

Sept. 21, 1926.

A. N. PASMAN

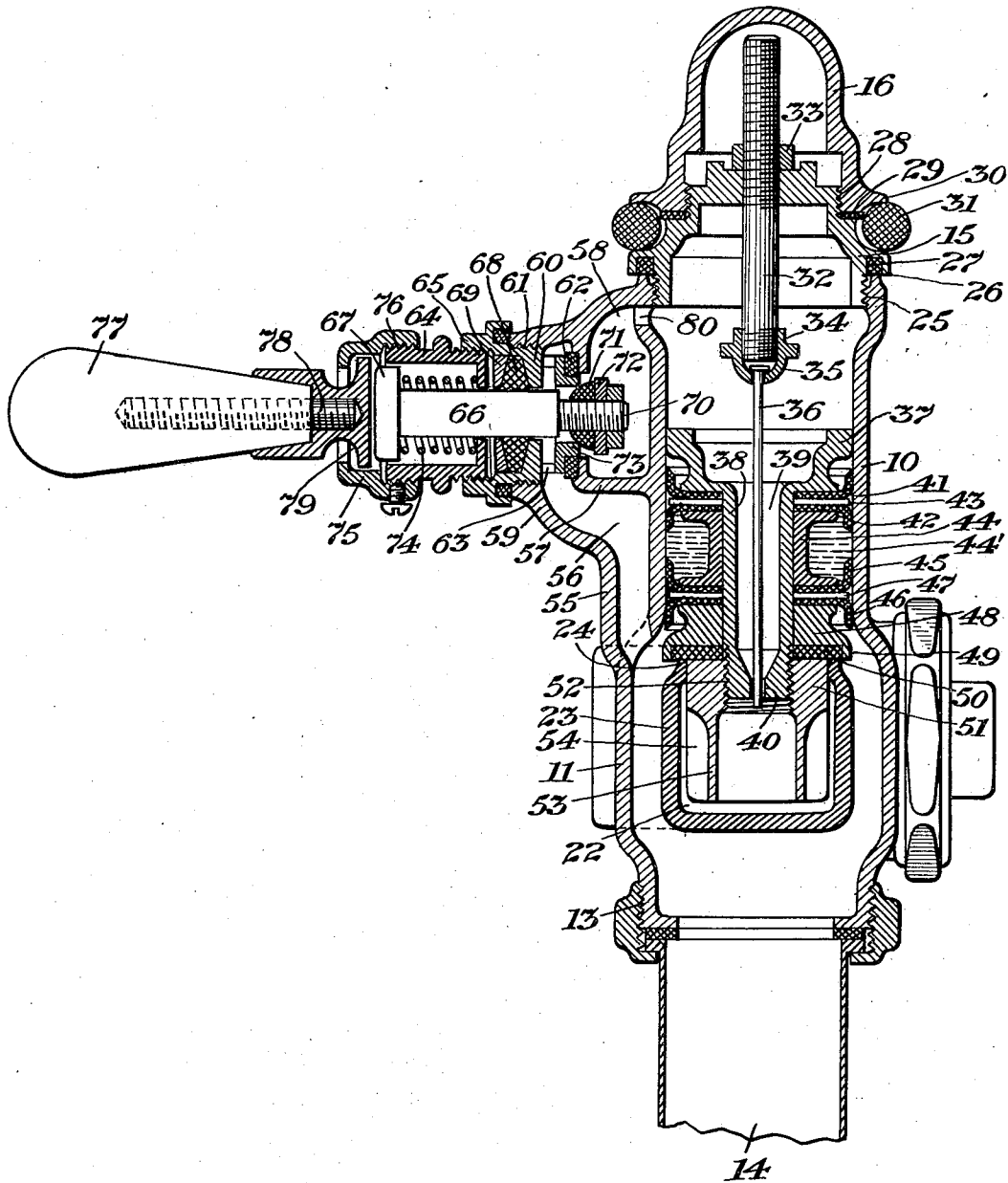
FLUSHOMETER

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2 Sheets-Sheet 1

Fig. 1



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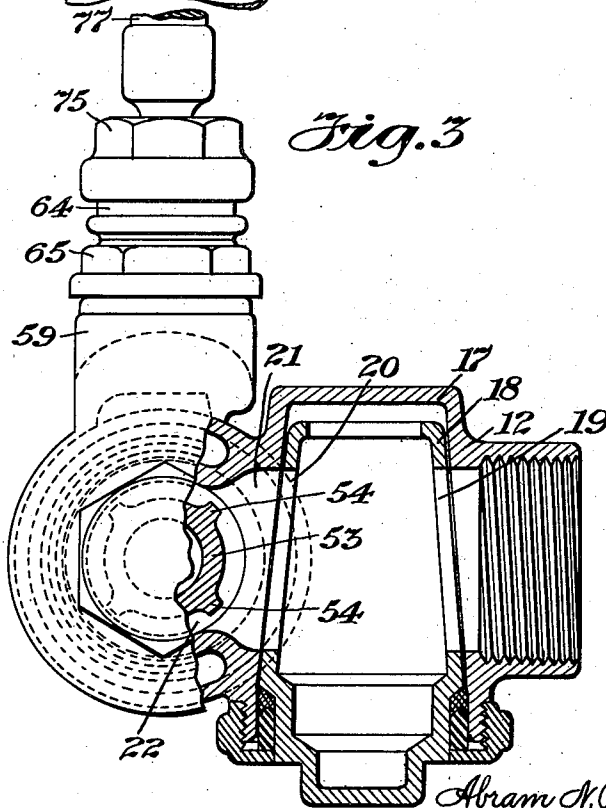
