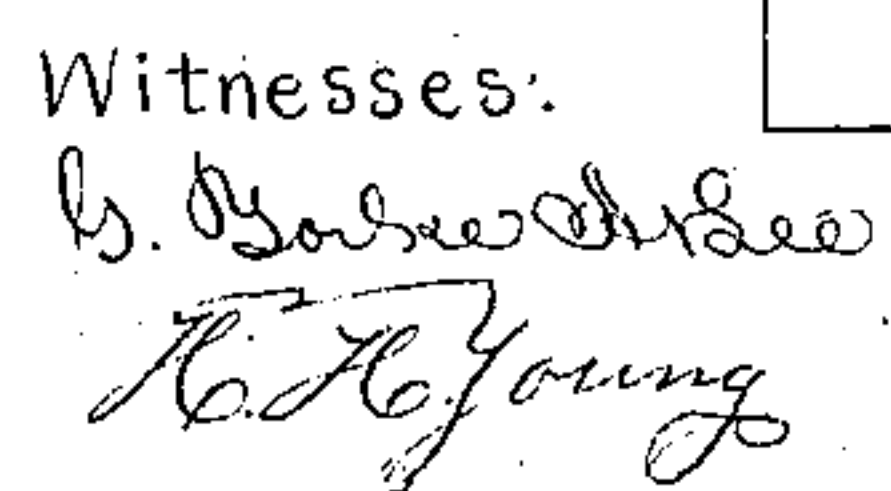
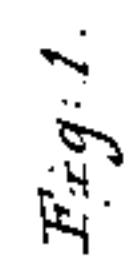


*Patented Apr. 26, 1859.*



Inventor,

Nathan Smith



# UNITED STATES PATENT OFFICE.

NATHAN B. MARSH, OF CINCINNATI, OHIO.

## WATER-METER.

Specification of Letters Patent No. 23,772, dated April 26, 1859.

*To all whom it may concern:*

Be it known that I, NATHAN B. MARSH, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement 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 a part of this specification, in which—

Figure 1, represents a face view of the meter with its valve box. Fig. 2, a longitudinal section through the measuring chambers and their cylinders. Fig. 3, an interior face view of the valve box detached, and Fig. 4, a transverse section through the valve box and cylinders in part.

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

The nature of my invention consists in constructing a water meter of two end measuring chambers on each side, united by a pair of stationary cylinders, and having in connection with them, independent interior reciprocating cylinders divided transversely by septa and having their stroke adjustable from the exterior; and surmounted by a valve box having valves under the control of the reciprocating cylinders, and passages forming inlet and outlet communications with and from the measuring chambers; substantially as hereinafter set forth. And the nature of my improvement further consists in a certain construction of parts whereby the end flanges of the stationary cylinders are made to carry the reciprocating cylinders and the one gasket or packing at each side is made to secure the reciprocating cylinders against leakage and to pack the junctions of the measuring chambers with the stationary cylinders.

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

A, A', and B, B', are the measuring chambers cast together in pairs and forming end covers and continuations to the middle piece or intermediate cylinders C, C', to which they are united by flanges a, a, on the measuring chambers and flanges b, b, on the ends of the intermediate cylinders.

The right and left measuring chambers A, A', and B, B', have, each pair of chambers, upon their upper sides necked projections c, c', cored out for the passage of the

water to and from the valve box D, with which they communicate and to which the measuring chambers are connected by bolts d, d, that, passing through the ends of the valve box or valve box cover, screw into bosses cast on the measuring chambers. An inward projecting boss e, is also cast on the head of each measuring chamber. Two of these latter bosses only need be drilled and tapped to accommodate opposite regulating bolts E, E', which project inward and serve as adjustable stops to the interior operating cylinder or cylinders, to regulate the capacity of the measuring chambers.

The intermediate cylinders C, C', have their flanges b, b, made to project slightly internally as well as externally, and a leather gasket or cup leather f, is interposed between said flanges and those a, a, of the measuring chambers, said gasket or washer having its internal opening of somewhat less diameter than the interior diameter of the inner portion of the flanges b, b. These intermediate cylinders C, C', have a longitudinal opening made in them along their top, extending from flange to flange b, b.

F, F', are two detached cylinders, made of zinc or other suitable material, and having a septum g, in the middle of each, with a boss thereon for the reception and attachment of rods G, G', screwed into the boss of each septum and arranged to project upward at right angles to the cylinders. These detached cylinders F, F', are turned straight and smooth upon their exterior, and so that they pass, without friction, between or through the inner projecting portions of the flanges b, b, of the intermediate cylinders, within or along inside which latter, and the measuring cylinders A, A', and B, B', they play, resting upon the inner projecting portions of the flanges b, b, and kept packed against the escape of water around them from the one measuring chamber to the opposite, by the gaskets or packing f, which packing also serves to prevent leakage at the joints of the cylinders.

