

*M. Smith,
Piston Meter,*

No. 11,702,

Patented Sept. 19, 1854.

Fig. 1.

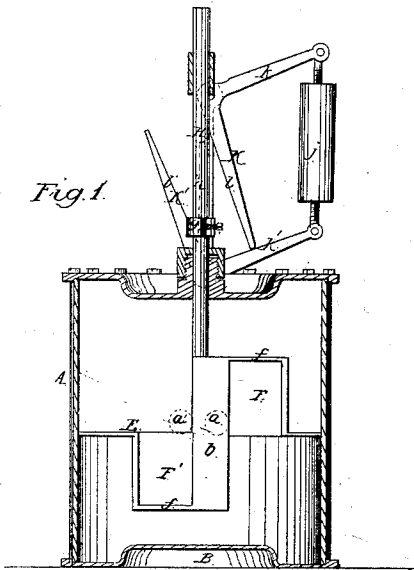


Fig. 2.

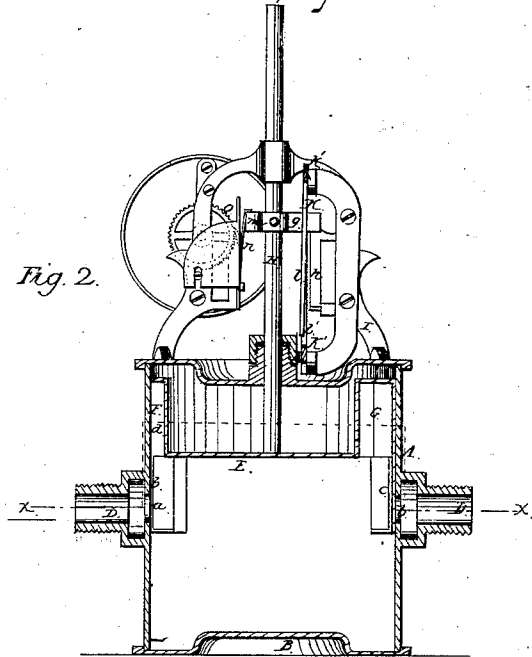


Fig. 4.

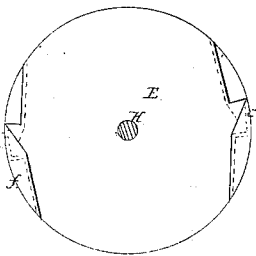
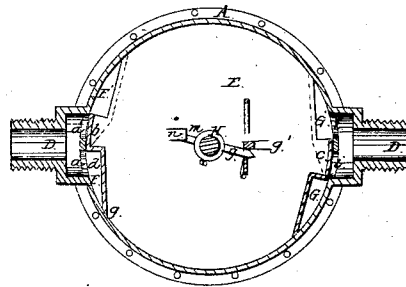


Fig. 3.



UNITED STATES PATENT OFFICE.

MARVIN SMITH, OF NEW HAVEN, CONNECTICUT.

WATER-METER.

Specification of Letters Patent No. 11,702, dated September 19, 1854.

To all whom it may concern:

Be it known that I, MARVIN SMITH, of the city and county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Water-Meters; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1, is a vertical section through the center of the cylinder or casing of the meter, with the principal working parts left entire. Fig. 2, is a section of similar character taken at right angles to Fig. 1. Fig. 3, is a horizontal section in the line, x, x , of Fig. 1, with a section of some of the mechanism which is outside the meter. Fig. 4, is a top view of the piston.

Similar letters of reference indicate corresponding parts in the several figures.

The meter to which this invention relates, is of that description which measures the water by registering the number of strokes made by a piston, which is impelled by the pressure of the water, back and forth, in a cylinder of known capacity.

The object of my invention is to effect the reversal of the movement of the piston, in a simple manner, without the employment of valves, and to this end my invention consists firstly, in a certain method of constructing the piston, whereby a slight movement about its axis is all that is necessary to reverse the action of the water upon it; and secondly, in certain means of giving the piston the necessary movement about its axis, at the end of every stroke.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A, is the cylinder which is bored out truly, and fitted with a water tight sole B, and head C, and has on opposite sides at about the middle of its length, two similar nozzles, D, D', to the former of which is intended to be screwed the inlet pipe, and to the latter, the outlet pipe. The nozzle D, communicates with the interior of the cylinder, by means of two holes, a, a' , side by side, and the nozzle D, by means of two similar holes i, i' .

