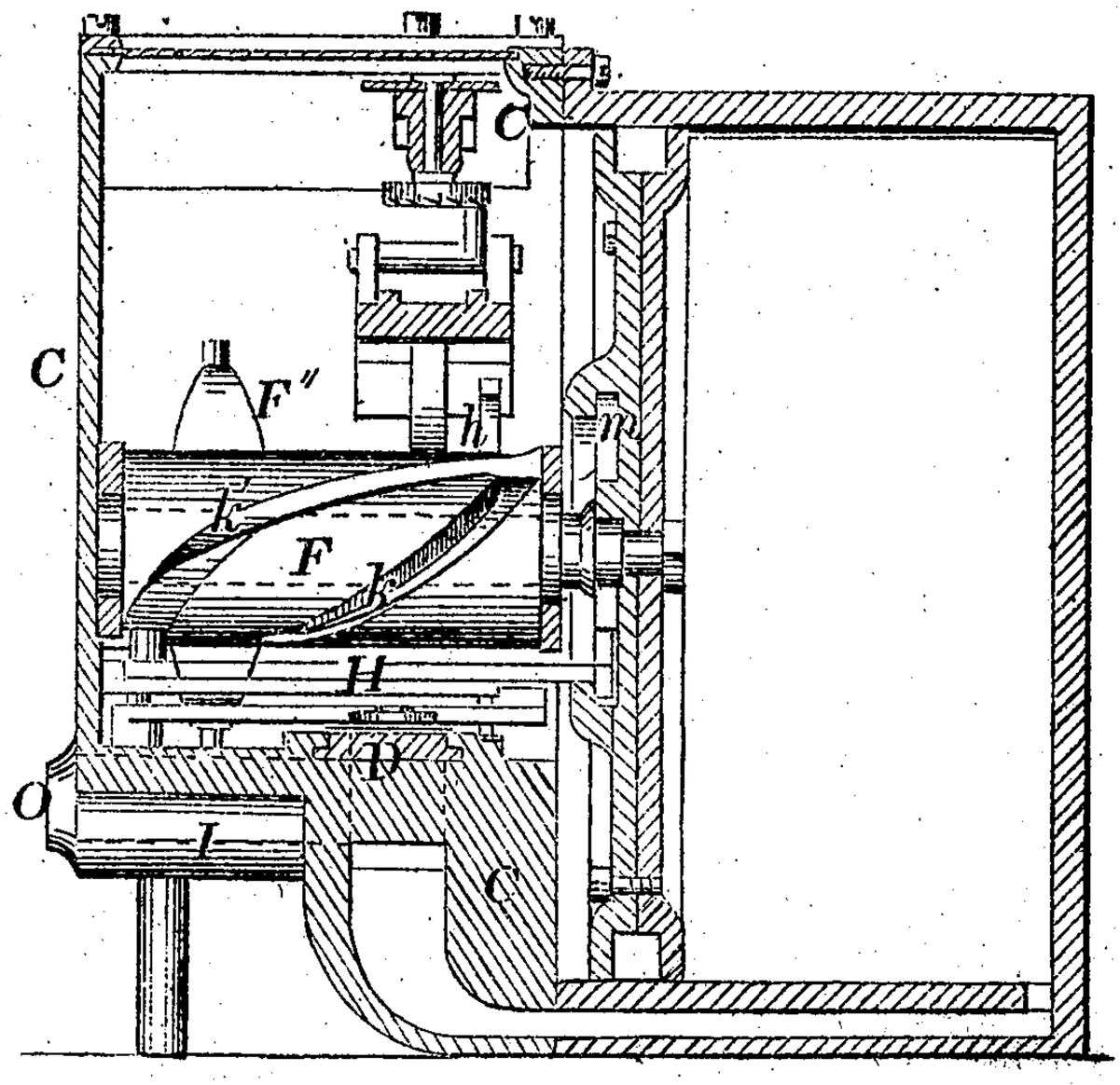
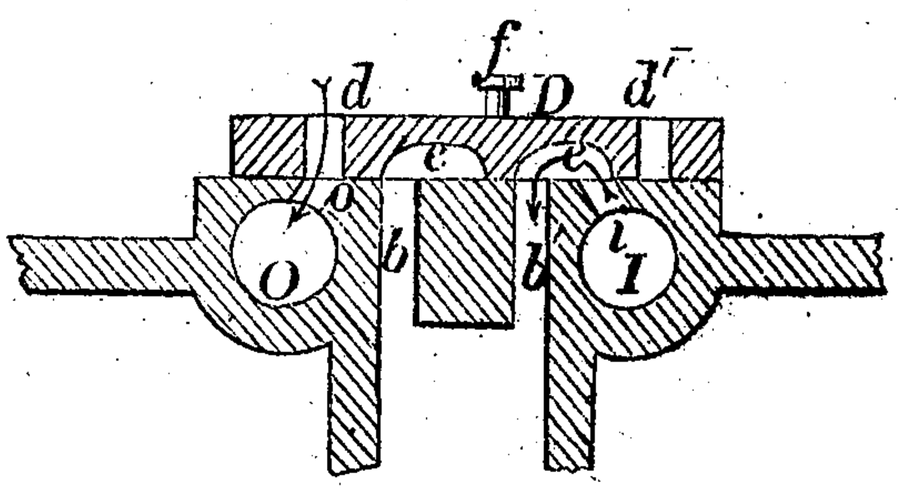
J. C. COOKE.

