

Filed Oct. 22, 1945

VACUUM BREAKING AND DUMP VALVE

2 Sheets-Sheet 1

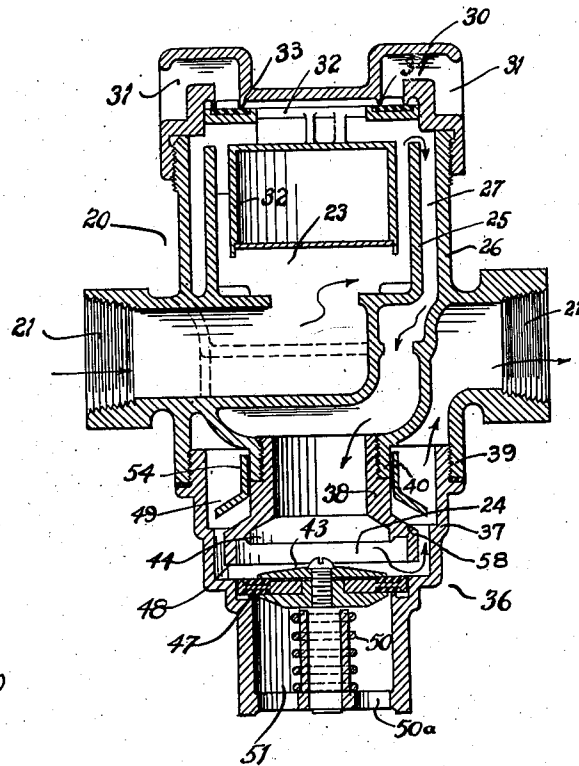


Fig. 1

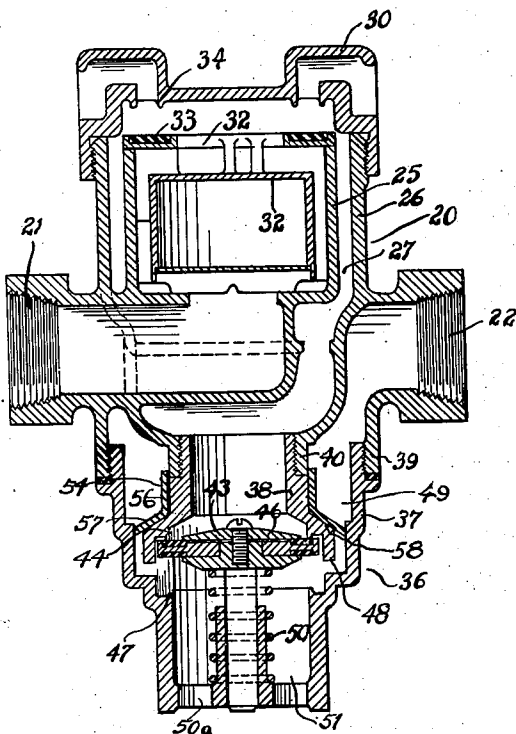


Fig. 2

INVENTOR.
DWIGHT M. ANDERSON
BY
Hyde and Meyer
ATT'YS.

June 14, 1949.

