Darlington & Piper,

Diaphragm Meter,

No. 16,049. Patented Nov. 11, 1856.

Fig. 2.

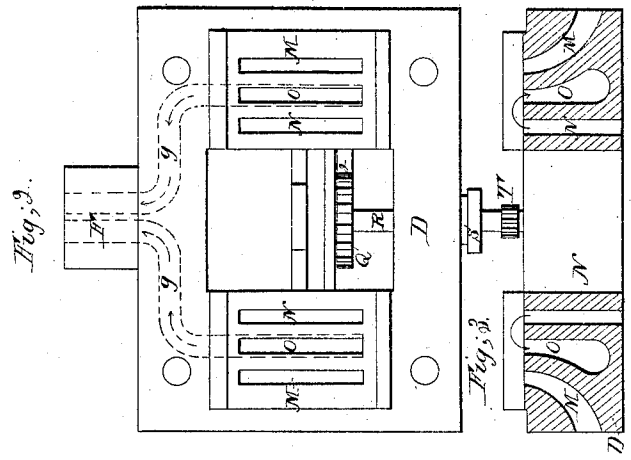
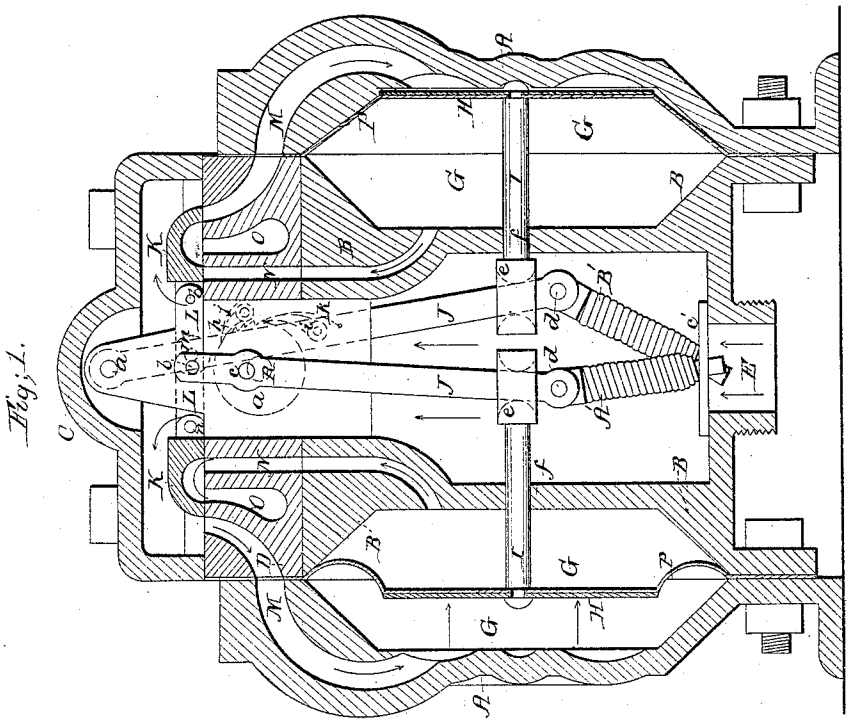


Fig. 2.

Fig. 1.



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UNITED STATES PATENT OFFICE.

I. HENRY DARLINGTON AND WILLIAM PIPER, OF NEW YORK, N. Y.

IMPROVED DIAPHRAGM FLUID-METER.

Specification forming part of Letters Patent No. **16,049**, dated November 11, 1856.

To all whom it may concern:

Be it known that we, I. HENRY DARLINGTON and WILLIAM PIPER, of the city, county, and State of New York, have invented a new and Improved Water-Meter; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, figures, and letters of reference thereon, in which—

Figure 1 is a vertical section of our improved meter. Fig. 2 is a top view of the valve-plate detached from the meter. Fig. 3 is a vertical section of the valve-plate.

Similar letters of reference indicate like parts in all the drawings.

The nature of our invention consists in so combining and arranging the mechanism that we are enabled to keep a constant stream of measured water running all the time, a feature which has not heretofore been accomplished by other meters using india-rubber diaphragms.

To enable others skilled in the art to make and use our invention, we will describe its construction and operation.

The various parts of the shell are firmly bolted together, the diaphragms packing the side joints by extending between the sides and body of the meter, as seen in Fig. 1. The cap-shell, which is directly over the valve-plate, is made tight by a suitable packing-ring, and is secured by four bolts, which pass through both the shell and the valve-plate and screw into the body of the meter.

A A represent the shell of the ends.

B B B B is the body of the meter.

C is the top plate or shell.

D is the valve-plate.

