J. B. BUTTON.

FLUID-METER.

No. 176,278. Patented April 18, 1876.

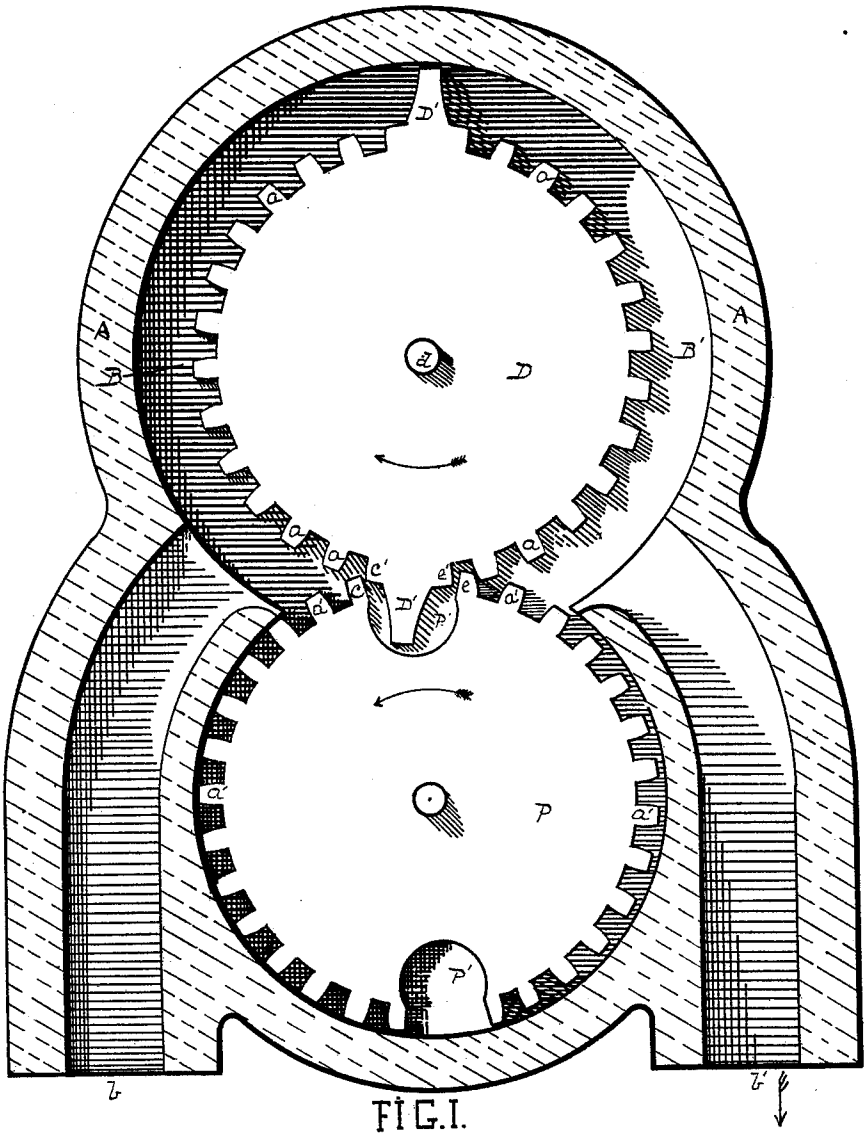

FIG. I.

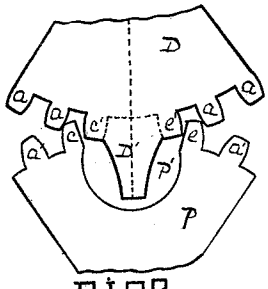

FIG 2.

WITNESSES.

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UNITED STATES PATENT OFFICE.

JOHN B. BUTTON, OF CLEVELAND, OHIO.

IMPROVEMENT IN FLUID-METERS.

Specification forming part of Letters Patent No. **176,278**, dated April 18, 1876; application filed March 10, 1876.