D. M. ANDERSON

2,472,933

VACUUM BREAKING AND DUMP VALVE

Filed Oct. 22, 1945

2 Sheets-Sheet 2

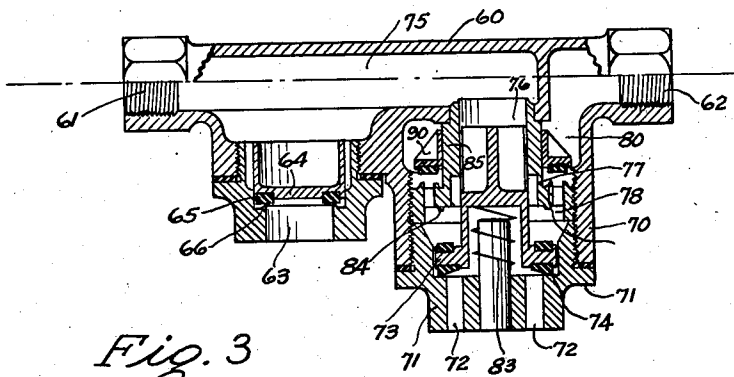


Fig. 3

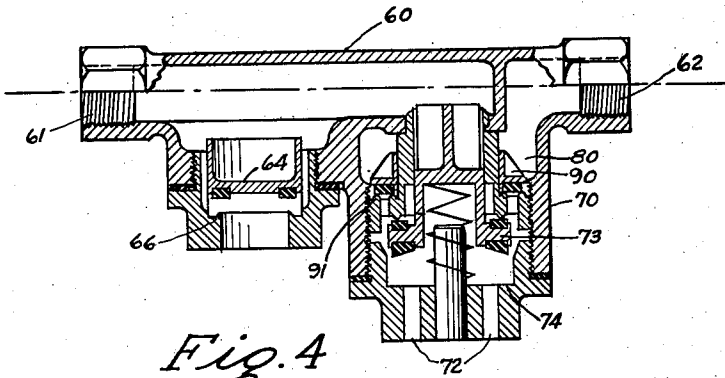


Fig. 4

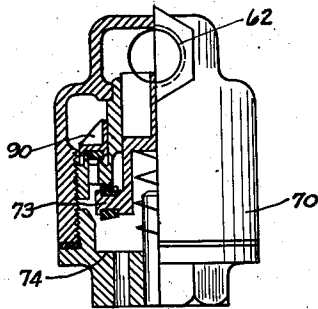


Fig. 5

INVENTOR
DWIGHT M. ANDERSON
BY

Hyde and Meyer
ATTY'S.

UNITED STATES PATENT OFFICE

2,472,933

VACUUM BREAKING AND DUMP VALVE

Dwight M. Anderson, South Euclid, Ohio

Application October 22, 1945, Serial No. 623,833

5 Claims. (Cl. 277-50)

1

The invention relates to fluid valve structures, and more particularly to valve structures comprising a combined vacuum break and dump valve assembly.

The invention will be herein described in relation to the behavior of a water pressure distributing system serving a building or the like.

It is well known to those skilled in the art that when there is a failure of pressure or a substantial drop in pressure in the mains serving a building, and particularly a building of substantial height, the recession of water in the pipes produces a partial vacuum which may result in several undesirable effects. For example, there may be a buckling or partial collapse of thin walled piping. More usually, at outlets where the water happens to be running at the moment of failure of pressure, such as in wash bowls, toilet bowls, or similar appliances, there is a strong suction which reverses the fluid flow, and may draw contaminated water back into the inlet piping or mains. This is particularly likely when a flexible hose connection, attached to an open faucet has its free end lying at the bottom of a wash bowl, bath tub, or the like.

For these and other reasons sanitary codes usually require that the water system serving buildings be provided with a vacuum break valve of some sort to vent the system to atmosphere on pressure failure.

In addition to the precautions above noted, it is desirable that means be provided for discharging the water in the building supply piping to a dump or sewer outlet at the time of pressure failure, so as to prevent all possibility of contamination and leave the system free and clean so that it may be in readiness for the renewal of pressure.

An object of the invention, therefore, is the provision of a novel and improved valve structure which automatically vents to atmosphere when there is a failure or substantial drop of pressure in the mains, while simultaneously providing outlet means for permitting the water in the building to drain to a sewer or otherwise.

Another object of the invention is to provide a vacuum break valve assembly comprising means to prevent flooding of the air vent in the vacuum break valve, and leakage out of the air vent valve, by water from the building system even when the vacuum break valve is disposed on one of the lower floor levels.

While the invention will be specifically described as adapted to the control of the water system for a building, it is apparent that the advantages of the invention may be achieved in fluid pressure distributing systems of other types, suitable modifications being apparent to those skilled in the art without departing from the

2

spirit and purpose of the invention as herein described and defined in the appended claims.

In the drawings which accompany this specification:

Fig. 1 is a vertical sectional view through a vacuum break and dump valve embodying my invention;

Fig. 2 is a vertical sectional view similar to Fig. 1 but showing the operating parts in a different operating position;

Fig. 3 is a vertical sectional view through a vacuum break and dump valve representing a somewhat modified form of my invention;

Fig. 4 is a view similar to Fig. 3, but showing the operating parts in a different operating position;

Fig. 5 is a view partly in section, partly in end elevation, of the valve assembly shown in Fig. 4.

