2 Sheets. Sheet 1.

Gray & Brittingham,

Water Meter.

No. 111,838. Patented Feb. 14, 1871.

Fig. 1.

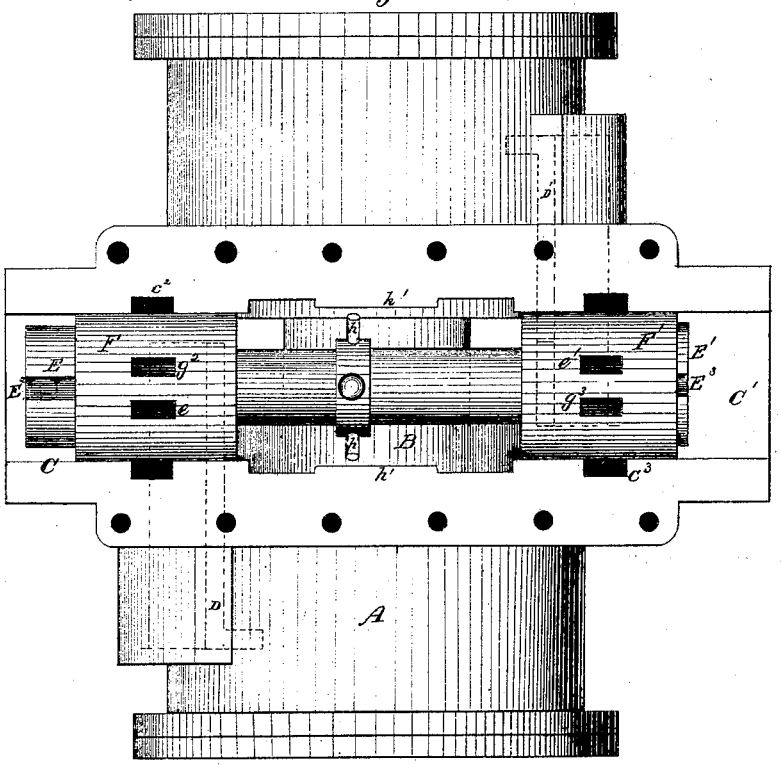
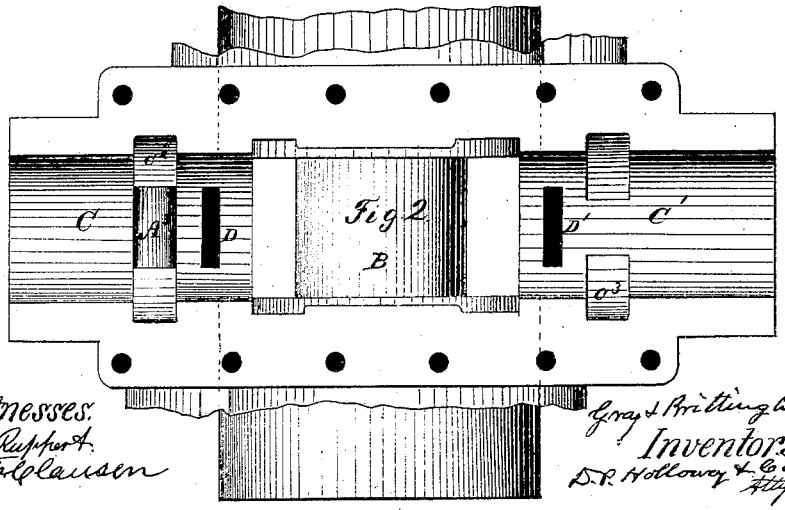


Fig. 2.



Witnesses.
A. Ruppert
C. F. Clausen

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Attys

2 Sheets, Sheet 2.

Gray & Brittingham,

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Fig. 5

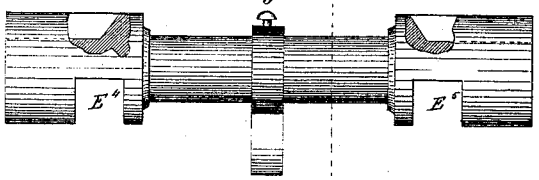


Fig. 5ª

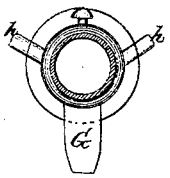


Fig. 6.

