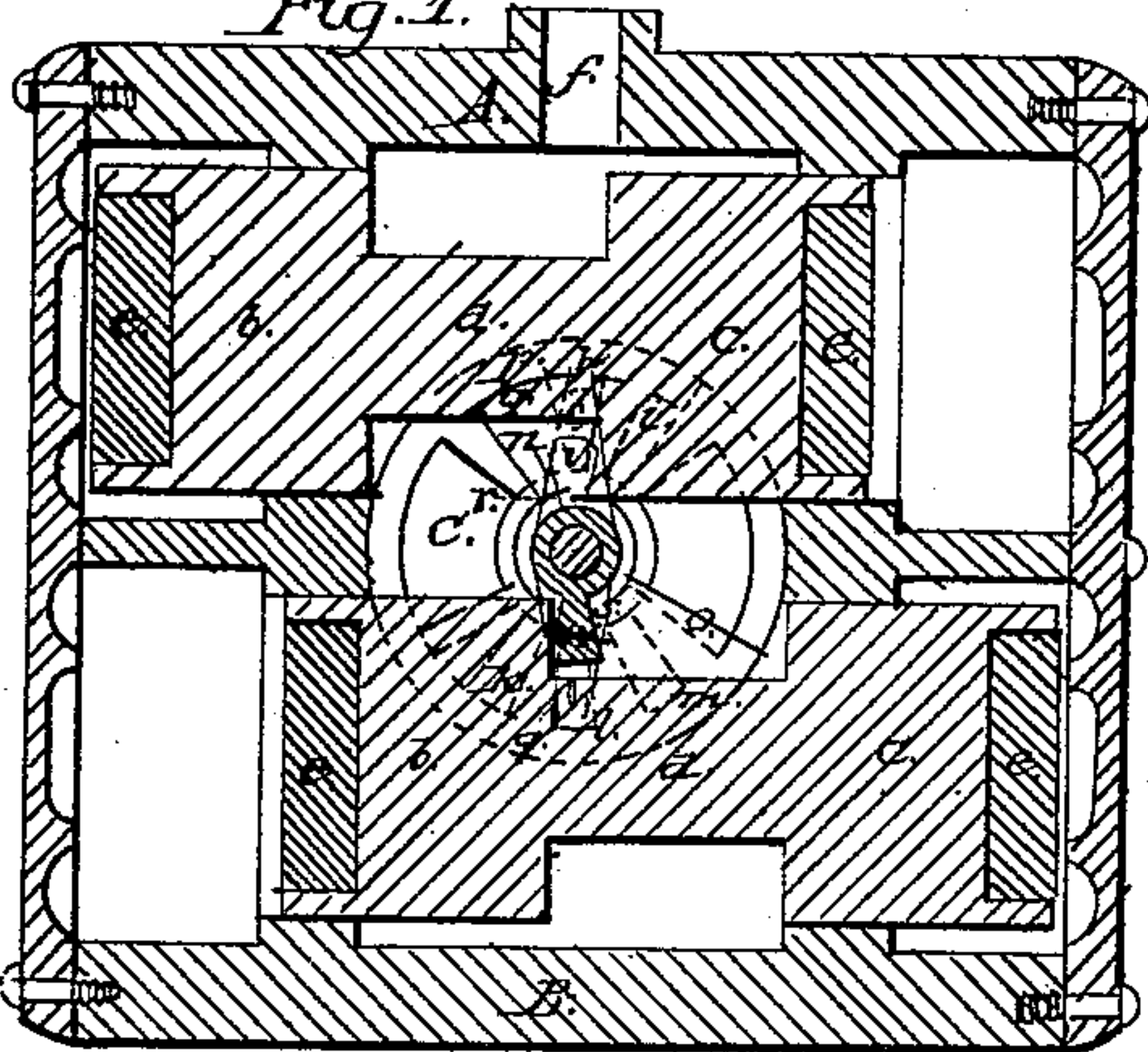


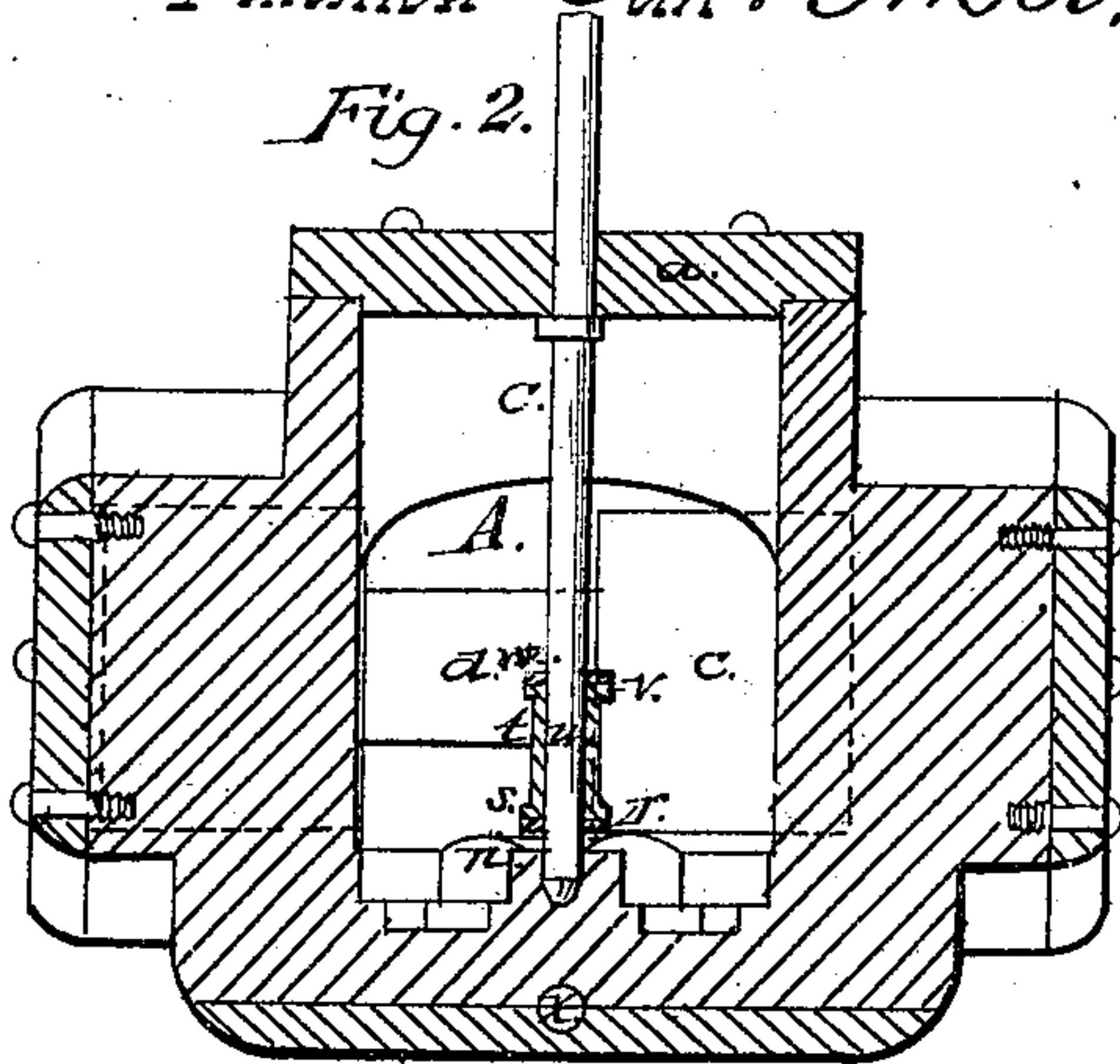
*J. Harris,*  
*Fluid Meter.*

*No. 85,656.*  
*Fig. 1.*

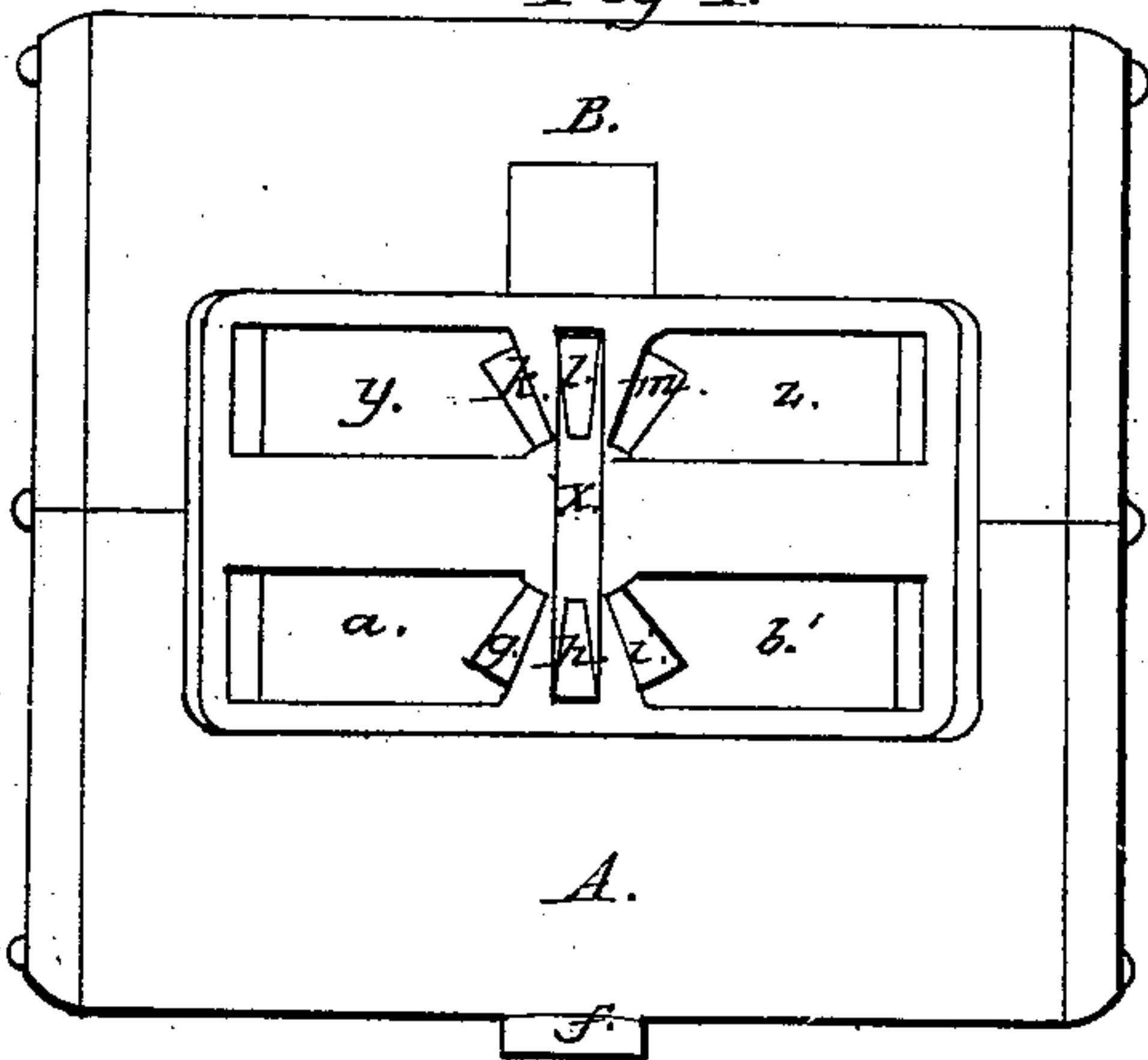


*Patented Jan. 5, 1869.*

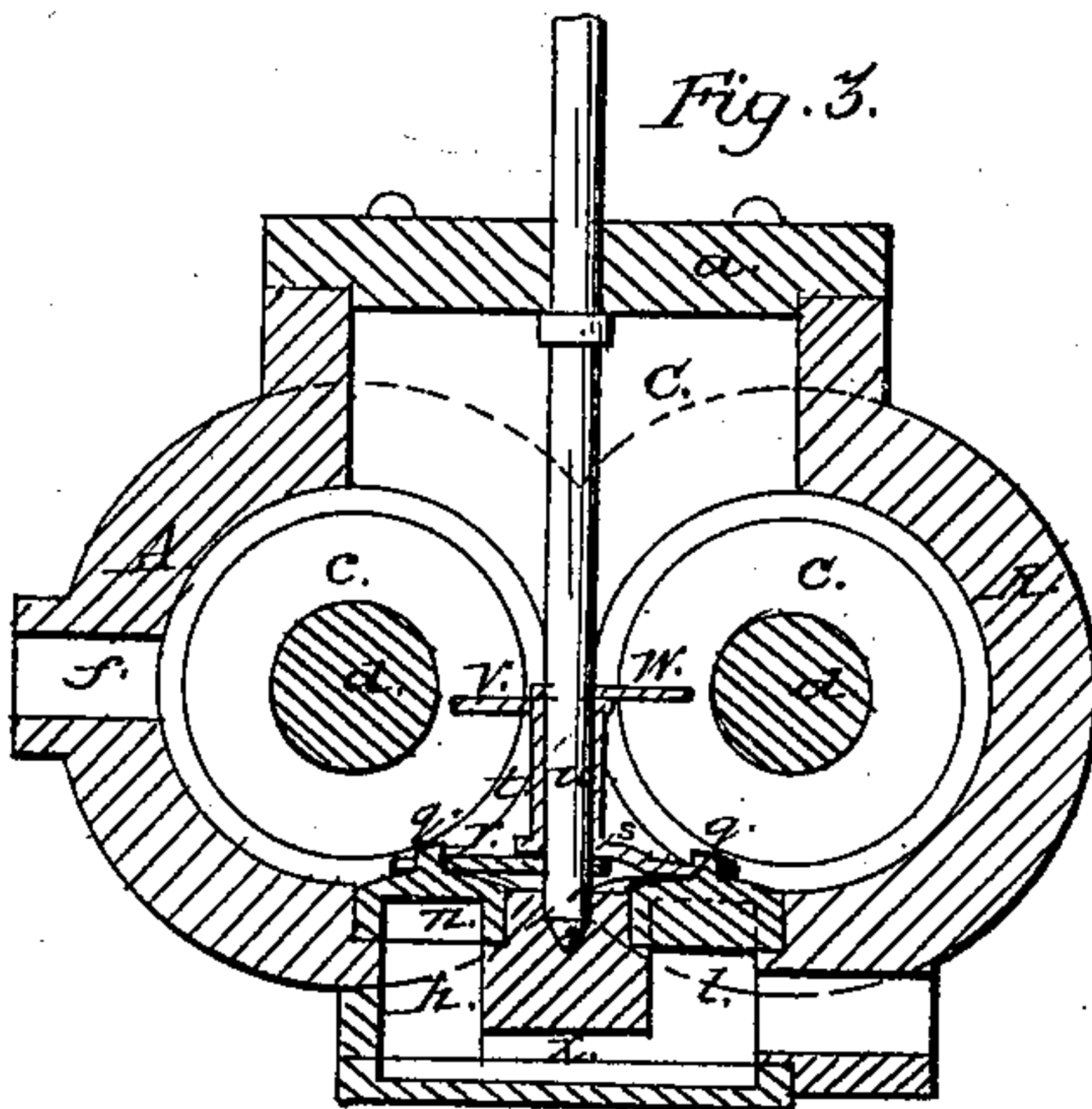
*Fig. 2.*



*Fig. 4.*



*Fig. 3.*



*Fig. 5.*



*Fig. 6.*



*Witnesses:*  
*S. N. Piper.*  
*J. C. Smith.*

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*James Harris.*  
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# United States Patent Office.

JAMES HARRIS, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 85,656, dated January 5, 1869.

## IMPROVEMENT IN FLUID-METERS.

The Schedule referred to in these Letters Patent and making part of the same

To all persons to whom these presents may come:

Be it known that I, JAMES HARRIS, of Boston, in the county of Suffolk, and State of Massachusetts, have made a new and useful Improvement in Water-Meters; and do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a horizontal section;

Figure 2, a longitudinal and central section; and

Figure 3, a transverse section of a meter, provided with my invention.

Figure 4 is an under side view of the cylinders, their valve-ports and passages.

