(No Model.)

2 Sheets—Sheet 1.

H. S. LORD.

WATER CLOSET SUPPLY VALVE.

No. 322,388 Patented July 14, 1885.

Fig. 1.

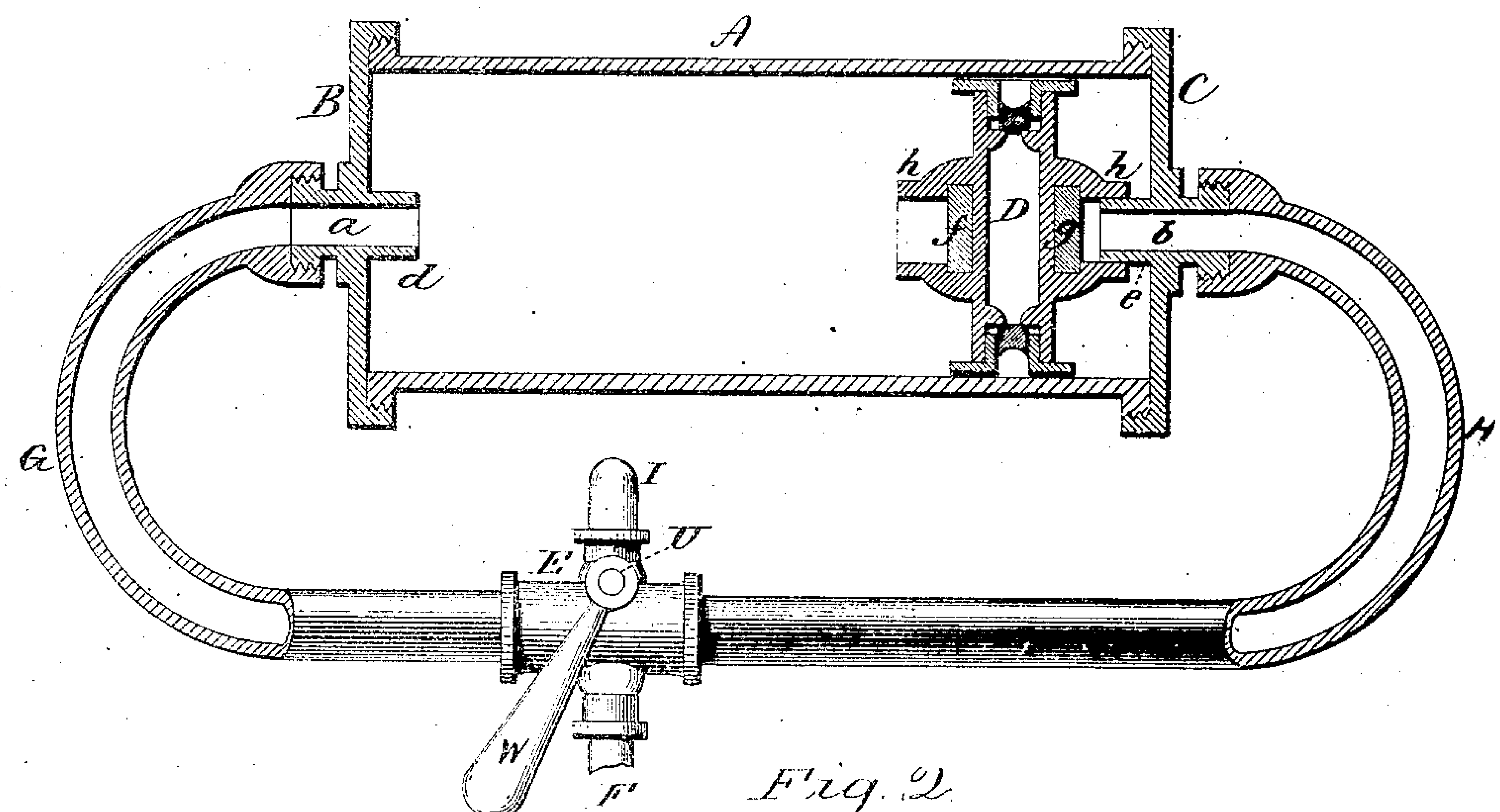
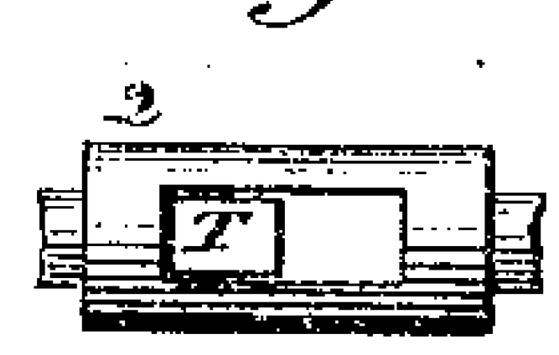
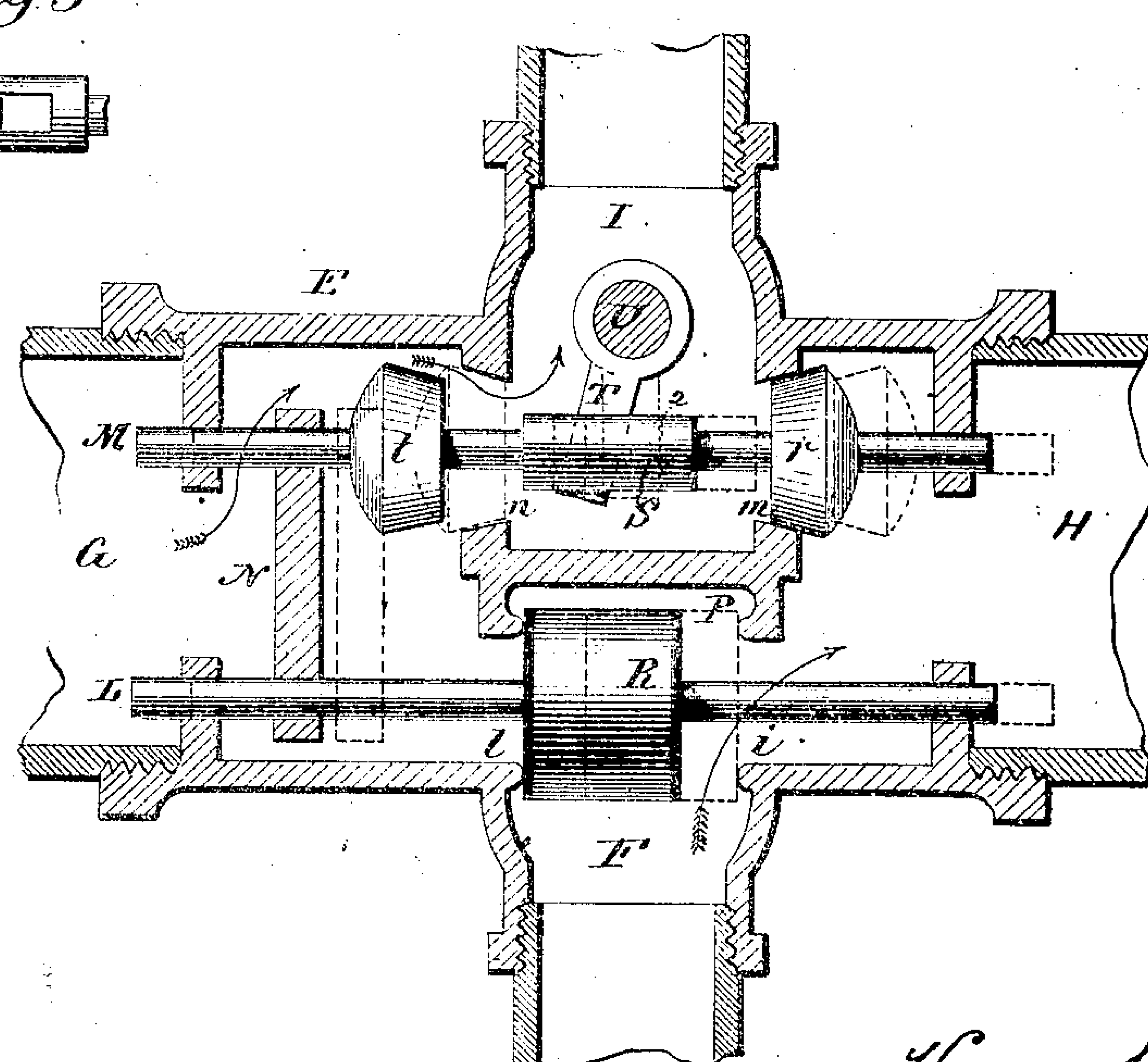


