

July 7, 1959

L. C. LEVENTHAL

2,893,418

VACUUM BREAKERS FOR WATER SUPPLY SYSTEMS

Filed April 18, 1957

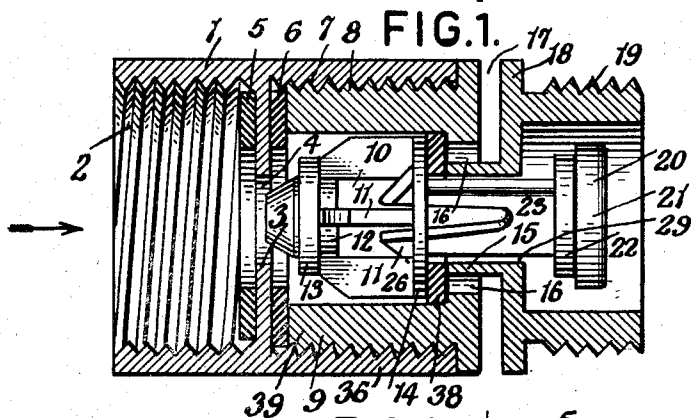
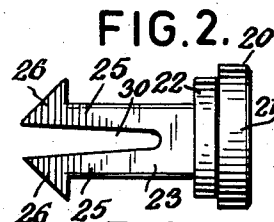


FIG. 3.

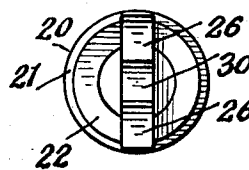


FIG. 5.

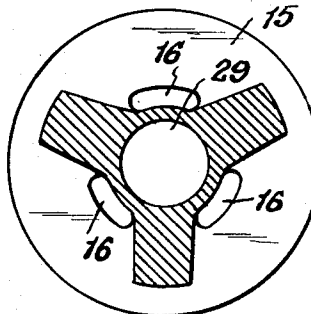
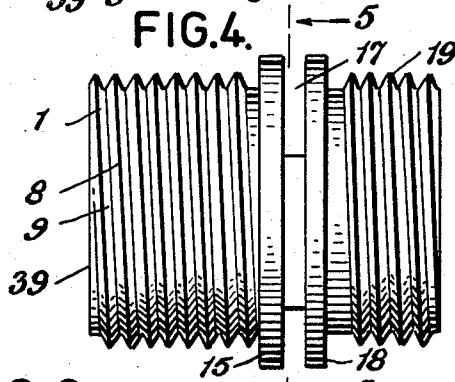


FIG. 6.

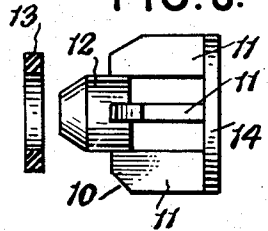


FIG. 7.

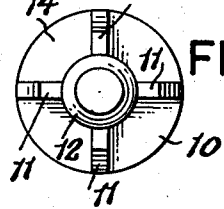
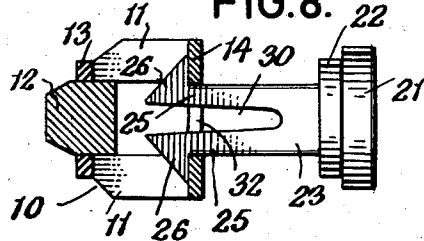


FIG. 8.



INVENTOR.
Leon C. Leventhal
BY
Fritz Ziegler
attorney

1

2,893,418

VACUUM BREAKERS FOR WATER SUPPLY SYSTEMS

Leon C. Leventhal, Ossining, N.Y.

Application April 18, 1957, Serial No. 653,546

4 Claims. (Cl. 137-218)

This invention relates to vacuum breakers of the character adapted for use in water supply lines, and by means of which a return flow of water into the line will be prevented in the event of cessation of normal water pressure and water flow in the line. A device of the character to which the present invention relates is shown in my Patent No. 2,646,815, dated July 28th, 1953, and the present invention relates to improvements on the structure shown in said patent.

One of the objects of the present invention is to provide a device of this character by means of which the return flow will be effectively prevented; which will be of simple construction with the parts thereof made of non-corrosive materials, such as of plastic if desired, and which can be easily installed or applied without requiring the use of tools.

Another object of the invention is to provide a device of this kind which can be easily manufactured; which will be unlikely to clog or get out of order and which will operate positively and efficiently whenever required.

It is another object of the invention to provide a device of this character in which the parts will be maintained together in operative relationship and will not separate or become lost in shipment, use or storage.

These and other objects are attained by the invention, a more particular description of which will be hereinafter set forth and pointed out in detail in the claims appended hereto.