To all whom it may concern:

Be it known that I, JOHN B. BUTTON, of Cleveland, county of Cuyahoga, State of Ohio, have invented or discovered a new and useful Improvement in Fluid-Meters; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which, like letters indicating like parts—

Figure 1 is a plan view of the meter with the cover removed, but showing the supply and discharge ports or passages in section; and Fig. 2 is a diagram of a portion of the meter-wheel and valve, showing the manner of spacing or laying off the gear-teeth so as the better to secure the end in view.

The meter and valve-case A are of any suitable construction, such as will give, in connection with the ordinary cover, the usual channels or annular chamber B B′ for the through-flow and measurement of water or other fluid or steam, which enters by the port *b* and is discharged at the port *b′*, these having the usual pipe-connections. The meter-wheel D is mounted on its axis *d* in the ordinary way, and is provided with gear-teeth *a* on its periphery, except through so much of its circumference as is occupied by the pistons D′, one or more in number.

The rotating valve P has like gear-teeth *a′*, except where its circumference is cut away to form recesses P′ for the passage of the pistons D from the rear, or discharge to the front or receiving sides of the meter. The rotating valve P performs, in connection with the wheel, the function of a diaphragm to cut off communication on that side of the wheel, between the receiving and discharging ports. Each recess P′ is made of such size and shape with reference to the pistons D′ that there will, while a piston is in a recess, always be an open communication for the direct passage of the fluid from one side of the piston to the other, either by a port for the purpose, or by the piston being so made as not to engage the walls of the recess, as represented in the drawing. Hence the piston, when in the recess, will be always balanced, whether the fluid-pressure be acting thereon from the supply or discharge side; and the better to attain this end, I cause the gear-teeth on the discharge side to mesh or engage each other as soon or a little before the teeth on the receiving side become disengaged. Thus the tooth *c*, on one side of the recess, continues in contact with a half-tooth, *c′*, at the base of the piston, both on the receiving side of the meter, until the teeth on the opposite or discharging side of recess and piston engage each other, and thereby cut off fluid-pressure from that side. It will then be seen that as a piston enters a recess, both the piston and recess will be in perfect balance as regards fluid-pressure, which then acts only from the discharging side, and that such balance will continue and be preserved while in the forward motion of these parts the pressure on the discharging side is cut off, and then, or thereafter, pressure on the receiving side is allowed to enter and act. While the piston is in a recess, the fluid is free to flow around it from one side to the other; but the pressure from the receiving side and that from the discharging side never act simultaneously on such piston.

The manner of spacing or laying off the pistons, recesses, and gear-teeth, by which this result is secured, is illustrated by the diagram, Fig. 2. The blank sides of the half-teeth *c′ e′* at the base of each piston are indicated by dotted lines, and the intervening space is equal to twice the space between each two gear-teeth *a;* also, the distance between the gear-teeth *c e*, at the mouth of each recess, is equal to the space occupied by two teeth and two intermediate spaces. Then, with the sides and end of the piston and walls of the recess so shaped that they shall not come in contact, so as to cut off the flow of fluid from one side of the piston to the other, the results above described are with certainty attained.

The construction and operation of the parts, except as above described, as also the fittings, packing, &c., are such as, being common in other fluid-meters, will come within the knowledge of the skilled mechanic, and need not be here explained in detail. The same useful and novel features may be employed as a meter by the making of obvious changes.

The gearing, arranged as described, may be

put on separate wheels outside the case with like useful result.

I claim herein as my invention—

1. In combination with piston and recess, a rear cut-off, closing at the base of the piston and end of the recess simultaneously with or in advance of the opening on the front or receiving side, substantially as set forth.

2. In combination with the balanced piston, the gear-teeth *c e c' e'* at the base of the piston and at the extremities of the recess, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand.

JOHN B. BUTTON.

Witnesses:
T. H. GRAHAM,
SAMUEL HITTEL.