H. Isham.

Piston Meter.

No. 51,056. Patented Nov. 21. 1865.

Fig: 3.

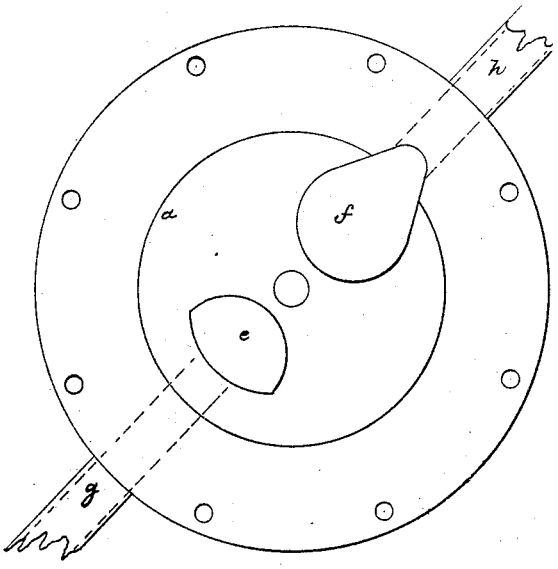


Fig: 4.

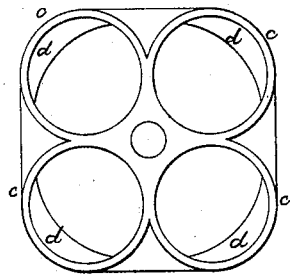


Fig: 2. B, b,

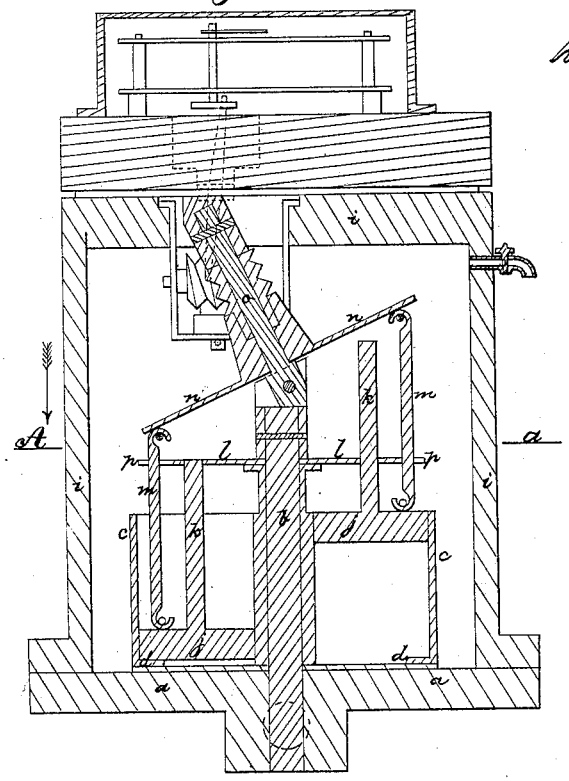
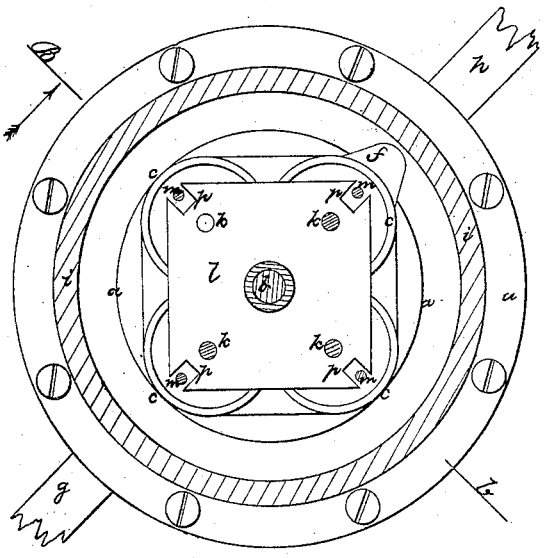


Fig: 1. A, a,



Witnesses
Wm. H. Bishop
Andrew Delacy.

Inventor
Henry Isham

UNITED STATES PATENT OFFICE.

HENRY ISHAM, OF NEW BRITAIN, CONNECTICUT.

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. **51,056**, dated November 21, 1865.

To all whom it may concern:

Be it known that I, HENRY ISHAM, of New Britain, in the State of Connecticut, have invented certain new and useful Improvements in the Water-Meter, which may be employed as a water, steam, or gas engine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a horizontal section, taken at the line A *a* of Fig. 2; Fig. 2, a vertical section, taken at the line B *b* of Fig. 1, with the casing and registering mechanism; Fig. 3, a top view of the bed-plate with the group of cylinders removed, and Fig. 4 a bottom view of the group of cylinders.