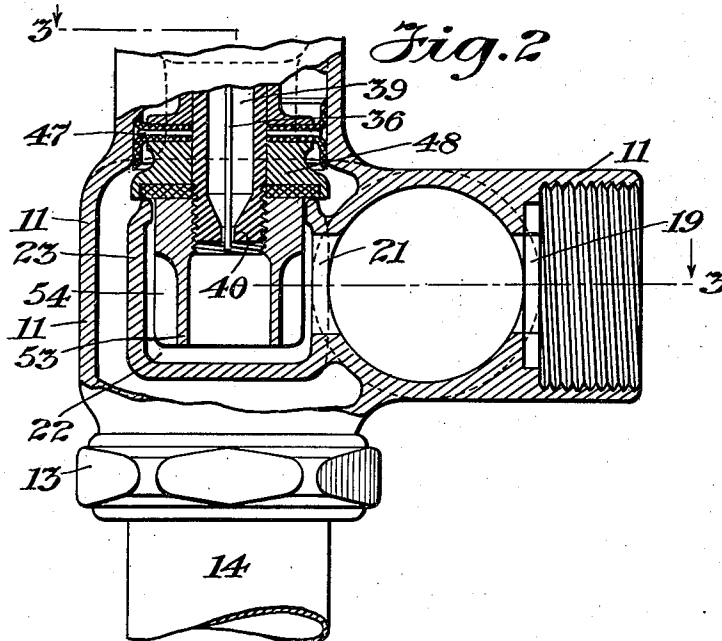
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FLUSHOMETER

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2 Sheets-Sheet 2



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FLUSHOMETER.