In the accompanying drawing, wherein an illustrative embodiment of the invention is disclosed,

Fig. 1 is a longitudinal sectional view of a vacuum breaker constructed in accordance with the invention;

Fig. 2 is a side elevational view of the supplemental valve element;

Fig. 3 is an end view of the valve element shown in Fig. 2, looking at the same from the left of Fig. 2;

Fig. 4 is a side elevational view of the inner shell or sleeve;

Fig. 5 is a sectional view, taken substantially on the line 5-5 of Fig. 4, looking in the direction of the arrows;

Fig. 6 is a side elevational view of the main valve, with the washer therefor removed and shown in section;

Fig. 7 is an end view of the main valve, and

Fig. 8 is a sectional view of the main valve, showing how the same is coupled to the supplemental valve member.

Referring to the drawing, the housing for the device consists of two main parts of which 1 indicates an outer shell or sleeve and 39 indicates the inner sleeve. These parts, and other parts of the device to be described, may all be composed of metal or all of them made of any suitable plastic or other material suitable for the purpose. The outer shell or sleeve 1 is in the form of a tubular cylinder provided adjacent one end with a bore having internal screw threads 2 by means of which it may be attached to a faucet, water tap or other water outlet, this end of the device being the inlet end of the vacuum breaker. Within the outer sleeve or shell 1 is provided a

2

transverse wall or partition 3 having a central hole or aperture 4 through which the water will flow in the direction of the arrow shown in Fig. 1 to reach and pass the valve 10 in the device in a manner to be described. A washer 5 is positioned within the sleeve 1 and fits against the end of the faucet or tap that is engaged with the threads 2, to effect a seal.

Beyond the partition or wall 3 the outer shell 1 is provided with a tubular portion 36 which is internally threaded, as indicated at 7, for threadable engagement with the external threads 8 of the shank portion 9 of the inner sleeve 39. When the inner sleeve 39 is threaded within the outer shell as seen in Fig. 1, a flange 15 forming part of a wall or partition on the inner sleeve comes into abutment with an end of the outer sleeve 1, and the end of the shank 9 of the inner sleeve abuts against a washer 6 interposed between said end of the shank 9 and one face of the partition 3.

The inner sleeve 39 is externally threaded adjacent to one end, as shown at 19, to enable it to be attached to a hose coupling or other similar connection. Provided in the interior of the inner sleeve 39 is a transverse wall or partition 15 formed with a central opening 29 axially aligned with the opening 4. In said partition 15, and located around the opening 29 therethrough, is a number of apertures 16 providing air vents since they communicate with atmosphere through the spacing 17 between the wall 15 and a wall 18 formed on the inner sleeve 39. A washer 38 is loosely disposed against one side of the wall 15, and in the normal flow of water through the device, said washer 38 is maintained over the air vent apertures 16 to close the same.

The main valve of the vacuum breaker is generally indicated at 10 and the same is shown in detail in Figs. 6 and 7. The valve 10 may be composed of metal or plastic, and at one end it is provided with a ring member 14, said ring having a central opening 32 (Fig. 8). A plurality of equally-spaced radial fins 11, four being shown, extends from the ring 14 and located between the ends of the fins 11 is a cylindrical head 12 around which is fitted a washer 13, the washer 13 seating against the ends of the fins and being frictionally held on the head or plug 12. The valve, constructed as above described, is maintained within the chamber in the shell 39 that is formed between the washer 38 and partition 3.

At 20 is shown a secondary or supplemental valve member, which also may be made of metal or plastic, and it is provided at one end with a disk-like head 21 from which extends a shank 23 that is split or bifurcated, as indicated at 30, to form a fork and thereby divide the shank into a pair of legs 25, each of which terminates in a hooked end 26. A washer 22, which may be of rubber or other suitable material, is fitted around the shank 23 and is carried by the valve member 20 maintained in contact with one face of the head or disk 21. The manner in which the valve member 20 is slidably coupled to the valve 10 is shown in Figs. 1 and 8, wherein it will be seen that the legs 25 of the valve member 20 are extended through the central aperture 32 in the valve 10 and the hooked ends engaged against the ring 14. This coupling is effected by compressing the legs 25 toward one another until the ends can be passed through the opening 32. The fitting of the valve member 20 on the valve 10 is effected in such a manner that the legs 25 fit between the fins 11 of the valve member.

From the foregoing the operation of the improved vacuum breaker will be readily understood. The internally-threaded portion 2 of the outer shell 1 is attached to a faucet, tap or other source of water supply and the normal water flow through the device occurs in the direction of the arrow shown in Fig. 1. While this

3

occurs, the parts are in the positions substantially as shown in Fig. 1. The water entering the shell 1 as above described, will flow through the aperture 4, through the central aperture 32 in the ring 14, between the fins 11, through aperture 29 and out through the right hand end of the shell 39, to reach the hose or other conduit which may, at that time, be attached to the external threads 19 of the inner sleeve or shell 39.