LIQUID METER.

No. 33,675. PATENTED NOV. 5, 1861.



# UNITED STATES PATENT OFFICE.

JAMES C. COOKE, OF MIDDLETOWN, CONNECTICUT, ASSIGNOR TO WILLIAM WILCOX & CO., OF SAME PLACE.

## IMPROVEMENT IN LIQUID-METERS.

Specification forming part of Letters Patent No. **33,675**, dated November 5, 1861.

*To all whom it may concern:*

Be it known that I, JAMES COOPER COOKE, of Middletown, in the county of Middlesex and State of Connecticut, have invented certain new and useful Improvements in Meters for Measuring Water and other Liquids; 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 central longitudinal vertical section of a meter constructed according to my invention. Fig. 2 is a transverse vertical section of the same in the plane indicated by the line *x x* in Fig. 1. Fig. 3 is a section of the valve and seat, representing the valve in a position the reverse of that shown in Fig. 2. Fig. 4 is a diagram of the groove in the valve-operating rock-shaft.

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

My invention consists in a certain novel arrangement of a valve and its operating mechanism, in combination with a cylinder and piston for effecting the measurement of liquids by counting the number of reciprocating movements of the piston produced by the pressure of the liquid admitted to it by the valve on opposite sides alternately.

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

A is a cylinder having the axis in a horizontal position, fitted with a piston B, packed in such a manner as to work freely but water-tight within it. One end of this cylinder is closed and the other opens into a valve-box C, which is bolted securely to it. In the lower part of this valve-box is the horizontal seat *a a* of the slide-valve D, which is arranged to work transversely to the axis of the cylinder A and piston B over four ports *i o b b′*. (See Fig. 2.) The two outer ports *i* and *o* communicate with the two passages I and O, with the latter of which the outlet-pipe is connected and with the former of which the inlet-pipe is connected; and the two inner ports *b* and *b′* communicate with a passage *c*, which leads under the bottom of and communicates with the farther end of the cylinder A, as shown in Fig. 1.

The valve D has two ports *d d′* right through it, and two cavities *e e′* in its face, the said cavities being between the said ports, and the whole being constructed and arranged in such manner relatively to the ports in the seat that when the ports *d′* and *i* are in direct communication *b* and *o* are brought into communication by means of the cavity *e* in the valve, as shown in Fig. 2, and when *d* and *o* are in direct communication *b′* and *i* are brought into communication by means of the cavity *e′* in the valve, as shown in Fig. 3, the latter position being the reverse of that shown in the drawings.

The valve D is connected by a pin *f* with a horizontally-moving lever E, which works on a fixed fulcrum-pin *g*, secured in the bottom of the valve-box, and this lever is shifted to move the valve from the position shown in Fig. 1 to the reverse position and back again as the piston arrives at one and the other end of the cylinder by means of two tappets *h h′* on the horizontal rock-shaft F, which is arranged with its axis in line with the axis of the piston in suitable bearings *i′ j*, the latter of which is fitted into the head of the cylinder A, and the former is supported upon a bridge G, which is secured to the bottom of the valve-box C. This rock-shaft is made hollow to serve as a guide for the piston-rod B′, which is rigidly secured to the piston B. By thus making the rock-shaft serve as the piston-guide much space is saved within the meter. In the exterior of the rock-shaft F there are two curved oblique grooves *k k′* for the reception of a stud *l*, carried by a slide H, which is attached to the piston by hooking into a grooved circular protuberance *m* on the face thereof, and which works in guides in the bridge G, the said grooves *k k′* extending half-way round the shaft and meeting at their ends, and the said rock-shaft is furnished with an arm F′, loaded with a heavy weight $F^2$ and with a cam or wiper *n*. The stud *l*, moving parallel with the axis of the rock-shaft in one direction along the groove *k* and in the opposite direction along the groove *k′*, turns the rock-shaft in opposite directions far enough to carry the arm F′ so far past a vertical position above the shaft that the weight $F^2$ will throw it over suddenly to a horizontal position, or as far as

is permitted by stops *p p*, attached to the said weights and coming in contact with the bottom of the valve-box or bridge G, and so cause the valve to be shifted suddenly from one to the other of the two positions hereinbefore mentioned, and represented in Figs. 2 and 3, to reverse the action of the water on the piston as the latter arrives at the end of its stroke in opposite directions. By hooking the slide H into the grooved circular protuberance *m* on the piston it is enabled to be attached whichever side of the piston is upward.