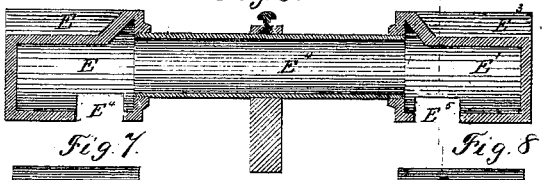


Fig. 6ª

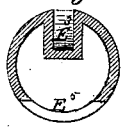


Fig. 7.

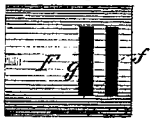


Fig. 8

Fig. 8ª

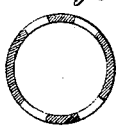


Fig. 3.

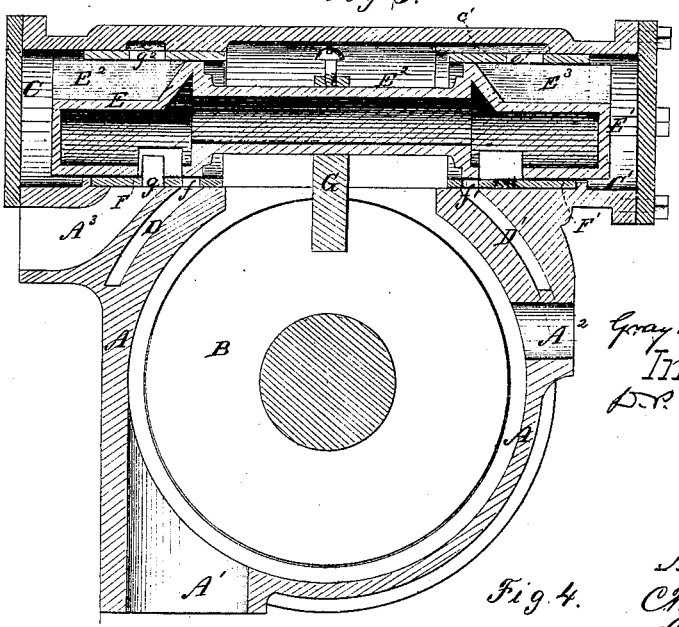
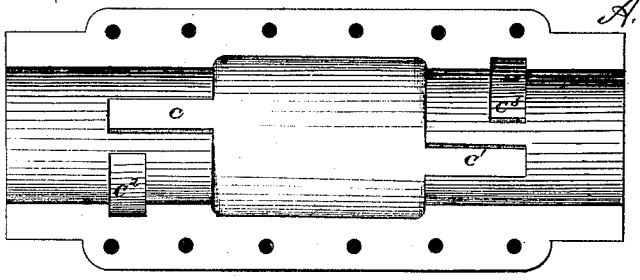


Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

ROBERT C. GRAY AND WILLIAM B. BRITTINGHAM, OF LA FAYETTE, IND.

IMPROVEMENT IN WATER-METERS.

Specification forming part of Letters Patent No. **111,838**, dated February 14, 1871.

To all whom it may concern:

Be it known that we, ROBERT C. GRAY and WILLIAM B. BRITTINGHAM, of La Fayette, in the county of Tippecanoe, and in the State of Indiana, have invented some new and useful Improvements in Water-Meters; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, making a part of this specification, in which—

Figure 1 is a plan view of the meter, showing the valve-chest and valve uncovered. Fig. 2 is also a plan view thereof, both the valve-chest cover and the valves being removed to show the ports and channels in the chest. Fig. 3 is a transverse section. Fig. 4 is a bottom view of the cover of the valve-chest. Figs. 5 5^a and 6 6^a are views of the double valve. Figs. 7 and 8 8^a represent views of the valve-seats.

The same letters of reference where employed in the several figures denote identical parts.

The nature of our invention, which relates to an improvement in water-meters, also applicable to steam-engines, consists in the construction of an oscillating double slide-valve, which, on being oscillated by the piston at the end of each stroke, is slid in its seats to reverse the flow of the fluid passing through the meter by the direct action of such fluid, as will be more specifically pointed out in the following description and claims.

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

In the annexed drawing, A represents the cylinder; B, the double-headed piston; and C C′, the duplex valve-chest, which is arranged transversely across the cylinder, opening into the same between the valve-chambers and between the heads of the piston.

The chamber C of the valve-chest communicates with one end of the cylinder by the passage D, while the one, C′, is connected with the other end by the passage D′.

