayed by many of the best mechanics to produce during past years a device for moving the valves of machinery in which there is no momentum to shift the valve on the dead-points.

Many devices have been tried and patented that have been proved practically worthless, owing to their liability to catch and stop.

All the difficulties I have heretofore known are overcome by my present improvement, and a certainty of action is thereby secured not heretofore attained by which the objections to devices previously made are obviated, as hereafter described.

In the accompanying drawing, which illustrates my invention, I have shown my devices connected with a slide-valve, A, working over a valve-seat, *k*, with ports *k'*, as shown in the drawing, and moved by arms *b*, actuated by means of the pressure of the water on the diaphragm, as in other diaphragm-meters, like that described in the patent of C. W. Baldwin, December 31, 1867, on which this is an improvement.

The valve A is an ordinary D-valve, sliding over the ports *k'* of the valve-seat *k*. This valve has a projection rising up on the back of it in the form of a double inclined plane. This valve also has an elongation, *a*, beyond each end, that bears on the valve-seat to steady the valve and prevent its wear at that point caused by the action of the power that moves it, and the valve-seat is strengthened by carrying a partition, *k''*, across the ports, as clearly seen in Fig. 4.

The yoke *b* extends across over the valve, its ends being brought nearly down to the valve-seat, and the center curved upward to clear the valve.

Two arms, *c c*, project up through an oblong hole or port in the valve-seat from the body of the meter, where they receive their motion.

The yokes in meters heretofore essayed were intended to cover the openings in the valve-seats through which the arms *c* project, so as to stop the leak at that point; but they were liable to be raised from their seat by the action of the levers and the leverage of the spring that worked the valve, and cause a leak that rendered the meter inaccurate. To obviate this, rollers were introduced to hold the ends of the yoke down; but they caused so much friction as to impede the action of the meter. I remedy these defects by holding the yoke in proper position, by securing it to the ends of the arms by set-screws or nuts *m*, screwed onto the ends of the arms, with elastic washers or springs *n* interposed between the nuts *m* and the yoke *b*. This gives a freedom and steadiness to the motion of the yoke, and a slight elasticity at that point, as I have found by experiment that without this the yoke was too rigid at the moment the roller *e* passes the vertex of the inclined planes on the valve to insure its action; but by the use of this elastic connection, while the arms retain a firm hold on the yoke, there is sufficient elasticity in the connection to permit the roller to pass over readily without a shock on the parts.

To prevent the leak that would otherwise occur at the arm-ports by this arrangement through the valve-seat, I place a water-tight flexible diaphragm or dividing-partition between the measuring-chamber and the said ports. This dividing-partition is represented in the drawing, a flexible tube, *h*, surrounding each arm *c*. The upper ends of these tubes are tightly secured in any well known and convenient way around the openings or arm-ports in the valve-seat, and the lower ends are secured water-tight to the arms near their fulcrum, thus forming a perfect and reliable barrier against leakage at that point without impeding the action of the moving parts, and obviating the necessity of great accuracy in fitting the working parts at this point.

It is obvious that a modification of this flexi-

ble barrier might be made by means of a small flexible diaphragm affixed by its center to the disk, and attached by its edge to the body of the meter, so as to divide the measuring-chamber from the space in which the arms *c* work.

Various modifications in the form here used may be made to suit the construction of the other part; but these will be readily understood by any competent mechanician, the device being a water-tight partition between the measuring-chambers and the arm-ports.

Another serious objection to the original invention of which this is an improvement is the unfavorable angle of the spring that actuates the valve, which prevents a certainty in its action. In that device the spring bears up against the top of the cap, so that its upper end has no lateral motion, and as the yoke moves it is inclined either way, by which the force of the spring is made to act indirectly upon the valve, and sometimes fails to move it. To obviate this defect I affix a frame, *d*, upon the yoke *b*, to hold the spring and move it bodily with the yoke. Through the cap of this frame *d* a spindle, *f*, slides perpendicularly to the motion of the yoke. The lower end of this spindle is bifurcated, and bears a roller, *e*, before referred to, that rests on the inclined planes of the valves, which it runs up as the yoke *b* moves it toward the center of the valve, by which the spring, which spirally surrounds the spindle, bearing against the cap of the frame, and a collar on the spindle, is compressed; and as soon as the roller passes the vertex at the top of the inclined planes the valve is thrown to the opposite side by the descent of the roller.

The valve-seat is surrounded by a frame, *i*, that guides and limits the motion of the valve, which is prevented from rising or canting at either end by the extended projections *a*, before named, and clearly seen in Figs. 1 and 2.

To relieve the friction of the spindle in the lower part of the frame as it is forced upward by the inclined plane, I insert two friction-rollers, *g*, one on each side of the spindle, and between it and the frame, as low down as possible. (One of these only is seen in Fig. 1, for which purpose the frame is broken away.)

The yoke is made with shoulders on it at *p p*, that bring up against the frame I on the side toward which the valve is to be thrown by the spring-roller *e*. This sustains the said frame from the shock of the valve striking it, the strain being brought upon the yoke, which is counteracted by the roller *e* on the opposite side, as will be obvious on an inspection of the the parts.

The action of the above-described machine will be understood by any intelligent mechanic acquainted with diaphragm-meters.

When the arms *c c* are forced in the direction of the arrows by means of the proper mechanism, moved by the pressure of the water filling one of the measuring-chambers, through the open port in the valve-seat, they carry the yoke *b*, attached to their upper ends, in the same direction, and the yoke *b*, being held firmly in place by the nuts *m* and elastic washers *n*, the roller *e* travels up the inclined plane on the valve, and just past its vertex, at which instant it presses down upon the inclined plane on the opposite side, and forces the valve A over to the opposite side of the frame *i*, thus closing the open port and opening the closed one, when the movement commences in the opposite direction as the opposite measuring-chamber fills, thus continuing the action of the meter with a certainty never before attained.

The parts are all fitted into place, and their movements adjusted before the cap, into which the supply-pipe opens, is fastened to its place, which could not be done with the other arrangement.

Claims.

Having thus fully described my invention, what I claim, is—

1. The combination of the yoke *b* and arms *c c*, when permanently united, so that the arms shall not only move the yoke, but hold said yoke to the valve-plate and prevent it from rising, substantially as and for the purpose described.

2. The combination of the compressible washer or spring *n* with the yoke *b* and arms *c c*, as and for the purpose specified.

3. The arrangement of the spindle and roller *e* entirely within the frame of the yoke, substantially as hereinbefore described.

4. The friction-rollers *g g*, in combination with the spindle *f* and roller *e*, as and for the purposes specified.

5. The partition *k''* in the valve-seat, in combination with the valve A, as and for the purposes set forth.

6. The projections *a a*, in combination with the valve A, constructed as and for the purposes specified.

7. A flexible partition separating the arm-port from the measuring-chamber, substantially as herein described.

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