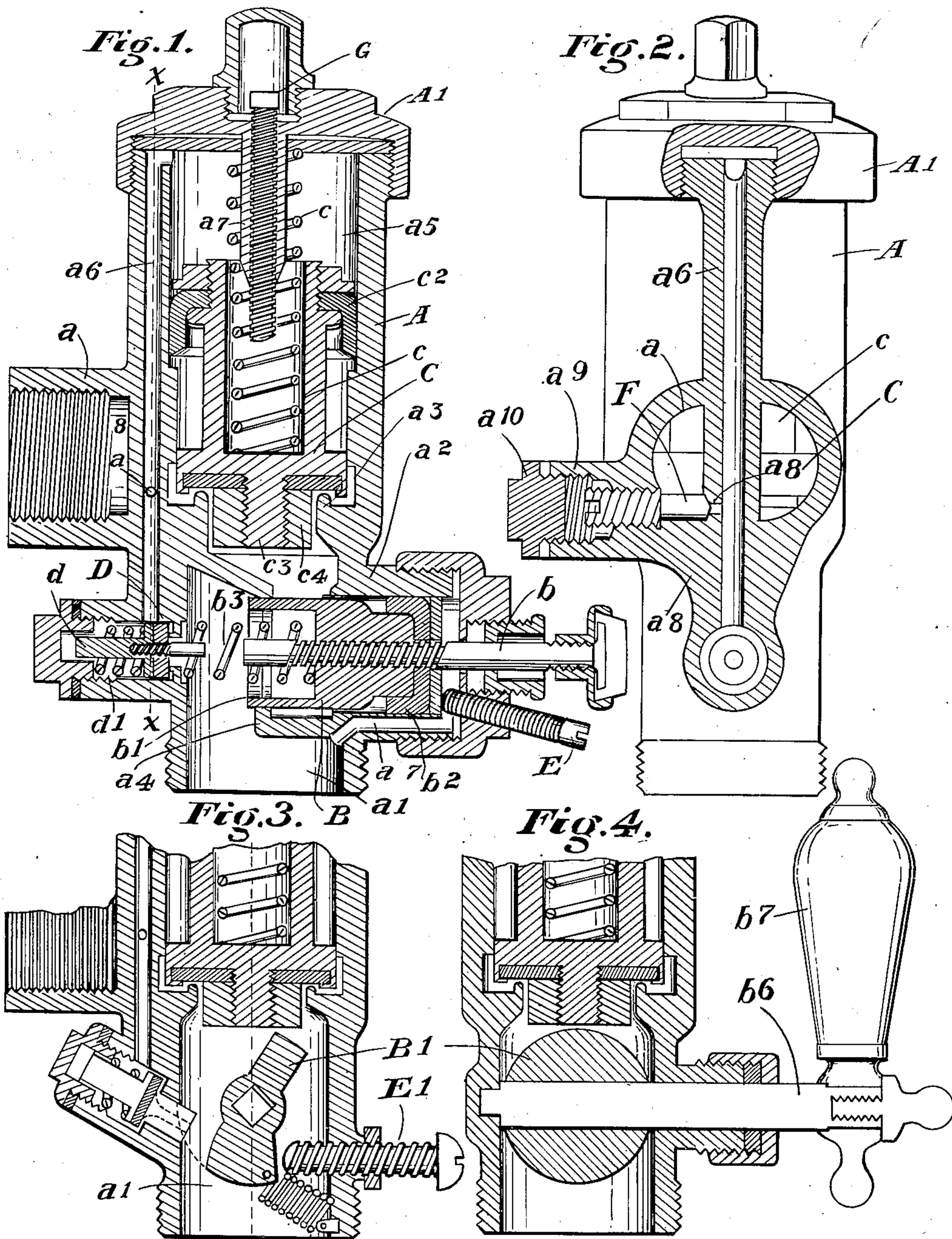


912,597.

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WITNESSES:

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FLUSH-VALVE.

No. 912,597.

Specification of Letters Patent.

Patented Feb. 16, 1909.

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To all whom it may concern:

Be it known that I, DANIEL W. McNEIL, a citizen of the United States of America, and resident of Cincinnati, county of Hamilton, State of Ohio, have invented certain new and useful Improvements in Flush-Valves, of which the following is a specification.

My invention relates to the class of flushing valves in which the valve controls the flow of water from the main supply pipe and thus dispenses with the auxiliary reservoir, or tanks, located adjacent to the device to be flushed.