Fig. 2.

Fig. 3.





Witnesses.
J. H. Shumway
Jos. C. Earle

Henry S. Lord,
Inventor.
By atty.
Wm. H. Earle.

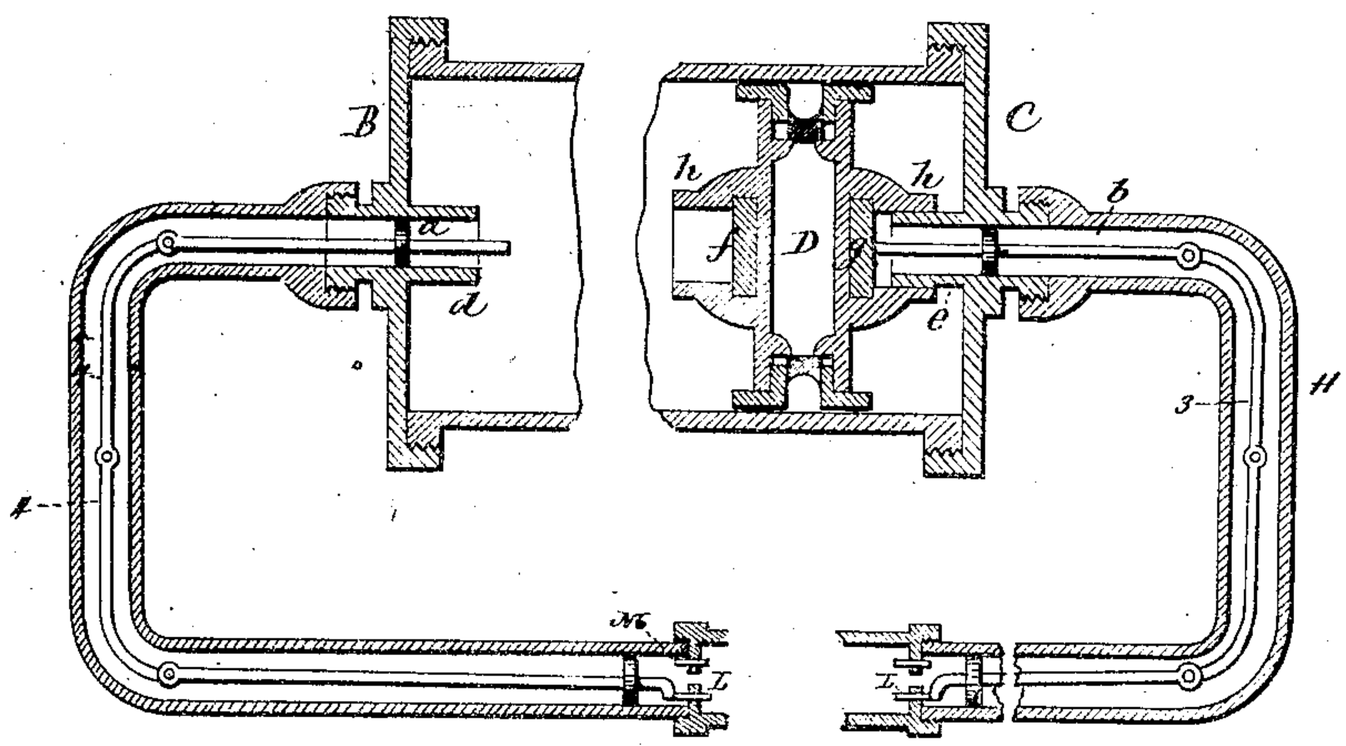
(No Model.) 2 Sheets—Sheet 2.

