J. H. COOMBS.

PISTON WATER-METERS.

No. 194,549. Patented Aug. 28, 1877.

Fig. 1.

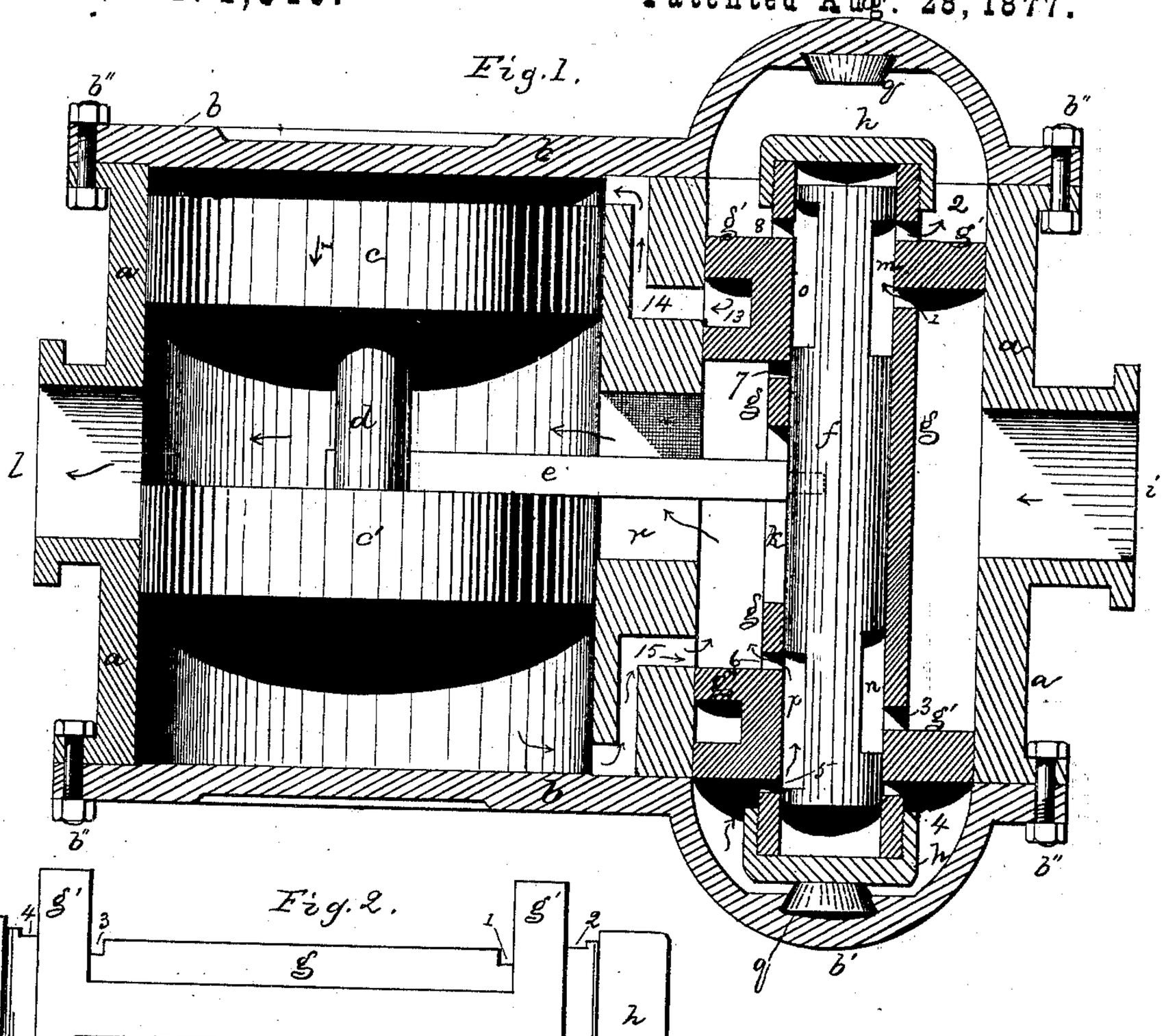


Fig. 2.