The water or other fluid enters the cylinder between the heads of the piston at A^1 or A^2, and, flowing to the chest alternately to one end and the other of the cylinder, drives the piston to the opposite end, discharging the water before it through the passage at that end and hollow valve into the exhaust-opening at A^3.

The valves E and E^1 are rigidly connected by the hollow stem E^4, and are made of cylindrical form and hollow, with closed ends, and nicely fitted in their cylindrical seats F and F′. The seat F is provided with two long segmental apertures, *f* and *g*, which register respectively with the passage D and exhaust-opening A^3, while the seat F′ has only one such aperture, *f*′, which covers the passage D′, and a smaller one, g^1. In the upper sides of these seats two ports are cut. (Marked respectively *e* and g^2 and *e*′ and g^3.) The port *e* of the seat F and the port *e*′ of the seat F′ communicate with the water-space in the chest by channels *c* and c^1 cut in the cover, and the ports g^2 and *g* in the one and g^3 and g^1 in the other are connected by channels c^2 and c^3 in such cover, continued in the wall of the chest around the seats.

The valves are constructed with deep channels or recesses E^2 and E^3 in their upper sides, opening into the valve-chambers C and C′. These channels are in line with each other, and, as the valves are oscillated, register alternately with the ports *e* and g^3 and *e*′ and g^2, admitting the water to the chamber C or C′, as the case may be, to slide the valves by its pressure upon their ends.

As shown in Fig. 3, the water is flowing into the chamber C′, sliding the valves toward the left, while the water in the chamber C escapes through the recess E^2, port g^2, and channel c^2 into the exhaust-opening. In the same manner, when the water flows from the cylinder into the chamber C, driving the valves in the opposite direction, the water in the chamber C′ escapes through the recess E^3, port g^3, channel c^3, and port g^4 into the hollow valve E^1 through its aperture E^5.

Large apertures E^4 and E^5 are cut in the under side of the valves, which are brought alternately opposite the ports *f* and *f*′, to connect the interior of the valves with one of the passages D or D′, the other passage being at the same time in direct communication with the water-space of the chest.

The aperture E^4 opens into the exhaust-port *g* at all times, and the aperture E^5 may

always cover the port g^1, but must do so the moment the water begins to be driven out of the chamber C′ by the sliding of the valves.

The valves are oscillated at the end of each movement of the piston by one of its heads striking against an arm, G, fastened on the valve-stem, which arm is provided with suitable stops h, which come in contact with projections h' on the chest to prevent the valves from being turned too far.

The operation of the meter is as follows: As shown in Fig. 1, the water is flowing through the passage D into that end of the cylinder into which said passage opens, driving the piston to the other end, from which the water is discharged through the passage D′, flowing through the port f' and aperture E^5 into the cavity in the valve E^1, passing thence through the hollow stem into the valve E and out through the aperture E^4 therein and exhaust-opening g in the seat into the exhaust-pipe A^3. The piston has nearly reached the end of its stroke in this direction, and its head nearest the valve-chest is oscillating the valves, which, at the end of the stroke, brings the recesses E^2 and E^3 of said valves in line with the ports e and g^3 in their respective seats. The water then at once flows into the chamber C and pushes the valves toward the right far enough to shut the passage D and open D′, when the water flows from the chest through the latter passage into the other end of the cylinder, driving the piston before it. The water before the piston is now discharged through the passage D and port f into tho valve E through its aperture E^4, and escapes directly from said valve into the exhaust-pipe. When used as a water-meter a suitable registering apparatus must be attached, which may be driven from the piston or the valve, as may be most convenient.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The recessed valves E E^2 and E^1 E^3, with reference to the ports e g^2 and e' and g^3 in their respective seats and channels c and c^1 in the chest, substantially as set forth.

2. In combination with the foregoing elements, the ports g and g^1 in the seats and channels c^2 and c^3 in the chest, substantially as set forth.

3. The hollow valves E and E^1, rigidly connected by the hollow stem E^2, and provided with apertures E^4 and E^5, respectively, with reference to the passages and ports D f and D′ f', and exhaust-openings A^3 g, substantially as set forth.

In testimony whereof we have signed our names to the foregoing specification in the presence of two subscribing witnesses.

ROBT. C. GRAY.
W. B. BRITTINGHAM.

Witnesses:
JAMES COLEMAN,
JAMES W. COOPER.