The valve box D, contains six chambers h, h', h<sup>2</sup>, h<sup>3</sup>, and H, H'. These chambers communicate with each other through the intervention of valves I, I', I<sup>2</sup>, I<sup>3</sup>. Said valve box is also provided with two parallelogrammatic openings J, J', surrounded by incasing projections extending from the bottom of the valve box to its top edge or surface. These openings are for the pur-



pose of allowing the passage and play, through the valve box, of the posts or rods G, G', which pass through the top longitudinal openings in the intermediate cylinders C, C', and which are connected and reciprocate with the interior operating detached cylinders F, F'.

The four cells or chambers to the valves I, I', I<sup>2</sup>, I<sup>3</sup>, are bored through from the outside of each end of the valve box, and brass or composition tubes *i*, *i'*, *i*<sup>2</sup>, *i*<sup>3</sup>, then inserted, the extremities of said tubes communicating with the two chambers H, H', of the valve box, and the peripheries of said tubes communicating by apertures *j*, *j*, with the other chambers *h*, *h'*, *h*<sup>2</sup>, *h*<sup>3</sup>, thereof. These latter chambers (*h*, *h'*, *h*<sup>2</sup>, *h*<sup>3</sup>,) communicate through the cored out necked projections *c*, *c'*, at each end, with the measuring chambers A, A' and B, B', over which they respectively are placed.

The valves I, I', I<sup>2</sup>, I<sup>3</sup>, are formed of two brass rods having upon each extremity a packing or piston of leather cupped both ways. Such valves are pushed home into their seats formed by the composition tubes *i*, *i'*, *i*<sup>2</sup>, *i*<sup>3</sup>, by entering them through the openings made in the edges or ends of the valve box which are afterward plugged up. The length of the brass rods connecting or forming the valves I, I', I<sup>2</sup>, I<sup>3</sup>, should be such that when the middle of either rod connecting the two valves at its opposite ends intersects the medium transverse line of the valve box, then the furrow, formed by the backs of the two cupped leathers upon each end of each rod shall occupy such relation to the apertures *j*, *j*, in the sides of the tubes *i*, *i'*, *i*<sup>2</sup>, *i*<sup>3</sup>, as that all communication is cut off between the four chambers *h*, *h'*, *h*<sup>2</sup>, *h*<sup>3</sup>, and the other two chambers H, H', of the valve box. The plungers on or packed portions of the rods which form these valves, are moved to and fro across the apertures *j*, *j*, of the tubes *i*, *i'*, *i*<sup>2</sup>, *i*<sup>3</sup>, in the following manner.

In the center of the one chamber H', of the valve box, a hole is drilled of  $\frac{3}{8}$  of an inch in depth, more or less. Into this hole the foot of a brass post J, is inserted. This post passes through a brass sleeve or cylinder K, and from thence to the top of the valve box. On one side of the brass post J, and projecting from it at right angles is a finger L, which plays into an opening made in the one valve rod I<sup>2</sup>, I<sup>3</sup>, just large enough to admit free motion of the end of the finger. By turning the post J, from right to left, or vice-versa, the finger L, causes the valves I<sup>2</sup>, I<sup>3</sup>, to move from their covering position of the apertures *j*, *j*, in their respective bearings or tubes *i*<sup>2</sup>, *i*<sup>3</sup>, and so establishes communication between the valve box chambers *h*<sup>2</sup>, *h*<sup>3</sup>, and H, H', and with the measuring chambers or cylinders B, B',

that the former two chambers *h*<sup>2</sup>, *h*<sup>3</sup>, respectively communicate with. The other valve rod I, I', is similarly operated by a finger M, extending from the sleeve or cylinder K, and playing between the extremities of two arms N, N, connected with said other valve rod. By this means, it will be seen, the valves I, I', are also made to move from their covering position of the apertures *j*, *j*, in their respective tubes *i*, *i'*, and communication thereby established between the other two valve box chambers *h*, *h'*, and the before named additional chambers H, H', and the remaining two measuring cylinders A, A'. But in thus speaking of communication being established by the uncovering action of the valves, between the valve box chambers *h*, *h'*, and *h*<sup>2</sup>, *h*<sup>3</sup>, with the other valve box chambers H, H', it should be borne in mind that each double valve I, I', or I<sup>2</sup>, I<sup>3</sup>, on opening their respective passages or chambers *h*, *h'*, or *h*<sup>2</sup>, *h*<sup>3</sup>, to the two valve box chambers H, H', do so at opposite ends, the one chamber *h*, to the chamber H, and the other chamber *h'*, to the other chamber H'; and so with the other two chambers *h*<sup>2</sup>, *h*<sup>3</sup>. A reverse movement of the valves of course reverses the communication of the chambers H, H', with the chambers *h*, *h'*, *h*<sup>2</sup>, *h*<sup>3</sup>.

The valve post or stem J, and sleeve K, pass out through the valve box cover and are squared for fitting on or attaching to them, the one to the sleeve K, and the other to the inner valve stem J, two double tailed levers P, Q, which are designed to strike or clip, respectively, the rods G, G', of the operating cylinder F, F'.