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My present invention relates to a flushometer or flush valve of the type adapted to provide a predetermined flow of water as may be required to flush toilets, urinals and similar fixtures. The invention furthermore relates to that type of flushometer in which the valve is controlled by a piston operated by the pressure of the water in the supply leading to the flushometer. In this type of flushometer the valve is normally maintained in a closed position by the pressure of the water or other fluid entrapped between the piston and the adjacent end of the casing of the device, suitable means being employed to release the entrapped liquid to permit the pressure in the supply pipe to move the piston to open the valve and when the releasing device is returned to its normal position to permit the accumulation of liquid between the piston and the adjacent end of the casing to automatically return the piston to its normal position and thereby close the valve. In this type of valve means are also commonly provided for regulating the quantity of the water permitted to flow at each of operation of the device for causing the valve to seat without producing a hammer or noise due to quickly closing the valve against a relatively high pressure and also to provide for an after or auxiliary flow to provide for a so-called refill in the toilet or other fixture to be flushed. The type of valve to which the invention generally relates is shown and described in the following Letters Patent No. 1,035,898, August 20, 1912; No. 1,074,379, September 30, 1913, and No. 1,077,745, November 4, 1913.

In this type of flushometer as heretofore constructed it has been customary to employ cup leather washers or similar devices associated with the piston to cause the same to make an operatively tight joint between the same and the walls of the cylinder forming part of the casing in which the piston operates. At one end of the piston these cup leather washers are always in contact with the water or other liquid employed with the apparatus and consequently no difficulty is experienced in maintaining these cup leather washers in proper operative condition. At the other end of the piston, however, the cup leather washers are only in contact with the water or other

liquid when the apparatus is operated and consequently the tendency of these washers is to dry out and stick or wedge in the cylinder so that considerable difficulty has been experienced in maintaining these latter named cup leather washers in proper operative condition. The object of my present invention is to overcome this difficulty and to provide a means for lubricating the walls of the cylindrical portion of the casing so as to not only lessen the friction between the piston and the cylinder, but also to maintain all the cup leather washers or similar devices employed in such condition that they will operate satisfactorily for an indefinite period of time. To this end in carrying out the invention I employ devices associated with the piston for providing a chamber for the reception of a suitable semi-fluid lubricant for the purposes hereinbefore indicated and as will be hereinafter more particularly described.

In the drawing:

Fig. 1 is a central longitudinal section illustrating a flushometer made in accordance with my present invention.

Fig. 2 is a similar view showing the parts in the position at right angles to that indicated in Fig. 1, and

Fig. 3 is a sectional plan on line 3—3, Fig. 2.

Referring to the drawing the flushometer made in accordance with this invention preferably comprises the usual casing 10 which has an enlarged inlet section 11 and an inlet connection 12 and an outlet connection 13 to which latter there is suitably secured a discharge pipe 14. The inlet connection is preferably at the side of the casing and the outlet connection at one end thereof, the opposite end of the casing being provided with a head 15 and a cap 16, to both of which reference will be hereinafter further made.

In the inlet connection adjacent the wall 11 there is a conical wall 17 adapted to receive an inlet valve 18 in which there are oppositely disposed ports 19 and 20, the latter being adjacent the opening 21 in the wall 11 and leading directly to an inlet chamber 22 made by the walls 23, at the upper or outer end thereof there is a valve seat 24 surrounding the discharge from the chamber.

A portion of the head 15 is screw threaded as indicated at 25 so as to be connected in the tapped upper or outer end of the casing 10. This head is also provided with a flange 26 having a recess therein for the reception of a gasket 27 adapted when the head is turned to position to contact with the upper or outer end of the casing to make a tight joint between these parts. The opposite end of the head 15 is also screw threaded as indicated at 28 in order to receive the cap 16 to secure these parts in position with an intermediate gasket 29 for making a tight joint between them. Although in some forms of the invention it is not necessary in the structure as illustrated the cap 16 is flanged as indicated at 30 to provide for a gasket 31 which is circular in cross section and is fitted between the flange 30 on the cap 16 and the outer portion of the flange 26 on the head 15.

The apparatus includes a rod 32 which passes through a centrally disposed tapped opening in the head 15 so as to be adjustable to position longitudinally therein and which may be secured in an adjusted position by means of a lock nut 33 or otherwise. At the inner end of the rod 32 the same is provided with a stop nut 34 and this stop nut 34 preferably has a round head 35 with a centrally disposed opening therein for the reception of a pin 36 which extends through the opening and is maintained in position relatively to the stop nut by means of the head of the pin lying within the circular head of the nut and between the same and the adjacent end of the rod 32, the function of which parts will be hereinafter described.

