Aug. 12, 1941. W. N. GLAB 2,252,174

VENT VALVE

Filed Oct. 23, 1939

Fig-2

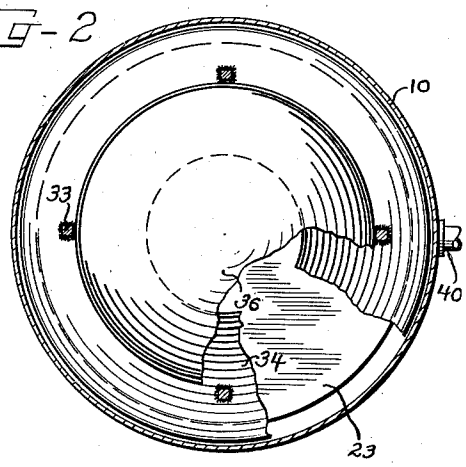


Fig-1

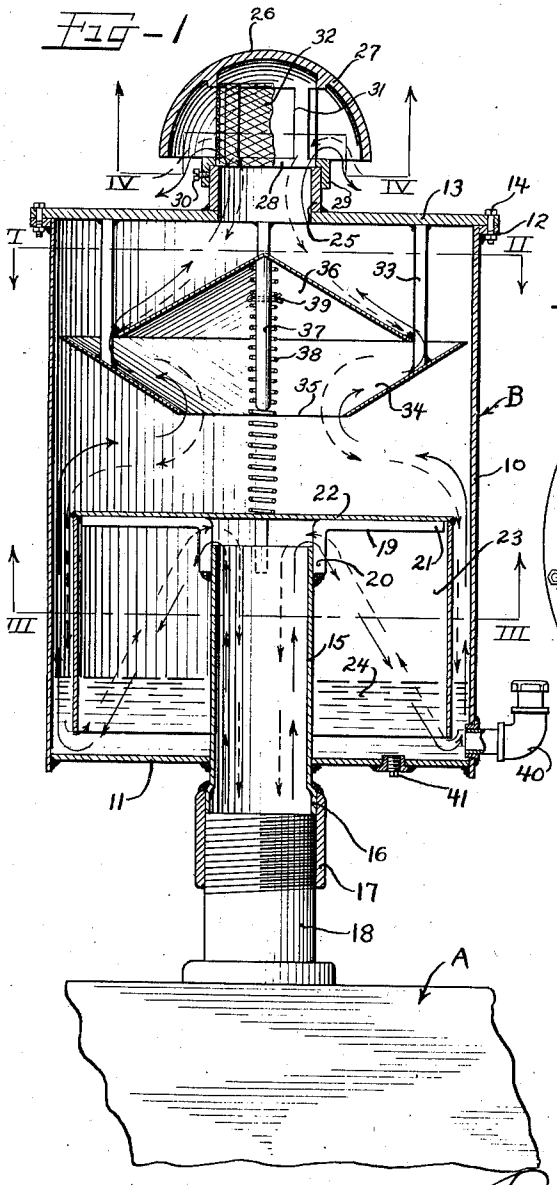


Fig-3

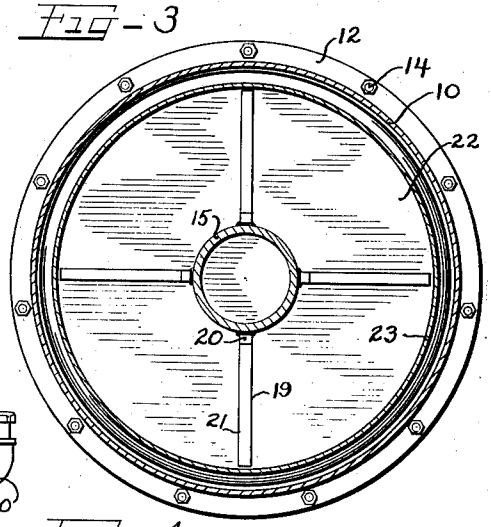
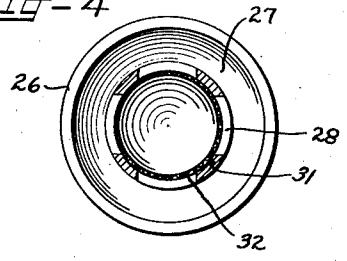


Fig-4



Inventor

WILLIAM N. GLAB

by Charles R. Villa Attys

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2,252,174

UNITED STATES PATENT OFFICE

2,252,174

VENT VALVE

William N. Glab, Dubuque, Iowa, assignor to Morrison Brothers Company, Dubuque, Iowa, a corporation of Iowa

Application October 23, 1939, Serial No. 300,757

1 Claim. (Cl. 137—53)

The present invention relates in general to a vent valve and is more particularly concerned with devices of such type as are utilized in connection with liquid containers to prevent evaporation of the liquid in the container on which they are used; but permit air to enter the container upon the occurrence of a vacuum in the container, and automatically permit the exhausting or expulsion of gas upon the occurrence of an abnormal pressure in the container.

It is a primary object of the herein described invention to provide an improved vent valve of simple and inexpensive construction which is efficient and reliable in operation, which may be easily cleaned and which is not liable to get out of order during long periods of use.

It is a further object of the invention to provide a vent valve for the above purpose in which moving parts and metal to metal seating surfaces are eliminated.