The drawings show a vacuum break and dump valve efficiently combined in a single housing.

The housing comprises a hollow body member indicated generally by reference character 20, and having an inlet port 21 in communication with the water supply main (not shown) and a service port or outlet port 22 in communication with a building plumbing system (also not shown). In its progress from said inlet port to said service port as indicated by the arrows in Fig. 1, the water passes through a vent chamber 23 and a dumping chamber 24, the construction and operation of said chambers being more specifically described below.

Referring to Figs. 1 and 2 the body member is provided with a pair of annular walls, concentrically disposed, and consisting of an inner annular wall 25 defining central cylindrical chamber 24 above noted, and an outer annular wall 26, slightly higher than the said inner wall 25, said outer wall defining an annular chamber 27 through which the water flows after passage through the inlet port 21 and the vent chamber 23.

A vent cap 30 has a threaded connection with the upper, outer surface of wall 26 and a clearance space is provided between said cap and the top of the inner wall 25. The vent cap is provided with vent opening 31 in communication with the atmosphere, said opening being normally closed by a valve 32 freely carried for vertical movement on float 32'. This valve seats upwardly, and is normally in the closed position so long as pressure exists in the mains. The valve 32 has an annular facing 33 of resilient material adapted to contact an annular seat 34. When the water pressure fails, the valve drops to the position shown in Fig. 2; the peripheral edge of the annular valve coming to rest on top of the inner annular wall 25 thereby opening the port 31, and venting the system to atmosphere so as to prevent the development of a vacuum in the system.

Under normal conditions, as hereinabove noted

when the water enters the inlet port 21 and proceeds through the venting chamber 23, so as to urge valve 32 to closed position, the water flows over the top of annular wall 25 and through annular chamber 27 from which it proceeds downwardly into and through the dumping chamber 24 which will now be described in detail.

The dumping chamber is defined by a hollow plug member generally referred to by reference character 36. It comprises an outer roughly cylindrical wall 37 having a threaded connection with an outer cylindrical portion 39 of the valve body 20. A hollow plug 38 provides an inner cylindrical wall threaded into portion 40 of body 20. A double seated valve member 43 is carried by the lower portion of plug 36 and is spring biased to normally seat upwardly upon a seat member 44 carried by the inner cylindrical wall of plug 38. Under normal conditions, when pressure exists in the mains, the water pressure is effective upon the upper inner face 46 of the valve to force it downwardly, against spring bias, to seat upon an annular bead 47 carried on a shoulder on the interior of wall 37 thereby permitting the water to flow under the annular edge 48 of inner wall 38 and thereafter upwardly through the annular space 49 between the outer and inner walls 37 and 38 and thence to the service port 22 which is in communication with the building plumbing. When, however, there is a failure of pressure in the main, the spring 50, which seats on a spider 50a at the bottom of cap 36, moves the valve upwardly to its upper seat 44 thereby cutting off communication between the main at port 21 and the dumping outlet 51 in the lower portion of the plug 36. As a result the water in the building plumbing is urged by gravity to flow downwardly and inwardly through service port 22 and through the annular passage 49 to the dumping outlet 51.

If the building is of considerable height, the body of water in flowing rapidly past the lower edge of inner annular wall 38 and past the lower face of valve 43, may have a tendency to create sufficient suction to cause the valve 43 to open partially and permit some of the water from the building to enter the chamber 24. If such is the case, it will be apparent that when pressure is again resumed, this water, which may be contaminated, will flow again through the building plumbing. In order to prevent this undesired effect, I have provided an additional choke valve member 54 which floats freely in the space 49 surrounding wall 38. Said choke valve has a vertical annular portion 56, and depending therefrom, an outwardly extending flared portion 57. The annular portion has a sliding fit on the outer surface of wall 38 so that it may move upwardly or downwardly rather freely, responsive to water pressure either on the upper or lower surface of the flared portion 57 which lies in the path of water flow. Normally, that is to say when water is flowing into the building supply system, it moves choke valve 54 upwardly to permit free flow of water past the lower, outer periphery of the flared portion 57. However, when the main pressure fails, the water flowing from the building plumbing system to the dump outlet 51 impinges upon the upper surface of flared portion 57 moving it downwardly to its lowest position where it contacts with shoulder 50. When in this position the water flowing to the dump outlet is permitted merely to trickle past the outer periphery of flange 57, such flow being insufficient

to produce enough suction to unseat valve 43 from its upper seat 41.