The meter on which my improvement is based has two cylinders and two pistons, one of such description being exhibited in the United States patent, No. 13,320, dated July 24, 1855, and granted to Henry R. Worthington.

Although, like the meter shown in the said patent, mine has two cylinders, with pistons contained in them, and also has two valves, and certain ports and passages, whereby each piston, during its movements, actuates the valve of the other, yet I make no claim to this principle.

My invention consists in a peculiar mechanism for operating, by means of the pressure and action of a column of water, the two pistons and the register-shaft, arranged between them and in the meter-case, in manner as hereinbefore specified.

In the drawings, A and B denote the two cylinders, arranged side by side, each being made to open laterally into a central cylindrical chamber, C, provided with a cap or cover, *a*.

Each piston has two heads, *b c*, connected by a short cylinder, *d*.

Each of the said heads is chambered from its outer end, to receive a cylinder, *e*, or series of disks of vulcanized India rubber, or some equivalent elastic medium.

When the liquid or the water may freeze, its expansion will be allowed to take place, the elastic medium giving way or contracting under the pressure induced by the expansion of the water, and thereby operating to prevent the water, while so expanding, from bursting the cylinder or cylinders.

An induction-passage, *f*, leads into the side of one of the cylinders.

Through the bottom of the chamber C are six ports, *g h i k l m*, which are arranged therein in manner as shown in figs. 1 and 4.

A single-chambered curved or segmental valve, *n*, slides on one series of such ports, there being on the other series a double-chambered valve, *o*. Longitudinal sections of these valves are represented in figs. 5 and 6.

Studs *p q* extend up from the valves, and into holes or slots made in two arms, *r s*, which project from two concentric shafts *t u*, the shorter of which turns as a sleeve freely on the longer.

From these shafts other arms, *v w*, project, in opposite directions, into the spaces between the heads of the two pistons.

The indicating or measuring-train of gearing is to be applied to the longer of the shafts, and to be operated by a pawl or other suitable device or devices, which, through the reciprocating vibratory motion of the shaft, will transmit a continued rotary motion to the train.

The two middle ports, *h l*, lead downward into a common transverse eduction-passage, *x*.

The other four ports lead down into four separate horizontal passages, *y z a' b'*, arranged as represented. These latter passages, at their outer ends, lead up into the two cylinders.

It will be observed that the passages last named are arranged parallel to each other, and neither of them crosses another, as is the case in the meter of Worthington. My arrangement is so much better and simpler, as to cause the water to flow through the passages with much less friction, in consequence of which the meter will operate under a less head of water.

The valves also operate in circular paths, each being moved by the piston farthest from it, and by one of the shafts and its arms.

The mode of operation of the pistons and valves by the water, under pressure, may be thus described:

Such water, after entering the induction-passage *f*, passes into and fills the chamber C; thence it flows down through the ports *m*, (supposing such to be open;) thence through the passage *z*, and up against the end of the piston, over such passage. Next, by its pressure, it will move the piston in its cylinder B from or near one end of it, to or near the other end of it. In the mean time the piston will be forced against and will move the arm *w*, so as to turn the shaft *u*, which will move the arm *r* and the valve *n*, so as to open the port *g*. The water will next rush down through the said port *g*, thence through the passage *a'*, and up into the cylinder A, and against one head of its piston. The water will next move the piston of the cylinder A in the direction opposite to that in which the other piston, B, was previously moved. In the mean time the valve *o* will be moved, so as to open the port *k*. Thence the water will pass through the passage *y*, and against the first piston, so as to move it.

During each movement of each piston, the water, which will be driven out of its cylinder by each piston, will escape through one of the eduction-ports *h l*, which will be open to admit of such.

Thus, during the movements of the pistons, a reciprocating rotary motion will be imparted to the shaft *u*, by which the indicator or measuring-apparatus will be put in action.

I claim, in the water-meter hereinbefore described, the combination and arrangement of the two shafts *t u* and their arms *r s v w*, the single-chambered valve *n*, the double-chambered valve *o*, the valve-ports *g h i k l m*, and the passages *a' b' y z*, as applied to the plungers *c c*, and their cylinders and case, as set forth.

JAMES HARRIS.

Witnesses:

R. H. EDDY,  
SAMUEL N. PIPER.