H. S. LORD.

WATER CLOSET SUPPLY VALVE.

No. 322,388. Patented July 14, 1885.

Fig. 4



Witnesses.
J. C. Shumway.
H. C. Earle

Henry S. Lord,
Inventor
By atty
Thos. G. Orvis

UNITED STATES PATENT OFFICE.

HENRY S. LORD, OF HARTFORD, CONNECTICUT.

WATER-CLOSET SUPPLY-VALVE.

SPECIFICATION forming part of Letters Patent No. 322,388, dated July 14, 1885.

Application filed February 9, 1885. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. LORD, of Hartford, in the county of Hartford and State of Connecticut, have invented a New Improvement in Water-Closet Supply-Valves; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a longitudinal section of the cylinder, showing outside view of the valve shell or casing; Fig. 2, a longitudinal central section through the valve-casing, showing the inlets and outlets; Fig. 3, a side view of the stirrup on the valve-rod M; Fig. 4, a sectional view showing modification adapting the valve to automatic operations.

This invention relates to an improvement in valve arrangement for the supply of water to wash-basins, closets, &c., and is an improvement on the invention made by me, and for which I filed application for Letters Patent, Serial No. 140,807.

The object of that invention was an apparatus whereby only a certain quantity of water would be permitted to pass through the faucet without some personal attendance.

Before proceeding to define my present invention, I will briefly describe the apparatus as set forth in my said previous application.

A represents the cylinder—its ends closed by heads B C. In the head B is an opening, *a*, and in the head C a like opening, *b*. Around each of the openings *a b* and extending into the cylinder is a tubular projection, respectively, *d e*.

D is a piston, fitted to move freely in the cylinder from end to end. Centrally on one side of the piston is a cushion, *f*, of any flexible or elastic material. On the reverse side and in the center is a like cushion, *g*. These cushions stand in line with the tubular extensions *d e* in the respective heads of the cylinder. Around the respective cushions is a tubular projection, *h*, the internal diameter of which is larger than the external diameter of the tubular extensions *d e*, and also somewhat shorter than the said extensions *d e*.

At some convenient point near the cylinder a valve is arranged, represented in Fig. 1 as at E. This valve was provided with a four-way plug. A pipe, G, leads to the valve from one end of the cylinder, and from the opposite end a like pipe, H, leads to the other side of the valve, the valve being provided with an inlet and outlet for the flow of water. By turning the plug in one direction the inlet opens to one end of the cylinder and the outlet opens from the other, and so that water flowing into one end will drive the piston toward the opposite end. Arriving at that end the piston will seat upon the projection *d* and close the outlet, the cylinder then being full upon the reverse side of the cylinder. Turning the valve in the opposite direction the inflow will be changed in its direction to the reverse side of the cylinder and turn the outlet from the side which was before the inlet, and so that the piston will return toward the opposite end of the cylinder and force the water out through, say, the pipe H, and, so continuing, the piston works first to one end and then to the opposite end, according as the plug is turned.

My present invention relates specially to the construction of the valve by which the flow is made to and from the cylinder; and it consists in the construction of the valve as hereinafter described, and more particularly recited in the claims.

E represents the casing or shell of the valve, open at both ends, and to one open end of which the pipe G leads from the opening *a* in the cylinder, and from the opening *b* in the cylinder a like pipe leads to the opposite end of the valve-casing.