The valve box is covered by a gasket of leather or rubber *k*, and it with its cover *n*, held firmly down by screws *m*, *m*, *m*, *m*, passing through the lid and into holes in the bosses cast in the valve box, and by the screw bolts *d*, *d*, passing through the lid and screwing into the bosses cast on the measuring chambers A, A', and B, B'.

Referring to this minute description of parts and their action, the general operation may be briefly described as follows: Supposing the chamber H, to be the water receiving chamber by means of a supply pipe R; and the other chamber H', to be the delivering chamber provided with an escape pipe S; through such disposition of said chambers with their pipes may be reversed; then, to start the meter, so adjust the valves I, I', I<sup>2</sup>, I<sup>3</sup>, that one pair of each double valves I, I', or I<sup>2</sup>, I<sup>3</sup>, have the discharge and receiving ports open from and to the measuring chambers A, A', or B, B', over which said valves respectively are situated. Thus supposing the valves I, I', to be so adjusted that water enters through the tube *i'*, and pass through the apertures *j*, thereof into the chamber *h'*, and from thence into the meas-



uring chamber A', and there pressing on the  
 septum *g*, of the operating cylinder F, it  
 urges the latter to the left hand. As said  
 cylinder F, thus moves to the left, air con- 5  
 tained in the measuring chamber A, is dis-  
 placed and forced up into the chamber *h*,  
 and through the apertures *j*, of the tube *i*,  
 into the latter and from it out into the cham-  
 ber H', and out through the escape pipe S.  
 10 The cylinder F, in thus moving, causes its  
 rod G, to press against the one tail of the  
 lever P, and moves it so as to turn the post  
 J, which, by its finger L, moves the other  
 two valves I<sup>2</sup>, I<sup>3</sup>, toward the right hand, thus  
 15 allowing water to flow from the chamber H,  
 into the chamber *h*<sup>2</sup>, and from thence into  
 the measuring chamber B, which of course  
 urges the operating cylinder F', toward the  
 right hand. This latter action of the valves  
 20 I<sup>2</sup>, I<sup>3</sup>, takes place as the cylinder F, ap-  
 proaches the termination of its stroke to the  
 left hand where it remains stationary till  
 sufficient water has entered the measuring  
 chamber B, to urge the cylinder F', toward  
 25 the right and, by its rod G', lever Q, sleeve  
 K, finger M and side arms N, N, moved the  
 valves I, I', so as to reverse the communi-  
 cation of the chambers *h*, *h*', with the  
 chambers H, H'. This done the water con-  
 30 tained in the measuring chamber A', passes  
 off into the chamber H', and from thence to  
 the escape pipe S; and water from the  
 chamber H, enters the chamber *h*, to pass  
 into the measuring chamber A, and, in course  
 35 of a little time, urges the operating cylinder  
 back to the right hand, and in so doing re-  
 verses the position of the valves I<sup>2</sup>, I<sup>3</sup>, to  
 move in its turn, the operating cylinder F',  
 to the left hand, and so on successively with  
 40 each operating cylinder, that, accordingly  
 as their stroke is limited by the adjusting  
 rods E, E', govern the measuring capacity  
 of the chambers A, A', B, B'. For a por-

tion of time it will be seen, two valves are  
 simultaneously receiving and other two dis- 45  
 charging water.

Such construction of meter must neces-  
 sarily insure perfect accuracy and is in no  
 way liable to get out of working order;  
 while the constructing of the whole in what 50  
 may be termed four parts, namely, the two  
 measuring chambers with their independent  
 operating cylinders, middle piece or sta-  
 tionary cylinders C, C', and valve box, ar-  
 ranged as described, not only facilitates put- 55  
 ting together, but also taking apart for any  
 or every purpose, of one or more of said  
 parts.

What I claim as my invention and desire  
 to secure by Letters Patent, is— 60

1. The combination of the two side or end  
 measuring chambers A, A', B, B'; middle  
 piece or stationary cylinders C, C'; inde-  
 pendent reciprocating interior cylinders F,  
 F', having septums *g*, *g*'; adjusting rods E, 65  
 E'; and valve box with its valves and pas-  
 sages, the former actuated by the reciprocating  
 interior cylinders essentially as set forth,  
 and the latter forming inlet and outlet com-  
 munications with and from the measuring 70  
 chambers; all for operation together sub-  
 stantially as specified.

2. Supporting the reciprocating interior  
 cylinders F, F', on projections formed by  
 the extension inward of the end flanges *b*, *b*, 75  
 of the stationary cylinders C, C'; and pack-  
 ing said reciprocating cylinders by the gas-  
 kets *f*, *f*, which make tight the joints of the  
 stationary cylinders with the measuring  
 chambers; said gaskets being cupped or bent 80  
 internally as shown and described.

N. B. MARSH.

Witnesses:

W. CHELLSEY,  
 EDWIN STEVENS.