E, is the piston which consists of a disk or plate of metal fitting to the cylinder, and having attached to it on opposite sides, two similar segments b, c , which fit to the cylinder A, and are of a proper width to cover

and close one of the holes a, a' , or i, i' . The position of the segments is such, that when one segment closes either of the holes a, a' , the other must close one of the holes i, i' . The segments extend equal distances above and below the disk E, their whole length requiring to be sufficient to keep the holes a, a', i, i' , covered by them during the whole of the required length of stroke of the piston. On one side of the segment b , there is a recess d , in the disk E, and from the edges of this recess, an angular plate e , see Fig. 3, extends upward as far as the top of the segment, the said angular plate being united at one side with one side of the segment b , and having its other side g , fitting close to the inside of the cylinder, and being moreover united at the bottom with the disk E, and being connected at the top with the bottom of the segment b , by a plate f , which is of the same form as the recess d , and which fits to the cylinder. The plates e , and f , thus form a deep cell F, in the piston, which is at all times, in free communication with the part of the cylinder below the piston, but shut off from the part above. The object of this cell is to serve as a communication between the inlet opening a , and the under side of the piston, when the disk of the piston is below the said opening. On the opposite side of the segment b , there is formed, in the same manner, a cell F', similar to F, but being in communication with the opposite, or upper part of the cylinder and shut off from the lower part. On opposite sides of the segment c , there are two cells G, G', precisely similar to F, and F', the cell G, being in communication with the lower part of the cylinder, and G', with the upper part.

When the piston is in such a position, considered only in reference to a circular, and not to a rectilinear motion, that the cell F, is opposite that part of the cylinder in line with the inlet opening a , and the segment b , closes the opening a' , as represented in Fig. 3, there will be a free communication from the inlet pipe to the lower part of the cylinder throughout the whole length of stroke of the piston, but no communication with the upper part of the cylinder. At the same time the cell G', is opposite the inlet opening i' , and the segment c , closes the opening i , and there is free communication from the upper part of the cylinder to the outlet pipe, and none from the lower part of the cylinder. But when the position of the piston is

changed to bring the cell F' , opposite the inlet opening a' , as shown in Fig. 1, where the positions of both inlet openings are indicated by red circles, the communications of the inlet and outlet, with the cylinder, are reversed, the upper part of the cylinder being in communication with the inlet through the opening a' , while the opening a , is closed by the segment b , and the lower part of the cylinder being in communication with the outlet through the opening i , while the opening a' , is closed by the segment c .

It has been shown how the communication between the upper and lower parts of the cylinder and the inlet and outlet are changed by the motion of the piston on its axis, so I will now proceed to describe the means by which the piston is turned every time it has made a stroke of the required length in either direction, in order that its motion may be reversed. On the piston rod H , which works through a stuffing box in the cylinder head, is secured, outside the cylinder, a tongue g , and attached to a standard, I , secured to the cylinder head, there is a vertical fixed guide h . When the tongue g , is on that side of the guide in which it is represented in Figs. 2 and 3, the piston is in position for the lower part of the cylinder to communicate with the inlet pipe, but when it is on the opposite side, the upper part of the cylinder communicates with the inlet pipe. The length of the guide h , is equal to the intended length of stroke of the piston, minus the depth of the tongue g . The tongue is always under the influence of one or other of two elbow levers K, K' , which are hung, the former upon a fixed fulcrum above, and the latter, from a fixed fulcrum below the guide h . These levers are both influenced by the same weight j , which is hung on a rod connecting their arms, k, k' , in such a manner as to draw the arms l, l' , which are on opposite sides of the tongue g , toward each other. When the piston is at the bottom of the stroke, the two levers are in contact with the tongue, and hold it in a position to ascend the guide on the side where it is represented in Fig. 3, or on the right hand, looking in the direction of Fig. 1, and as the tongue ascends in contact with the oblique side of the arm l , it forces the arms, l, l' , to move apart, the arm l , remaining in contact with the tongue and holding it to the guide, until it (the guide), has passed

the top of the tongue, when the arms l, l' , are left free to approach each other, and as they move toward each other, the arm l , throws the tongue over the guide h , by which time the arm l' , of the other lever l' , comes in contact with it. The communication of the inlet and outlet, are now reversed, and the piston commences to descend, the tongue g , being held by the arm l' , on the opposite side of the guide h , to that first described, until it passes the bottom of the guide, and is thrown by the approach of the levers toward each other into the position in which it was first described, bringing the piston to the proper position for ascending.

The movement of the registering apparatus is effected by means of a projecting piece m , on the back of the tongue g , which actuates a click n , which engages with a wheel o , on the first arbor of the register.

To prevent any misconception of the object of providing two inlet and two outlet holes, I will here remark, that one outlet and one inlet hole are sufficient, but would require a greater amount of movement of the piston on its axis to reverse the action of the meter, an as it is desirable to effect the reversal as quickly and with as little motion as possible, I make two holes. The amount of motion necessary may be reduced by making the openings long and narrow.

What I claim as my invention, and desire to secure by Letters Patent is:—

1. Constructing the piston E , with cells F, F' , and G, G' , arranged in any way substantially as described, to communicate with the inlet and outlet pipes of the cylinder, so that by a slight movement of the piston on its axes, the communications of the upper and lower parts of the cylinder with the inlet and outlet pipes, may be reversed, as herein set forth.

2. The combination of the tongue g , on the piston rod, the vertical fixed guide h , and the connected weighted levers, K, K' , all operating substantially as described, for the purpose of moving the piston on its axis at the end of every stroke, and thereby reversing the communications of the inlet and outlet.

MARVIN SMITH.

Witnesses:

HENRY W. THORNSON,
R. K. CARLTON.