As long as the water is normally flowing from the supply source through the vacuum breaker, or in the direction of the arrow shown in Fig. 1, the valves 10 and 20 will remain in their open positions as shown in Fig. 1, so that a free flow of water through the device is assured. Should the water cease to flow, through failure of pressure or otherwise, and a vacuum then be developed in the line to an extent sufficient to cause suction to retract water back into the supply line from within the hose attached to the device, such water on its return flow in a direction from right to left in Fig. 1, will exert pressure within the interior of the shell 39 and particularly against the disk 20, ring 14 and head 12, which pressure will act to move the valve 10 toward the left and bring its tapered end and its washer 13 through and around aperture 4 to close the same, while washer 22, carried by the auxiliary valve member 20, will be brought against wall 18 to close the aperture 29 therethrough. It will be understood that while the valve members 10 and 20 are coupled together in the manner clearly illustrated in Fig. 8, these parts are relatively movable in an axial direction so that these valve elements are independently movable and the seating of the washers 13 and 22 will take place under back pressure as above described.

When the valve 10 is moved to closed position to close the aperture 4, the washer shown at 38 will be moved away from over the openings or air vents 16, thus opening these vents, and the vacuum developed in the system will be broken and the pressure equalized to prevent the return flow of water through the device. When the normal flow of water again occurs through the device, the valve 10 will be moved to its open position, as shown in Fig. 1, and supplementary valve 20 also moved to open position. As valve 20 moves to open position, its hooked ends 26, as well as water pressure exerted in the direction of the arrow against ring member 14, will cause the ring member to urge the washer 38 over vent openings 16 to thereby close the same. As long as valve 10 remains in its open position it will act to urge the washer 38 against partition 15 to close the vent openings therethrough.

While I have herein shown a single embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. A vacuum breaker for water supply lines comprising, a housing having an inlet end, a wall in said housing located inwardly of said end and provided with a central aperture, the housing having an outlet end and provided with an air vent near said outlet end, a centrally apertured partition in the housing through which the air vent is provided, a valve movable in the housing and adapted to be maintained in open position by normal water flow through the housing, said valve consisting of a hollow finned member provided with means at one end for closing the central aperture in the wall of the housing, means at the opposite end of the valve for closing the air vent during normal water flow through the housing, a supplemental valve member slidably coupled to the valve, a sealing element carried by the supplemental

4

valve member for closing the aperture in the partition during back pressure and while the aperture in the wall of the housing is closed by the valve, said supplemental valve member having a forked shank slidably engaging with the valve between the fins thereon, said forked shank including legs terminating in enlarged ends which engage against the valve to maintain the valve and valve member in coupled but slidable relationship.

2. A vacuum breaker for water supply lines comprising, a tubular housing having a pair of spaced walls within it, the first of said walls having a centrally positioned inlet opening, the second wall having a centrally positioned outlet opening, vent openings provided in the second wall, a washer closing the vent opening during normal water flow, a valve slidably movable within the housing between the walls, the valve having a nose portion surrounded by a washer for closing the inlet opening during back pressure, the valve having a plurality of spaced radial fins connected by a ring, which ring is operative against the first-mentioned washer to maintain the same in position to close the vent openings during normal water flow, a supplemental valve member having a split shank fitted through the ring and slidable therethrough, a head at one end of the shank and a washer carried thereby, said last-mentioned washer being effective to close the outlet opening during return water flow and while the valve is closing the inlet opening, and the split shank having enlargements at its opposite end for maintaining the valve and the supplemental valve member in connected slidable relation.

3. A vacuum breaker as provided for in claim 2, wherein the enlargements on the end of the supplemental valve member are in the form of hook portions at the ends of parts of its split shank, which hook portions engage behind the ring and hold the valve and valve member against separation but permit relative sliding movement of the same.

4. A vacuum breaker for water supply lines comprising, a tubular housing having a pair of spaced walls within it, the first of said walls having a centrally positioned inlet opening, the second wall having a centrally positioned outlet opening, vent openings provided through the second wall, a washer acting to close the vent openings during normal water flow, a valve slidably movable within the housing between the walls, the valve having a nose portion surrounded by a washer for closing the inlet opening during back pressure, the valve having a plurality of spaced radial fins connected at one end by a ring, which ring is operative against the first-mentioned washer to maintain the same in position to close the vent openings during normal water flow, a supplemental valve member having a forked shank fitted through the ring and slidable therethrough, a disk-shaped head at one end of the shank and a washer carried on the shank adjacent to the head, said last-mentioned washer being effective to close the outlet opening during return water flow and while the valve is closing the inlet opening, the shank having hooked elements engaging behind the ring of the valve to prevent separation of the supplemental valve member from the valve.

References Cited in the file of this patent

UNITED STATES PATENTS

1,647,873	Lockwood	Nov. 1, 1927
1,960,970	Fiña	May 29, 1934
2,259,984	Anderson	Oct. 21, 1941
2,322,631	Groeniger	June 22, 1943
2,646,815	Leventhal	July 28, 1953