It is the object of my invention to provide a flush valve wherein the main valve will rise to a predetermined distance from its seat when the flush valve is actuated, in which the position of the operative valve may be regulated to determine the rate of discharge of the flush valve, and in which the proper relative flow of the water for flushing and for the afterflow is obtained readily for varying pressures in the mains. This object is attained by the means described in the specification and illustrated in the accompanying drawings, in which,

Figure 1 is a central sectional view of a flush valve embodying my invention. Fig. 2 is a sectional view taken upon line $x-x$ of Fig. 1, the release valve being omitted. Fig. 3 is a detail sectional view showing a modified form of the release valve and of the hand-operated valve. Fig. 4 is a sectional view of the same taken upon line $y-y$ of Fig. 3.

The housing, A, of the valve has an inlet opening, a , which is to be connected to the main supply pipe of the water, an outlet, a' , which is to be connected to the pipe leading to the device to be flushed, an annular extension, a^2 , within which is located the push rod, b , of the hand-operated valve, B. Within the main chamber of the housing is an annular seat, a^3 , against which the main valve, C, is seated. The main valve, C, has a tubular valve stem, c , within which is seated a coiled spring, c' , which bears at the other end against the cap, A' , of the housing. The tubular valve stem carries a cup washer, or piston, c^2 . The main valve, C, is seated in alinement with the inlet opening, a , so that the water from the inlet may surround the main valve and take under the cup, or piston, c^2 . Cap, A' , has an inwardly projecting central stud, a^7 , which has a central internally screw-threaded bore, within which is seated

a set-screw, G, the position of which limits the upward movement of the main valve, C. Main valve, C, has a downwardly projecting screw-threaded stud, c^3 , upon which is secured a nut, c^4 , which projects into the outlet passage, below the main valve when the same is seated, so as to stand adjacent to but not to contact the walls of the outlet passage below the valve seat, a^3 . Below the seat, a^3 , the housing, A, is divided by a central diaphragm, a^4 , which is perforated to pass the wings, b' , of the hand-operated valve, B, and against which diaphragm the valve, B, is seated when the push rod, b , is forced inward. Valve, B, has a cup washer, b^2 , which contacts the walls of an annular extension, a^2 , of the housing. The outer end of the chamber formed by extension, a^2 , has a channel, a^{17} , connecting it with the discharge, a' . The valve, B, is held normally away from the diaphragm, a^4 , by a coiled spring, b^3 . The relative normal position of the valve, B, to the diaphragm, a^4 , is regulated by a set-screw, E. Upon the side of the main chamber, a^5 , a release channel, a^6 , is formed to extend from the top of the chamber, a^5 , and to terminate in the outlet, a' . The opening of the channel, a^6 , into the discharge, a' , is controlled by a release valve, D, whose valve stem, d , is in axial alinement with the push rod, b , of the valve, B. The valve, D, is held normally to its seat by a coiled spring, d' . The walls of the channel, a^6 , intersect the inlet channel, a , and have a port, a^8 , leading into the inlet channel, a . The size of the port, a^8 , is regulated by a screw-plug, F, to house which, the housing, A, has a rearward extension, a^9 , closed by a cap, a^{10} , which may be removed for the purpose of regulating the position of the plug, F.

The operation of the device is as follows: The normal, or closed position of the valve is illustrated in Fig. 1. In this position the water from the mains surrounds the main valve, C, and fills the chamber, a^5 , upon both sides of the cup, c^2 , the part of the chamber above the cup, c^2 , having been filled by the water from the inlet passing in through the opening, a^8 , through the channel, a^6 . When the push rod, b , is actuated by hand it carries the valve, B, to its seat against the diaphragm, a^4 , thus temporarily closing the outlet passage, a' , below the valve-seat, a^3 , and bringing the valve stem, b , into contact with the valve stem, d , thereby raising the release valve, D, from its seat. Thereupon the