E is the induction-pipe.

F is the eduction-pipe.

G G are the reservoirs containing the water, which act on the diaphragms, forcing them alternately in opposite directions.

H is a metallic plate, to which is attached the diaphragms.

I I are the piston-rods having their bearings at *f*, to which are fastened the plate and diaphragms.

J J are the levers which the pistons work by passing through the slotted heads therein at *e*.

K K are the valves properly fitted in parallel ways to allow them to work freely and secure them in a proper position during their travel.

L L are the connecting-rods attached at one end by joints to the valves *l n* and to the vibrating levers at *b m* at the other end.

M M are the outside water-channels.

N N are the inside water-channels.

O O are the exhaust-channels which lead the water through the valve-plate to the eduction-pipe. (See Fig. 2.)

P P are the india-rubber diaphragms. These, we would remark, form no part of our invention, as they are common to most water-meters.

Q is a ratchet-wheel for registering the water used.

R is the shaft of said registering-wheel.

S is the stuffing-box to pack the shaft R tight.

T is a small pinion to connect with the registering apparatus.

A′ and B′ are short levers connected with the levers J J, forming a sort of toggle-joint, which levers are inclosed by helical springs to assist in the extreme movement of the pistons.

C′ is a small plate, slotted, in which the lower ends of the levers A′ and B′ work. This plate is perforated to allow the free introduction of water from the pipe E.

Operation: The water passes up from the induction-pipe through the center of the meter (which is an open space) in the direction of the arrows, and passes down through the water-channel M on the left-hand side (that valve-port being open for its passage) into the reservoir G, and presses against the metallic plate and diaphragm H P, and thereby forces it toward the right-hand side of the meter, and by means of the lever J, which has its fulcra at *c*, the upper end of which is attached to the valve K on the right-hand side of the connecting-rod L at *b* and *l*, while the lower end of the lever J passes through the head of the piston-rod at *e*, which is slotted in a manner to allow it to work freely and keep a good joint, and by the lateral motion of the piston opens the valve K on the right-hand side and allows the water to enter the channel M, which forces the right-hand diaphragm toward the left side. As the right-hand valve opens the port M, it also brings the water-channel N on that side in communication with the exhaust-port O and allows the exit of the water contained inside the diaphragm on the right-hand side, and by means of the long lever having its ful-

crum at *a* and connecting with the valve K on the left-hand side by the connecting-rod L at *m n*, while the lower end of the long lever passes through the piston-head at *e*, and by the lateral motion of the piston through the lever and connection slides the left-hand valve over the port or channel N and admits a flow of water therein. At the same time the valve travels over the channel M and leaves the water in the left-hand reservoir G in free communication with the exhaust-port on that side, and thereby allows the free exit of all the water on this side, which the diaphragm in its travel from right to left forces out through the exhaust, as plainly shown at *g g* in Fig. 2, in the direction of the arrows and dotted lines. In this way the water causes a constant intermittent reciprocating motion to be kept up, each diaphragm by its mechanism working the opposite valves, and, as they are constantly at work, they will allow the discharge of a constant stream of water from the eduction-pipe F, (see Fig. 2,) which, being discharged in such quantities as the reservoirs hold, must be accurately measured and determined by the registering apparatus.

We would here remark that the long levers, with the piston-heads connecting therewith, are arranged to pass each other in their vibrations, as shown in Fig. 1.

The registering apparatus is shown in Figs. 1 and 2, and consists of a ratchet-wheel, Q, upon a shaft, R, which shaft passes through the valve-plate for one of its bearings, (the joint being packed by the box S,) while the other is formed in a plate directly back of the ratchet-wheel. This ratchet-wheel has a motion imparted to it by a small pawl, *i*, attached to the long lever J. There is also another pawl, *h*, which serves as a check to stop any backward motion of the ratchet-wheel. These pawls are kept in place by small springs *j k*. This registering apparatus forms no part of our invention, as it is in common use in machinery.

The short levers A′ B′, inclosed by the helical springs, perform a useful office by contributing to help the pistons close their stroke when the force of water has the least action upon the diaphragm which is attached to the piston. Without this or some equivalent device it would be difficult to complete the stroke by the action of the water alone, so as to force the water completely from the diaphragm-chambers at each forward and backward motion.

Having thus described our improved water-meter, we do not claim any of the separate elements or devices, nor do we claim any special combination thereof; but

We do claim—

Their particular arrangements, as hereinbefore, and for the purpose set forth.

I. HENRY DARLINGTON. [L. S.]
WILLIAM PIPER. [L. S.]

Witnesses:
C. A. DURGIN,
L. P. HIGGINS.