2 Sheets—Sheet 1.

J. BARNES.

Piston Water-Meter.

No. 203,876. Patented May 21, 1878.

Fig 1.

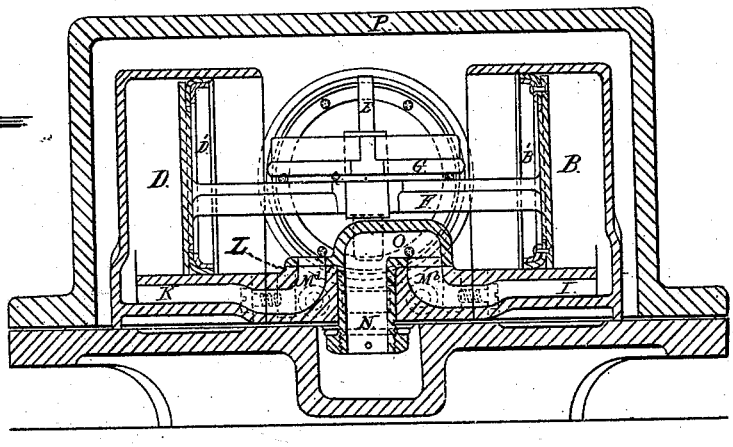
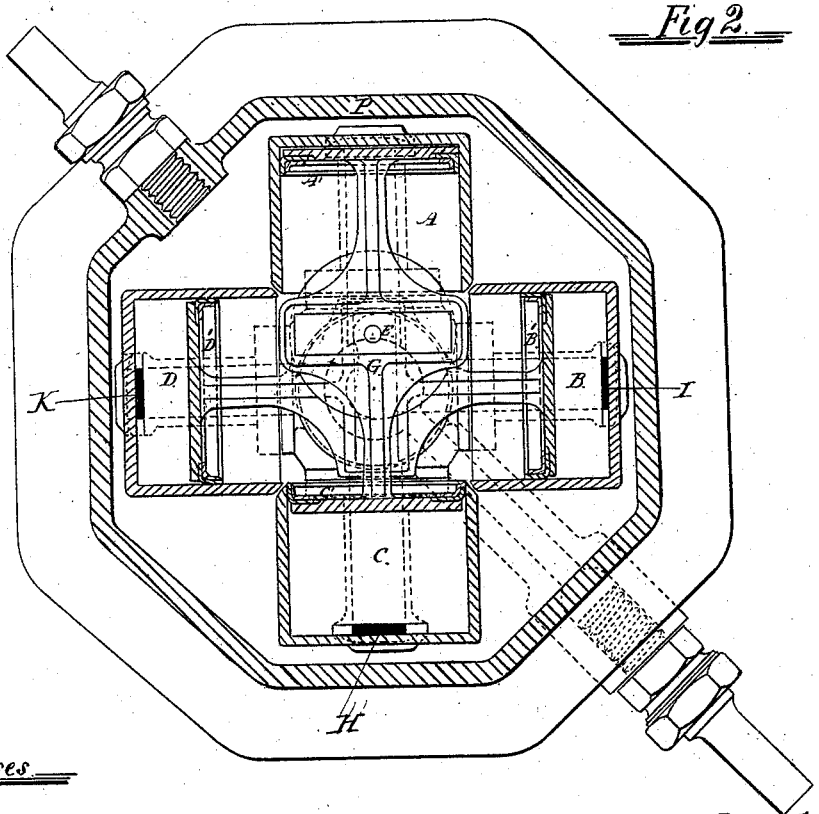


Fig 2.



Witnesses

Donn I. Twitchell

Will H. Dodge

Inventor.

James Barnes
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Attys.

2 Sheets—Sheet 2.

J. BARNES.

Piston Water-Meter.

No. 203,876. Patented May 21, 1878.

Fig 3.

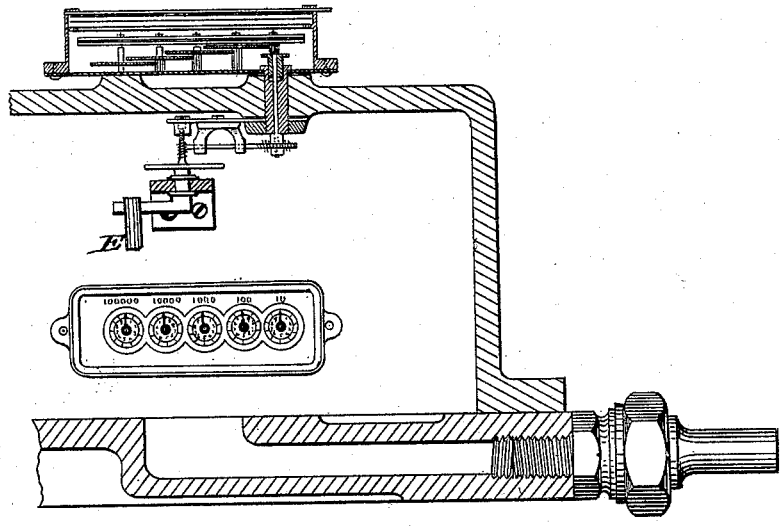


Fig 5.