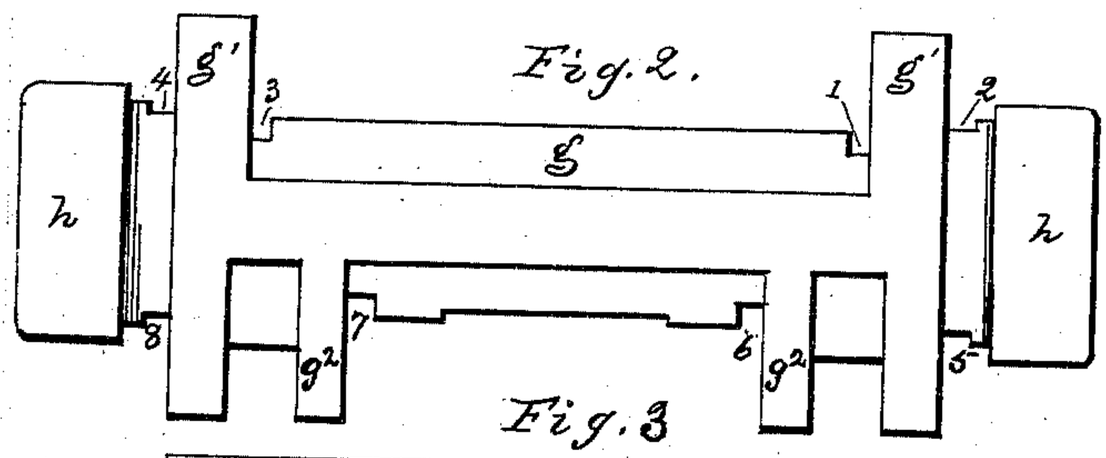


Fig. 3

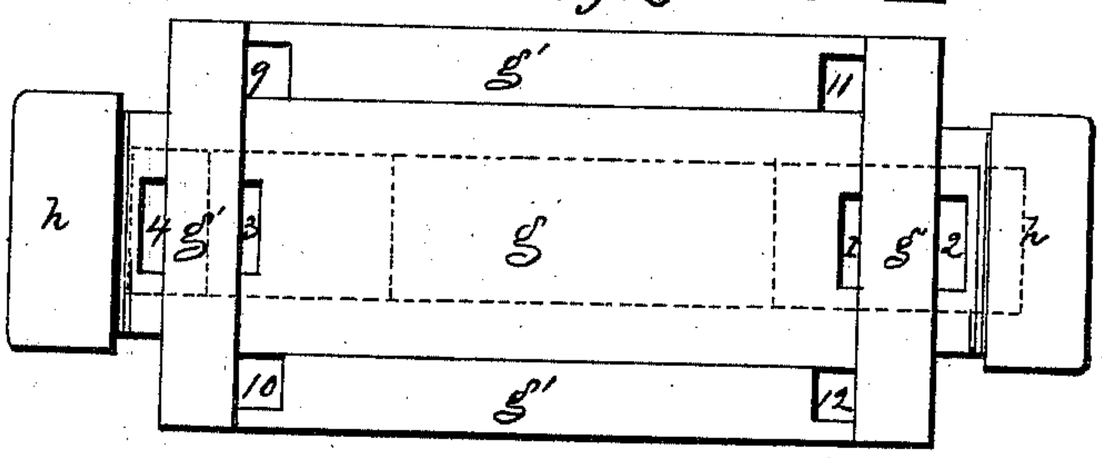
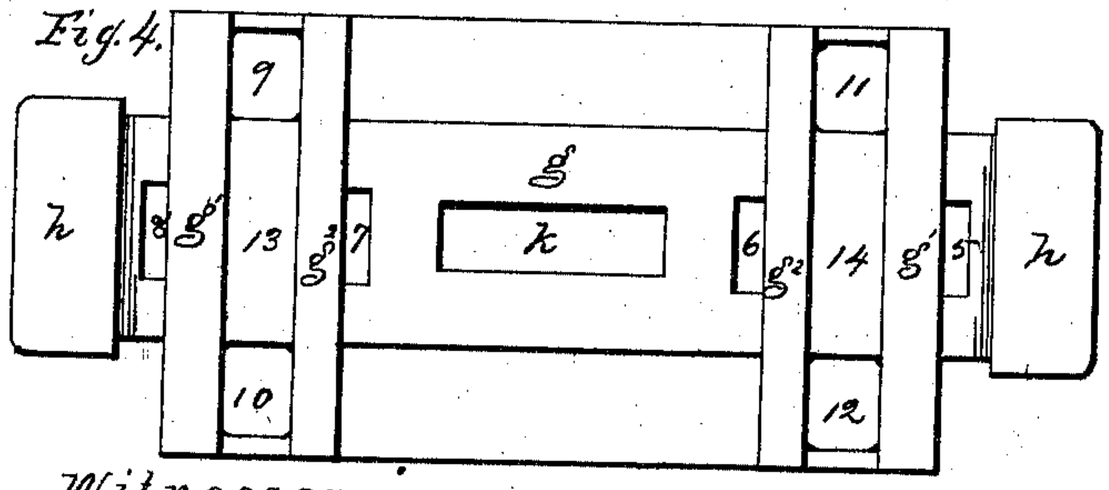


Fig. 4.



Witnesses.
L. H. Latimer
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by J. H. Adams atty.