F is the inlet and I the outlet, here represented as opposite each other and at right angles to the axis of the casing.

Through the valve-chamber two parallel rods, L M, are arranged in guides within the shell, as shown, and so as to be supported in their parallel position, but permitted longitudinal movement. The two rods are connected by a bar, N, so that a movement of one will be imparted to the other.

Within the main valve-chamber is an auxiliary inlet-chamber, P, constructed with an opening, *i*, at one end and *l* at the opposite end. The inlet F opens directly into this cham-

ber P. The rod L passes centrally through the openings in this chamber, and within this chamber on the rod a double-ended valve, R, is fixed, so that, setting at one end of the chamber, it closes the one opening, *l*, as seen in Fig. 2, or, moved to the opposite end, it closes that opening, *i*, as indicated in broken lines, Fig. 2. One end being closed the other will be open.

S is the outlet-chamber, also formed within the casing of the valve, the said chamber opening at *l* for discharge. This chamber is constructed with a valve-seat, *m*, at one end, and a like valve-seat, *h*, at the opposite end. Both the valve-seats *m n* are of conical shape, opening outward from the chamber S. The valve-rod M runs centrally through these valve-openings and the chamber S, and carries a valve, *r*, corresponding to the valve-seat *m*, and a like valve, *t*, corresponding to the seat *n*, each valve adapted to close its respective opening when set therein.

The relative arrangement of the valves R and *t r* is such (as seen in Fig. 2) that when the inlet-valve closes the opening *l* at one end of the inlet-chamber P the valve *t* at the same end of the outlet-chamber stands open, and in this condition the valve-seat *i* is opened and the corresponding outlet-valve *r* is closed. In the outlet-chamber a lever or arm, T, is arranged upon a shaft, U. The said shaft, extending through the shell, is provided with a handle, W, by which the shaft may be turned.

The valve-rod M in the chamber S is constructed with a stirrup, 2, into which the arm T extends. The opening in the stirrup is considerably longer than the width of the arm, as seen in Fig. 3.

To illustrate the operation of the valve, suppose the parts to stand as seen in Fig. 2—that is, the inlet-valve closing the seat *l*, leaving a free passage through the seat *i*. At the same time the valve *r* closes the seat *m*. Water now flowing through the inlet F, thence through the seat *i*, passes directly to the pipe H, thence to the cylinder A at the right hand of the piston D, and under the pressure of the water the piston will move toward the opposite end as the cylinder fills, and will continue so to move until the piston seats itself upon the extension *d* at the opposite end. Then, the cylinder being full, the flow will cease. If, now, the shaft U be turned to throw the valves in the opposite direction, as indicated in broken lines, Fig. 2, the inlet-valve seat *i* will be closed and the other inlet-seat, *l*, open. At the same time the outlet-valve seat *n* will be closed, and the opposite outlet-valve seat, *m*, will be opened. The inflow now will be turned to the left, and the water, passing through the valve-seat *l*, will flow through the pipe G to the left hand of the piston. Applying the pressure of the water thereto will force the piston to travel toward the opposite end, it being permitted so to do, as the water upon the opposite side of the piston is now permitted to pass out through the pipe H, thence through the valve-seat *m* to discharge. The inflow and outflow will thus continue until the piston seats itself at the right-hand end, to close upon the opening at that end.

The pressure of the water upon the inlet-valve when upon its seat serves to hold it firmly seated and until it shall be turned from its seat by the movement of the arm T, as before described.

In order that the valves may not be forcibly held all in an open condition, and thereby permit a continuous flow of water without regard to the cylinder A, the stirrup 2 is constructed with its openings of greater length than the width of the arm T, and so that the arm T is only used to start the valves in their movement, the movement being completed by the flow of the water.