It will be apparent that the dump valve 43 prevents water in the building system from flowing outwardly through vent 31, when pressure fails in the main, even though the valve housing 30 is disposed at one of the lower floor levels in the building, regardless of the pressure or absence of the dumping outlet 51.

Figs. 3, 4, and 5 illustrate another embodiment of my invention comprising a vacuum break valve and a dump valve. Referring to the drawings I show a fitting 60 having a water inlet port 61, and an outlet or service port 62. Projecting downwardly from the fitting is a vacuum break port 63 normally sealed by a downwardly seating valve 64 which has a resilient seating face 65 for contact with an up-turned bead 66 on the wall of the port 63. It will be apparent that when water from the main enters port 61 it maintains valve 64 in leak-proof relationship with valve seat 66, but if pressure fails in the main, atmospheric pressure unseats valve 64 and relieves the vacuum developed on pressure failure.

Associated with the vacuum break valve is a dump valve assembly housed in another projecting part 70 of the fitting, said projecting portion is of hollow cylindrical form internally in communication with the water inlet port 61. A plug 71 has a screw threaded connection with projecting part 70, and the plug is provided with one or more externally opening apertures 72 constituting dumping ports. Plug 85 also is threaded into part 70 and is provided with ports 79 extending through its outer annular flange. A double seated valve 73 is normally maintained on its lower seat 74 by water pressure in the fitting, so as to permit the water to flow to the outlet port 62 through the passages 75, 76, 77, 78, 79, and 80. On failure of pressure in the main, the spring 83 biases the valve 73 upwardly (Fig. 4) to seat at 84 on plug 85, thereby closing passage 77 to prevent possible back-flow of contaminated water through service port 62. The structure simultaneously permits the water in the building to flow outwardly through dumping ports 72.

When a structure of the nature just disclosed is situated on a lower floor of a building, failure of main pressure while a water outlet is open as heretofore disclosed might induce a siphoning action by a rush of water to ports 72, entirely apart from the vacuum caused by drop of main pressure. In such case the action of valve 73 causes such siphoned water to be discharged to a sewer outlet, while at the same time sealing the passage between the building and the fresh water main. Even if dumping ports 72 are not present, upward seating of valve 73 effectively stops all siphoning action since it closes the outlet for fresh water.

It may be desirable at times to restrain or entirely prevent the discharge of water from the building water system serviced by port 62 (Figs. 1 to 3). As is apparent from the drawings, valve 73 has an upwardly extending stem portion or guide 73' which is movable vertically within the reduced upper cylindrical portion 85' of plug 85. Surrounding said reduced portion 85', and freely slidable vertically in passageway 80, is an annular valve 90 which is seatable downwardly on a seat 91, so as to substantially block retrograde flow of water from service port 62 through ports 79 whenever pressure drop in the main permits valve 73 to move upwardly to its seat 84.

As will appear from a study of Figs. 3 and 4,

as long as water is flowing under pressure from port 61 to port 62, its upward flow in passages 79 and 80 raises valve 90 to the position shown in Fig. 3. This permits water to flow to service port 62. When water pressure fails in the main, choke valve 90, under retrograde water pressure from the building system, drops to the position shown in Fig. 4. If restrained flow of water past valve 90 is desired, the seat 91 may be perforated, grooved, or otherwise arranged to permit water to trickle past seat 91 and leave by ports 79 and 72.

It is apparent, from a consideration of the structures herein illustrated and described, that there is a close cooperating relationship between the vacuum break valve and the dump valve shown in the several embodiments to such extent that while the vacuum break valve vents and breaks the vacuum resulting from pressure failure, the dump valve protects the vacuum break valve from flooding through gravity or siphoning.