UNITED STATES PATENT OFFICE.

JOHN H. COOMBS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN PISTON WATER-METERS.

Specification forming part of Letters Patent No. **194,549**, dated August 28, 1877; application filed June 18, 1877.

To all whom it may concern:

Be it known that I, JOHN H. COOMBS, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Fluid-Meter, of which the following is a specification:

The object of my invention is to produce a water-meter which shall be simple in construction, easy of operation, and accurate in its measurements; and the invention consists in the combination of a cylinder and a valve-chamber, in the first of which is arranged a double-headed piston, which operates a valve-stem, the free end of which projects into the piston-chamber, the other end being firmly connected to a solid cylindrical valve, located within an exterior valve, operating in the valve-chamber. The solid valve is provided with four passages, and changes its position, by the action of the piston on the valve-stem, so as to allow the water from the inlet-pipe to change the position of the main valve, which is held open by the pressure of the water, independently of the main piston, until it completes its stroke. The main piston, as it completes its stroke, acts again upon the valve-stem, changing the position of the valves, and thereby exhausting the dead and admitting the live water to drive it in the opposite direction, so as to keep up a continuously-reciprocating motion of the piston.

In the drawings, Figure 1 is a longitudinal section of a meter embodying my invention, the inner valve being shown in elevation. Fig. 2 is a side elevation of the hollow valve. Fig. 3 is a plan or top view thereof, and Fig. 4 a reverse plan or bottom view of the same.

a is the casing; *b b*, the heads, secured to the casing by the bolts *b'' b''*. *c c'* are the two heads of the double-headed piston, connected together by one or more connections, as at *d*; *e*, a valve-stem, projecting from the valve-chamber into the piston-chamber, and between the piston-heads *c c'*.

The valve-stem *e* is connected to the valve *f*, which consists of an elongated solid cylinder, provided at each end with inlet and outlet passages, as shown at *m n o p*.

The valve *f* is contained within an exterior valve, *g*, provided with a slot, *k*, through which the valve-stem *e* passes, the slot *k* being elongated to admit of the free reciprocation of the valve *g*. The valve *g* is provided with a proper number of ports to conform to those of the valve *f*.

h h are caps, secured to the ends of the valve *g*, so as to inclose the ends of the valve *f*, and prevent the water in the valve-chamber from coming in contact with them. *q q* are rubber cushions, secured in seats made for their reception at each end of the valve-chamber.

The water, entering from the supply-pipe through the inlet-opening *i* on the side of the valve-chamber, fills the space between the heads g^1 g^1 of the valve *g*, a portion of this water passing through ports 9, 10, Fig. 4, into the space 13, between the head g^1 and the auxiliary head g^2, which extends only halfway around valve *g*; thence through the passage 14 in the wall between the cylinder and valve-chambers into the space in the cylinder outside of the piston-head *c*, causing the piston to move in the direction of the arrow 1.

Another portion of the water, entering at *i*, passes into port 1 of the valve *g* through the passage *m* in the valve *f*, thence out through port 2 of the valve *g* into the valve-chamber, and, by its pressure there, forces the valve *g* forward against the rubber cushion at the opposite end of the valve-chamber, as shown in Fig. 1 of the drawing.

The dead water from the space in front of the piston-head *c'* flows through passages 15, at that end of the dividing-wall between the piston and valve-chambers, into the valve-chamber; thence through the elongated slot *r* into the piston-chamber between the heads of the piston, and out through the exhaust or outlet *l*.

The piston moving in the direction of the arrow 1, the head *c* strikes the valve-stem *e*, carrying it forward, and with it the valve *f*, thus changing the position of the ports, and reversing the piston and valves.

The dead water, which has expended its force upon the head of the main valve, finds its outlet from the space between the head of the meter and the head of said valve through the ports 5 and 6, which are converted into outlet-ports by the shifting of the reciprocating valve *f*.

By arranging the main valve, the auxiliary valve, and the pistons so that they shall each have a reciprocating motion in the same general direction, the construction of the meter is very much simplified, and the disadvantages arising from the use of rotating or oscillating valves are materially obviated. In the latter class of meters there is considerable liability of the valve setting upon the dead-center, in which event the ports may be left in such position that water will flow through the meter without disturbing the pistons, and thus destroy the effect or purpose of the machine.

I claim—

1. The reciprocating solid valve *f*, provided with the passages *m n o p*, and arranged within the exterior valve *g*, provided with a corresponding number of ports, when constructed and operating substantially as and for the purpose set forth.

2. The combination of the solid reciprocating valve *f*, provided with the valve-stem *e*, the slotted exterior valve *g*, and the double-headed piston *c c'*, substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN H. COOMBS.

Witnesses:

L. H. LATIMER,

J. H. ADAMS.