To illustrate: Suppose the parts stand in the position seen in Fig. 2. The arm T is turned, as indicated in broken lines, until it comes against, say, the right-hand end of the stirrup. The turning of the arm, continuing, will start the valves to the right, and after they are so started the reaction produced by the inflow of water coming upon the reverse side of the valve R will at once throw the valve to its opposite seat, carrying with it the outlet-valves, the one away from and the other to its seat. This throw or movement of the valve is permitted independent of the arm T, because of the freedom which the stirrup has about the arm, as, when the valves are so started, the arm is only bearing upon the stirrup toward the desired movement of the valve, and so soon as that movement is started the open space on the reverse side of the arm permits the valve to be thrown by the action of the water, so that the arm cannot hold the valves at any intermediate point between their open and closed condition, which it might do were the connection between the rod and the arm made close. The result of this action of the valves is to at once place the valves on the one side wide open and closed upon the opposite side, or vice versa, an intermediate or partly-open position being impossible.

The operation of the valve may be made automatic—that is, may be produced by the piston—as, for illustration, suppose a lever, 3, hung at one end of the cylinder, and a like lever, 4, at the opposite end, one arm of each lever extended through its respective end of the cylinder and so that the valve as it approaches the end of the cylinder may strike that arm and thereby turn the lever, the other arm of the lever having an extension into the valve-shell so as to bear against one end of one of the valve-rods, say L, as seen in Fig. 4. Hence, as the piston approaches one end, the valves will be reversed to throw the flow to that end and open the outflow from the opposite end. There must, however, be the same freedom of the valves between the action of the respective arms of the levers, as shown, so that movement of the valves will be simply started by

the levers, but completed by the flow of water independent of the levers.

I claim—

1. The combination of the cylinder A, having an opening, *a*, at one end and *b* at the opposite end, the piston D, arranged in said cylinder, free to travel from end to end, the valve shell E, tubes or pipes connecting the respective ends of the cylinder with the corresponding ends of the said shell, the said valve-shell constructed with an inlet-chamber, P, having valve-seats *i l* at the opposite ends of the said chamber, and also constructed with the outlet-chamber S, having valve-seats *m n* at the opposite ends of that chamber, the valve-seats in the two chambers being in parallel planes, the valve-rod L, extending through the inlet-chamber P, the double-ended valve R, arranged on said valve-rod L, adapted to close either of said seats *i l*, the valve-rod M, extending through the outlet chamber S, carrying valves *r t*, corresponding, respectively, to the valve-seats *m n* in the outlet-chamber and adapted to alternately close their respective seats, the said two valve-rods connected so that a movement imparted to the one will be imparted to the other, and whereby the flow of water to and from the cylinder may be alternately changed to or from the opposite sides of the piston, substantially as described.

2. The combination of the cylinder A, having an opening, *a*, at one end and *b* at the opposite end, the piston D, arranged in said cylinder, free to travel from end to end, the valve-shell E, tubes or pipes connecting the respective ends of the cylinder with the corresponding ends of the said shell, the said valve-shell constructed with an inlet-chamber, P, having valve seats *i l* at the opposite ends of the said chamber, and also constructed with the outlet-chamber S, having valve-seats *m n* at the opposite ends of that chamber, the valve-seats in the two chambers being in parallel planes, the valve-rod L, extending through the inlet-chamber P, the double-ended valve R, arranged on said valve-rod L, adapted to close either of said seats *i l*, the valve-rod M, extending through the outlet-chamber S, carrying valves *r t*, corresponding, respectively, to the valve-seats *m n* in the outlet-chamber and adapted to alternately close their respective seats, the said two valve-rods conuected so that a movement imparted to the one will be imparted to the other, the valve-rod M constructed with a stirrup, 2, a shaft, U, carrying the arm T, the said arm extending into the said stirrup, the opening in the stirrup being greater than the width of the arm, the said shaft adapted to be turned to throw the said valves toward and from their respective seats, substantially as described.

HENRY S. LORD.

Witnesses:
JOHN C. ABBOT,
HENRY E. HASTING.