In the cylinder 10 there is a piston 37. Associated with the piston 37 and forming part thereof is a cylindrical member 38, the passage through which is indicated at 39. At the lower or inner end of the cylinder 38 the passage terminates in a port 40 of materially decreased diameter. The pin 36 passes through this port 40 and the diameter of the pin is appreciably less than the diameter of the port. Fitted over the cylinder 38 there are pairs of spaced cup leather washers. The pair of washers adjacent the piston head 37 are indicated at 41 and 42 and between the same there is a spacer washer 43. The other set of cup leather washers are indicated at 45 and 46 and are provided with an intermediate spacer washer 47. On the cylinder 38 and between the cup leather washers 42 and 45 there is a drum or spool 44. This spool 44 provides a means for spacing the inner adjacent cup leather washers and also provides a chamber 44' for a semi-fluid lubricant, such for example as vaseline, although it will be understood any suitable form of a grease lubricant may be employed. Also on the cylinder 38 there is a valve collar 48 pro-

vided with a flange 49 and a recess for the reception of a valve 50 adapted when the parts are in their normal position as indicated in Fig. 1 to bear against the valve seat 24. The valve collar and the sets of cup leather washers with the intermediate spool are maintained in position on the cylinder 38 by a removable piston head 51, the inner or lower end of the cylinder being exteriorly screw threaded as indicated at 52 to receive the piston head 51 which may be turned down thereon sufficiently far to force and maintain the members hereinbefore enumerated in their proper positions on the cylinder. The wall of the piston head 51 is indicated at 53 and in this wall there are suitably spaced longitudinal ribs indicated at 54. The diameter of the piston head 51 and the distance between the oppositely disposed ribs 54 is approximately equal to the diameter of the discharge opening from the chamber 22 so that in reseating the valve by a return movement of the piston and associated parts the piston head enters the discharge opening in the chamber 22.

The casing is also provided with a wall 55 making provision for a passage 56 between the same and the adjacent portion of the cylindrical wall 10. Also connected to the cylindrical wall is an internal wall 57 making provision for a chamber 58 in which the control valve hereinafter described is located. In the wall 55 there is a boss 59 having a tapped opening therein adapted to receive a gland 60, the screw threaded end of the gland being indicated at 61. At its inner end the gland is fitted with a gasket 62 adapted to surround the discharge opening in the wall 57 and to make a tight joint between the inner end of the gland and this wall. In this portion of the gland also there is a passage or port 63 by means of which when the control valve is open there will be an open communication between the passage 56 and the chamber 58. I also employ a plunger cylinder 64 adapted to be received in a tapped outer end 65 of the gland 60. In this plunger cylinder 64 there is a plunger 66, the head 67 of which operates in the plunger cylinder. The plunger 66 passes through the gland 60 and also through a packing 68 therein which is maintained in position as illustrated by a suitable washer 69 extending between the outer portion of the packing and the base of the plunger cylinder 64, although it will be understood that other suitable means may be employed as a stuffing box for the plunger 66. The inner end of the plunger is of reduced diameter as indicated at 70 and extends into the chamber 58. The plunger is preferably screw threaded and adapted to carry a control valve 71 which is maintained in position on the reduced end of the plunger by nuts 72 or otherwise. In its closed posi-

tion the control valve 71 is adapted to bear against a seat 73 provided therefor at the inner end of the gland 60. The control valve is normally maintained in this seated position by means of a spring 74 surrounding a portion of the plunger 66 and extending between the base of the cylinder 64 and the plunger head 67.