J is a slide arranged to work horizontally and transversely to the rock-shaft in guides *q q* in the upper part of the valve-box and carrying two pawls *r r'* to act on a ratchet-wheel on opposite sides of the axis thereof and so that one will move the ratchet-wheel while the slide J is moving in one direction and the other while the said slide is moving in the opposite direction. These pawls have attached to them weights *s s'*, which hold them up to operate on the ratchet-teeth, but which allows the ratchet-teeth to pass each in turn while the other is operating.

The slide J is moved in opposite directions alternately, making one movement for each stroke of the piston by the action of the wiper *n* upon one and the other by means of two protuberances *v v* on the lower part of the said slide.

To explain the operation I will first suppose the parts to be in the position and condition represented in Figs. 1 and 2, the piston having just completed its stroke toward the valve-chamber and the rock-shaft F having just moved in the opposite direction to the arrow shown near it in Fig. 2 and moved the valve to the position shown in that figure by means of its tappet *h'*. The cylinders A and the valve-box B are both full of water, and water now begins to enter from I through ports *i* and *d* into the valve-box, and water from the valve-box enters the cylinders and by its pressure moves the piston toward the opposite or closed end of the cylinders, and the piston forces the water from the cylinder through the passage *c*, port *b*, valve-cavity *e*, and port *o* to the outlet O, and as this operation continues the stud *l*, moving with the piston, travels along the groove *k'* and causes the rock-shaft to turn in the direction of the arrow before mentioned. Some time before the piston completes its stroke the arm F', moving with the rock-shaft, passes the vertical position above the shaft, and when the piston has approached as near the end of the cylinder as is desired the stud *l* arrives opposite the opening *u* between the grooves *k k'* of the rock-shaft and allows the rock-shaft to be moved farther very suddenly by the fall of the weight $F^2$ to the position the reverse of that shown in Fig. 2, and by this sudden movement of the rock-shaft the tappet *h* is caused to strike the lever H and move it to bring the valve to the position shown in Fig. 3, causing the water to enter the cylinder through the port *i*, valve-cavity *e'*, port *b'*, and passage *c* and drive the piston toward the valve-box, and the piston now forces the water from the open end of the cylinder into the valve-box, and from thence through the ports *d* and *o* to the outlet O, and during this movement of the piston the stud *l* moves along the groove *k* and turns the rock-shaft F in the opposite direction to that indicated by the arrow shown near it in Fig. 2, and as the piston approaches near the valve-box the arm F passes the vertical position over the shaft and the stud *l* arrives opposite the opening *u'* between the grooves *k k'* and permits the movement of the shaft to be continued in a very sudden manner by the fall of the weight F to the position shown in Fig. 2, which brings the tappet *h* into operation on the lever E and causes the said lever to move the valve from the position shown in Fig. 3 to that shown in Fig. 2, when the movement of the piston is again reversed. In this way the operation is continued, and as the rock-shaft moves alternately in either direction the wiper *n* acts alternately on one and the other of the protuberances *v v'* of the slide J, and so causes the said slide to be moved back and forth and the pawls *r r'* to act alternately on the ratchet-wheel *t*, and thus effect the registration.

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

1. The valve D, with its ports *d d'* and cavities *e e'*, arranged to work transversely to the stroke of the piston in a box C at one end of the measuring-cylinder, and in combination with a system of ports *i o b b'* and passages I O *c*, arranged substantially as herein described.

2. The valve-operating rock-shaft F, with its spiral grooves *k k'*, weighted arm $F^2$, and tappets *h h'*, applied and arranged in combination with the piston and slide-valve, to operate substantially as and for the purpose herein set forth.

3. The construction and arrangement of the valve-operating rock-shaft, substantially as herein described, to serve as a guide for the piston-rod.

4. Combining the piston with the spirally-grooved valve-operating rock-shaft F by means of a slide H, working in straight guides and hooking into a circular grooved protuberance *m* on the piston.

JAMES C. COOKE.

Witnesses:
JAMES LAIRD,
G. W. REED.