What I claim is:

1. A device of the character described comprising in combination, a casing having a fluid inlet port in communication with a source of pressure fluid, and a fluid outlet port in communication with a system to be serviced, a passageway through said casing normally establishing communication between said ports, there being a vent opening to atmosphere from said passageway through said casing, a vent valve for said vent opening and biased to closed position by the pressure of fluid normally transmitted through said passageway, a dump opening in said casing disposed in said passageway between said vent opening and said outlet port, a dump valve for said dump opening, spring biased means engaging said dump valve in a direction tending to open said dump valve but said dump valve being normally maintained in closed position by the pressure of fluid normally transmitted through said passageway, whereby, when fluid pressure drops in said passageway, said vent valve and said dump valve open substantially simultaneously to respectively vent said passageway to atmosphere, and provide a dumping outlet for reverse fluid flow from said system.

2. A device of the character described comprising in combination, a casing having a fluid inlet port in communication with a source of pressure fluid and a fluid outlet port in communication with a system to be serviced, a passageway through said casing normally establishing communication between said ports, there being a vent opening to atmosphere from said passageway through said casing, a vent valve for said vent opening and biased to closed position by the pressure of fluid normally transmitted through said passageway, there being a dump opening in said casing disposed in said passageway between said vent opening and said outlet port, a valve seat in said passageway adjacent said dump opening and between said dump opening and said inlet port, a valve seat adjacent said dump opening, a dump valve disposed between the two said valve seats, said valve having opposed sealing faces wherewith in one position to maintain sealing contact with the seat in said passage so as to prevent reverse fluid flow through said passage towards said inlet port, and in the other position to establish sealing contact with the valve seat adjacent said dump opening so as to prevent fluid flow through said dump opening,

spring biased means engaging said dump valve in a direction tending towards sealing contact with the seat in said passageway, but said dump valve being normally maintained in sealing contact with the seat in said dump opening by the pressure of fluid normally transmitted through said passageway, whereby, when fluid pressure drops in said passageway, said vent valve opens to vent said passageway to atmosphere, and said dump valve moves from a position in which it seals said dump opening to a position in which it prevents reverse fluid flow through said passageway, but permits dumping of fluid from said system through said dump opening.

3. In a fluid pressure transmission and valving arrangement such as defined in claim 1, the combination therewith of choke valve means disposed in said passage between said dump opening and said outlet port, said choke valve means opening towards said outlet port whereby direct fluid flow towards said outlet port is permitted, but reverse fluid flow from said outlet port is inhibited.

4. In a fluid pressure transmission and valving arrangement such as defined in claim 1, the combination therewith of a choke valve seat disposed in said passage between said dump opening and said outlet port, a choke valve in operative relationship with said seat, and opening towards said outlet port to permit free flow towards said outlet port, and means providing limited clearance between said choke valve and its seat even when the choke valve is in seated position whereby reverse flow of fluid from said outlet port towards said dump opening is inhibited.

5. In a fluid supply system having a fluid inlet port in communication with a source of pressure fluid and a fluid outlet port in communication with a system to be serviced, a passageway normally establishing communication between said ports, there being a vent opening to atmosphere through the walls of said passageway, a vent valve for said vent opening biased toward closed position by the pressure of fluid normally transmitted through said passageway, there being a dump opening disposed in said passageway between said vent opening and said outlet port, a dump valve for said dump opening, spring means biasing said dump valve in a direction tending to open said dump valve, said dump valve being normally maintained in closed position by the pressure of fluid normally transmitted through said passageway and sufficient to overcome said spring means, whereby when fluid pressure drops in said passageway, said vent valve and dump valve open substantially simultaneously, respectively to vent said passageway to atmosphere and to provide a dump outlet for reverse fluid flow from said system.

DWIGHT M. ANDERSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,115,499	Salvoni	Apr. 26, 1938
2,259,984	Anderson	Oct. 21, 1941
2,310,586	Lohman	Feb. 9, 1943
2,325,956	Holtman	Aug. 3, 1943
2,399,996	Fitch	May 7, 1946