water in the chamber, a^5 , above the cup, c^2 , is put into communication with the outlet, or discharge, a' , through the channel, a^6 , and the pressure of the water in the chamber, a^5 , below the cup, c^2 , will throw the main valve, C, completely from its seat and carry it upward until the movement away from its seat is limited by its coming into contact with the regulating screw, G. The main valve will always be carried upward until it meets the regulating screw, G, for the reason that when the rod, b , is pushed inward, the hand-operated valve, B, closes the discharge so as to prevent any release of pressure beneath the main valve, C, at the same time that the pressure is released above the cup, or piston, c^2 . As soon as the rod, b , is released by the person actuating the same, the spring, b^3 , carries the valve, B, away from its seat, and the water from the inlet, a , passes into the outlet, a' , through the wings, b , of the valve, B. The rate of discharge depends upon the relative position of the valve, B, to the diaphragm, a^4 , which is regulated according to the pressure in the mains, by means of the screw, E. As soon as the stem, d , is released by the stem, g , valve, D, assumes its seat and the water passes into channel, a^6 , through the port, a^8 , passes into the top of the valve chamber, a^5 , and as this chamber fills with water above the cup, c^2 , carries the main valve, C, towards its seat. The length of time which is consumed in filling the chamber, a^5 , above the cup, c^2 , is regulated by the position of the plug, F, so that by a regulation of the position of the hand-operated valve in the discharge channel, a' , and of the size of the port, a^8 , in the release channel, a^6 , the rate of discharge and the length of time the water will run are determined. The flow of the water from the inlet, a , to the outlet, a' , while the projections, c^3 , c^4 , of the main valve, C, are well above the valve seat, a^3 , is the stronger flow known as the flushing flow. After the projections, c^3 , c^4 , have entered the port below the valve seat, a^3 , the flow is lessened and is known as the after-flow.

In order to regulate the length of the flush without unduly lengthening the time of after-flow, I have provided the set-screw, G, by means of which it is seen that the distance the main valve, C, is raised from its seat may be regulated, so as to regulate the length of the flushing operation, without affecting the after-flow.

In the modifications shown in Fig. 3 and Fig. 4, instead of having a reciprocating valve to be operated by hand, I have shown a rotating, or butterfly valve, B', the rotation of which will bring it into contact with a release valve, b^4 . The butterfly valve, B', is held in its normal position by a coiled spring, b^5 . When the butterfly valve, B', is in a more inclined position in relation to the walls

of the outlet, a' , it limits the orifice thereof and when it is in its more axial position in relation to the outlet, a' , it enlarges the orifice. The normal position of the butterfly valve, B', is regulated by a set-screw, E'. When it is desired to actuate the flush valve for this form of hand-operated valve, its valve stem, b^6 , is rotated by grasping the handle, b^7 .

What I claim is:

1. In a flush valve the combination of a housing having an inlet and an outlet opening, a valve seat in the housing between the inlet and outlet openings, a main valve in the housing, means of conveying the pressure of water from the inlet to the valve so that the pressure of fluid tending to hold it to its seat is greater than that tending to raise it from its seat, a release channel in the housing leading into the outlet opening for releasing the pressure of the fluid holding the main valve to its seat, a release valve to control the opening of the release channel, a means to be moved by a person for actuating the release valve and so positioned that when contacting the release valve it limits the orifice between the main valve and the outlet and permits the discharge of the release channel into the outlet, thereby insuring a full lift of the main valve from its seat.

2. A flush valve having an inlet, a discharge, a main valve, means whereby when the main valve is seated the pressure of the fluid tending to hold the valve to its seat is greater than that tending to lift it and a release valve for relieving the pressure of fluid upon one side of the main valve to raise it from its seat, in combination with a third valve to be moved by a person for actuating the release valve, said third valve being located in the discharge outlet and means for regulating the position of the third valve in the discharge outlet to control the rate of discharge of the fluid.

3. In a flush valve which is provided with means of conveying unequal pressures from the inlet to the main valve, the greater pressure tending to hold the valve to its seat and the lesser to carry the valve from its seat, the combination of a release channel leading into the discharge outlet of the valve, a release valve in the channel for controlling the fluid pressure tending to hold the main valve to its seat, a third hand operated valve located in the discharge outlet and adapted to actuate the release valve and open the release channel to the discharge outlet and to limit the outlet of the main valve simultaneously, to insure a full lift of the main valve.

4. In a flush valve the combination of a housing having a main valve chamber, a valve seat in one end of the main chamber, an inlet opening upon one side of the seat,

a discharge opening upon the other side, a
release channel connecting the outlet open-
ing with the end of the chamber opposite
the end in which the valve seat is located, a
5 port connecting the inlet opening with the
release channel, a means for regulating the
size of said port, a main valve within the
chamber, a release valve located at the
point where the release channel enters the

outlet opening, a third valve located in the 10
outlet and to be operated by a person to
contact the release valve, and a means of
regulating the position of the third valve in
the outlet to change the size of the outlet.

DANIEL W. McNEIL.

Witnesses:

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AGNES McCORMACK.