Fitted over the outer end of the plunger cylinder 64 is a cap 75 which is tapped so as to be turned down on the outer screw threaded portion 76 of the plunger cylinder. The plunger is operated by means of a handle 77 suitably connected in a socket member 78 adapted to pass through an opening in the cap 65 and to have the base 79 of the socket contained and operative within the cap so that by the movement of the handle the base 79 will bear against the plunger head to force the same inwardly against the action of the spring 74 and thereby move the control valve 71 from its seat. In the wall of the casing there is also a port 80 making communication between the interior of the cylinder and the chamber 58.

In the operation of this apparatus the parts are normally in the position shown in the drawing and in this position the water or other liquid employed with the device acts against the inner end of the piston but the piston is maintained in position by the water or other liquid entrapped between the same and the upper or outer end thereof filling the chamber between this end of the piston and the cylinder head and also filling the chamber 58. As is customary in this type of apparatus when the operating handle is moved to shift the plunger and unseat the control valve 71 the liquid entrapped is released and permitted to flow through the port 80, through the chamber 58, around the control valve, and through the port 63, through the passage 56 and thus to the discharge. When the entrapped liquid is thus released the pressure at the inlet end of the flushometer forces the piston upwardly or outwardly thereby opening the valve 50 and permitting the water to flow from the inlet to the outlet connection. The extent of the movement of the piston and consequently the quantity of water under a given pressure permitted to flow is controlled by the position of the stop nut 34 which prevents the piston from moving further than that position in which it contacts with the nut. When the handle is released and the control valve returned to its normal position the water or other liquid under pressure passes through the port 40 and gradually accumulates in the chamber at the opposite end of the piston thereby forcing the piston in the opposite direction until finally the valve 50 is reseated shutting off the communication between the supply

or inlet and discharge connections of the apparatus. In this structure the gradual reseating of the valve is accomplished by the construction of the piston head 51 inasmuch as after the inner end of the same has entered the chamber 22 the effective pressure from the inlet connection will be decreased progressively until the valve is reseated as will be readily understood. It will also be understood that in the apparatus described due to the chamber provided for the lubricant that each time the piston is operated it will lubricate the walls of the cylinder and because of this lubricated condition all the cup leather washers or other devices associated with the piston will be maintained in operative condition thereby making the operation of the piston more positive due to a decrease in the friction between the moving parts and also preventing the piston from becoming wedged or otherwise inoperative.

I claim as my invention:

1. In a flushometer, a casing, a piston therein having a portion of reduced diameter, sets of washers fitting over the reduced portion of the piston, a spacer device also fitting over the reduced portion of the piston and spacing the said sets of washers and also providing an annular chamber for a lubricant between the said sets of washers, and means for securing the sets of washers and the spacing device in position on the reduced portion of the piston.

2. In a flushometer, a casing, a piston therein having a depending portion of reduced diameter, sets of washers fitting over the reduced portion of the piston, a spool also fitting the reduced portion of the piston and spacing the sets of washers and providing an annular chamber for a lubricant between the said sets of washers, and means for securing the sets of washers and the said spool in position on the reduced portion of the piston.

3. In a flushometer, a casing, a piston therein having a reduced depending portion, a pair of washers fitting over the reduced portion of the piston, means for spacing the said pair of washers, a second pair of washers also fitting over the reduced portion of the piston, means for spacing the second pair of washers, a spool also fitting over the reduced portion of the piston for spacing the said pairs of washers and providing an annular chamber for containing a lubricant, and means for securing the said pairs of washers and the intervening spool in position on the reduced portion of the piston.

4. In a flushometer, a casing, a piston having a depending portion of reduced diameter, a pair of washers fitting over the reduced portion of the piston, a spacer between the said pair of washers, a second pair

of washers also fitting over the reduced portion of the piston, a spacer between the said second pair of washers, a spool fitting over the reduced portion of the piston and extending between the adjacent members of the said pairs of washers and providing an annular chamber for a lubricant, and means for securing the said pair of washers, the spacers between the same and the said spool in position on the reduced portion of the said piston. 10

Signed by me this 1st day of May, 1923.

ABRAM N. PASMAN.