The same letters indicate like parts in all the figures.

In my said meter or engine there is a group of any number of cylinders, although I prefer four, each provided with a piston and arranged about a central axis of rotation, the lower open ends of which in the revolution pass in succession over an induction-way to receive the water or other fluid which actuates the pistons, and over an eduction-way, through which the water or other fluid is discharged; and the connecting-rods of the pistons are connected with a plate or the arms of a hub which turns on an axis placed at an angle with the axis of the group of cylinders.

In the accompanying drawings, *a* represents a bed-plate, with a central vertical shaft, *b*, permanently secured thereto. The upper surface of this bed-plate should be at right angles to the axis of the shaft, and ground true to form a fluid-tight joint with the under face of a group of cylinders, *c*. Four are represented in the accompanying drawings, that being the preferred number.

The group of cylinders I prefer to cast in one single block, the several cylinders being bored parallel with each other and at equal distances from a central bore fitted to turn on the central shaft, *b*. The under face of this block, from the central bore to a little beyond the openings at the lower end of the cylinders, should be fitted accurately to the face of the bed-plate, which is best done by a ground joint, although, if desired, the surfaces may be packed.

The upper ends of the cylinders are open, and their lower ends I prefer to form with an inward-projecting flange, *d*, leaving the opening equal to about three-fourths of the area of each cylinder.

The bed-plate *a* is formed with two apertures, *e* and *f*, communicating the one, *e*, with the induction way and pipe *g*, and the other, *f*, with the eduction way and pipe *h*, and these apertures are so located that when the cluster of cylinders revolve on the central shaft the cylinders shall in succession pass over both apertures, and as one cylinder passes over the induction-aperture *e* the opposite cylinder shall pass over the eduction-aperture *f*.

The eduction-aperture *f* is of larger capacity than the induction-aperture *e*, and it is so located that a portion of its area is not covered by that portion of the under face of the cylinders which runs in contact with the face of the bed-plate that the fluid may escape into the surrounding-case *i*, for a purpose to be hereinafter described.

To each cylinder is properly fitted a piston, *j*, and each piston is provided with a guide-rod, *k*, which works in a guide-hole in a guide-plate, *l*, connected with the upper end of the cluster of cylinders, so as to revolve with them; and each piston is also provided with a hinged connecting-rod, *m*, and the four connecting-rods are in turn hinged to the under surface of a plate, *n*, or, as the equivalent, the arms of a hub mounted on a fixed shaft, *o*, which is connected with the upper end of the central shaft, *b*, but forming an angle therewith, as represented, the inclination of the said plate depending upon the stroke of the pistons in the revolution of the cluster of cylinders.

The guide-plate *l* is formed with four slots, *p*, in which the connecting-rods *m* play.

When water or other fluid under pressure passes from the induction-pipe *g* into any one of the cylinders it acts against and forces the piston of that cylinder upward, and this action, by reason of the inclination of the axis of the plate *n*, causes the cluster of cylinders with their appendages to rotate about the common axis *b*, and that cylinder which is on the opposite side of the axis is thereby caused to pass over the eduction-way, into which the water or other fluid which it had previously received is discharged by the downward motion

of its piston induced by the plate *n*, with which it is connected. Before the eduction-pipe is opened the water or other fluid discharged into the eduction-way *h* escapes through the outer portion of the eduction aperture or port *f* into and fills the case *i*, making a counter-pressure on the upper surface of the piston, thereby producing an equilibrium and holding the meter or engine in a state of rest; but the moment the eduction way or pipe *h* is opened for the escape of water or other fluid the equilibrium is destroyed, and the meter or engine started and worked in exact proportion to the capacity of the discharge, the surplus pressure being balanced by the fluid in the surrounding-case.

The surrounding-case *i* should be provided with a small cock or valve to permit the escape of air until it is filled with water or other actuating fluid.

When employed as a meter for measuring the flow of water or other fluids the hub of the plate *n* should be connected with a registering mechanism such as represented, or any other suitable for the purpose; but when used as a motor the said hub is to be provided with a belt-wheel or other suitable gearing.

I have above described the mode of application of my said invention which I have tried with success; but I do not wish to be understood as limiting my claim of invention to such mode of application, as it may be modified without changing the mode of operation, which distinguishes my said invention from all other things before known.

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

1. The cluster of cylinders capable of revolving about a common center, provided with pistons, substantially as described, in combination with the inclined plate (or the equivalent thereof) with which the piston-rods are connected, and with the bed-plate and its induction and eduction ways, substantially as and for the purpose specified.

2. In combination with the cluster of cylinders and the bed-plate, the case surrounding the cluster of cylinders, and the eduction aperture or port to discharge into the case, substantially as and for the purpose described.

HENRY ISHAM.

Witnesses:

WM. H. BISHOP,

ANDREW DE LACY.