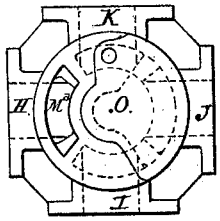


Fig 4.

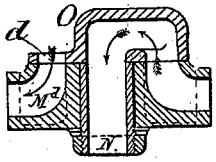
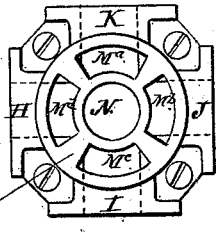


Fig 6



Witnesses
Conn P. Turtchell
Will H. Dodge

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UNITED STATES PATENT OFFICE.

JAMES BARNES, OF ACCRINGTON, ENGLAND.

IMPROVEMENT IN PISTON WATER-METERS.

Specification forming part of Letters Patent No. **203,876**, dated May 21, 1878; application filed May 9, 1877; patented in England, April 24, 1877.

To all whom it may concern:

Be it known that I, JAMES BARNES, of Accrington, in the county of Lancaster, England, engineer, have invented new and useful Improvements in Fluid Meters and Motors, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings.

This invention, for which Letters Patent of Great Britain were granted to me on the 24th day of April, 1877, No. 3,939, consists in a new arrangement of parts, composing a meter for the measurement of fluids, applicable also as a motor. It is best described by the aid of the accompanying drawings, in which—

Figure 1 is a vertical section; Fig. 2, horizontal section; Fig. 3, vertical section of casing and counting apparatus; Fig. 4, section of valve and seat; Fig. 5, plan of same; Fig. 6, plan of seat. In the middle of Fig. 3 is a plan of counting apparatus.

Four cylinders or boxes, A, B, C, and D, are placed round a spindle, E. One pair of cylinders, A C, face each other on opposite sides of the shaft E. The other pair, B D, are similarly arranged at right angles to the first pair.

The axes of all the cylinders are preferably in the same plane, or nearly so.

Each cylinder has a piston, A′ B′ C′ D′, and each pair of opposite pistons are rigidly connected together by a rod, F or G, on which, and forming an integral part of it, is a link with a long transverse slot. In this slot the spindle (or a journal round the spindle) works, the two piston-rods and link being so arranged as to pass each other on opposite sides of the plate or disk Q on spindle E, and actuate the same spindle (or, theoretically, crank-pin) at right angles to each other. The object of this plate is to act as guide to keep the spindle standing truly at right angles to all the cylinders. The end nearest the spindle of each cylinder is open, the other end closed, but provided with a port, H, I, J, or K, leading to a central valve seat or face, L, in which they terminate in induction-ports M^a, M^b, M^c, and M^d. On the seat or face there is mounted a rotating valve, O, consisting of a disk provided with an eduction port or opening, *d*, and with a central tubular spindle, through which the water is admitted to the apparatus, the bore or passage N of the spindle having its upper end curved to one side, and extended downward through the under face of the valve above the seat L, so that as it is carried around over the face of the valve it will communicate with the different induction-ports in succession. The spindle E is fixed upon the valve on one side of the center, and is, in effect, a crank-pin. The whole is inclosed in a casing, P.

The mode of action is as follows: Water being let into the casing, and the apparatus being in such position that piston A′ is close to the cylinder-head, C′ close to the open end, and B′ and D′ at half-stroke. The crank revolving, A′ advances toward the central shaft E, B′ continues its advance, and C′ and D′ retreat. At the same time the valve O has uncovered the induction-port of cylinder A and covered that of cylinder C, leaving B's induction-port open and D's still in communication with the exhaust N. At the same time C's port was cut off from communication with the central chamber through its port M^c being covered, and was coupled with the exhaust N by means of the valve O.

Any of the ordinary kinds of registering apparatus can be connected with the continuation of the crank-shaft, the plan I like best being shown in Fig. 3. I need not, however, describe it, as it is well known, and not original with me.

I prefer to make all the working parts of bronze, brass, or other metal not liable to speedy corrosion.

Under a considerable head and with a free exhaust, this apparatus, without any alteration beyond adding a second web to the end of the spindle and prolonging the shaft so as to attach a pulley or gearing thereto, can be used as a motor for machinery, more especially sewing-machines and other light affairs.

Three or any other number of cylinders at equal angles with each other would do instead of four, and jointed connecting-rods could take the place of slotted rigid ones, whether used as a meter or a motor; but it would be more complicated, and I prefer the arrangement as above described.

One of the advantages of my arrangement of parts is that the water, after leaving the

cylinders, is permitted to escape directly into the surrounding case or body, and thence from the apparatus, instead of being compelled, as in other apparatus, to pass through circuitous passages, by which its flow is impeded, the result being that I am enabled to secure a more accurate measurement and to utilize the full power of the water.

It will be seen at once that the valve is one arm of the crank-shaft, and that the crank-pin is the principal feature of the crank-shaft, the shaft itself being practically dispensed with, except when the apparatus is used for a motor, when the other web of the crank is placed above and the shaft continued through the casing at a point opposite the valve.

I claim as my invention—

The combination of spindle E, armed with plate Q, fitting between rods F and G, for the purpose of keeping the rod E upright.

JAMES BARNES.

Witnesses:

JOSEPH BRIDGE,

JAMES HARGREAVE.