A still further object of the invention is to provide an improved vent valve which utilizes a liquid medium for controlling a passageway through the valve, the valve being so constructed as to subject the liquid medium to a differential pressure which automatically effects the movement of the liquid to controlling positions under predetermined conditions.

Another object is to provide an improved device of the herein described type, wherein a liquid is not only used as a sealing medium, but is also utilized as a valve for controlling a passageway through the device.

Still another object is to utilize a single valve for the relief of either vacuum or positive pressure in a container to which the device may be applied.

Other objects and features of the invention will more fully appear from the detailed description taken in connection with the accompanying drawing which illustrates a single embodiment thereof, and in which:

Figure 1 is a vertical transverse sectional view through a device embodying the herein described invention, and showing the cooperative relationship of the internal mechanism thereof;

Figure 2 is a horizontal section taken through the top of the device housing and showing details of the baffile construction therein, portions being cut away to disclose the inverted cup member below the baffle, taken substantially on line II—II of Figure 1;

Figure 3 is a similar view taken through the bottom portion of the housing of the device and showing details of the support for the inverted cup member, taken substantially on line III—III of Figure 1; and

Figure 4 is a horizontal section taken through the atmospheric connection of the device to disclose details of construction of the hood cap for the atmospheric connection of the device.

As shown on the drawing:

As illustrative of the present invention, there is shown in Figure 1 a tank or container A such as utilized for the storing of a volatile liquid, and B generally indicates my improved vent valve which is connected to the tank. My improved vent valve is so constructed as to normally cut off communication between the atmosphere and the interior of the tank, but permits gas to escape from the tank when the pressure within the tank reaches a predetermined amount, and enables air to enter the tank when a vacuum is created therein during the operation of drawing liquid out of the tank.

In general, my improved valve construction is fabricated from stock material such as ordinary tubular members, plates, etcetera, which are welded together, thus eliminating castings, expensive dies, jigs, etcetera, and enabling the valve to be produced at very low manufacturing cost.

More specifically, my improved valve comprises a tubular housing which embodies a cylindrical tube 10 which is closed at one end by a bottom member 11 welded at its periphery to the tube wall.

The other end of the tube 10 has an annular ring 12 welded thereto so as to form an outstanding top end flange on the tube. This flange forms a seat for the peripheral margin of a top member 13 which may be secured to the ring 12 in any appropriate manner, as by securing bolts 14.

Centrally disposed in the bottom 11 and extending through a suitable aperture therein is a tubular member 15 which is welded to the bottom and projects above and below the bottom member.

The lowermost end of the tube 15 is slightly expanded as shown at 16 for receiving thereover one end of a standard coupling 17, the associated ends of the tube 15 and coupling being welded together. This coupling provides means whereby the valve may be secured to the tank A, as by screwing the coupling onto a threaded nipple 18 suitably mounted in the tank at its top.

The innermost end of the tube 15, which it will be noted is disposed above the bottom of the housing, is provided with a plurality of arms 19

which are circumferentially spaced around the associated end of the tube and welded thereto so as to extend in a radial direction from the tube. These arms are of substantially L-shape so as to provide a vertical leg 20 and a horizontally disposed leg 21. It will be noted that the innermost ends of the legs 20 project past the end of the tube 15 so as to support the leg 21 above the end of the tube, to provide a passageway between the tube end and a bottom 22 of an inverted cap member 23.

The radially disposed arms also act to center the cup member centrally of the housing. The brim of the cup member 23 is spaced from the bottom member 11 of the housing, and is arranged to dip below the surface of a suitable liquid 24, such as a light oil, partially filling the housing.

The top member 13 is also centrally apertured and provided with a tubular extension 25 which communicates with the opening in the top member and is welded at its lowermost end to the member. The extension 25 may be of any desired length, and provides a passageway connecting the interior of the housing with a hood member 26.

The hood member 26 comprises a downwardly opening dome portion 27 which is provided with a generally downwardly extending tubular portion 28 with an attaching flange 29 at its lowermost end adapted to receive the upper end of the tubular member 25. The hood may be secured to the tubular member 25 as by a suitable setscrew 30 mounted in the flange. Beneath the dome portion 27 and shielded thereby are a plurality of circumferentially spaced openings 31 permitting egress of gas from the vent valve housing and ingress of atmosphere to the housing under certain conditions of operation of the valve mechanism. The openings 31 are closed by a suitable screen 32 which prevents the entrance of insects, dust, et cetera, into the housing.

Circumferentially spaced around the opening in the top member 13 is a plurality of depending posts 33 having their upper ends welded to the lower surface of the top member. The lowermost ends of the posts 33 are welded to a frustoconical baffle member 34 which is disposed with its surface converging downwardly and terminating in a central open portion 35 which is axially aligned with the tube 15 in the bottom of the housing and the extension 25 in the top of the housing.

Above the opening 35 is a cooperating conical baffle 36 having its apex upwardly disposed and secured as by welding at its periphery to the posts 33. It will be noted that with this arrangement, the adjacently disposed edges of the baffles are spaced apart to permit the passage of air or other gas past the baffles, but effectively prevent the direct passage of liquid from the bottom of the housing out through the extension 25 and hood 26.

The baffle 36 at its center is provided with a depending stem member 37 which is adapted to receive one end of a coiled spring 38 thereover, this spring being retained against removal from the stem member as by a cotter pin 39. The lowermost end of this stem member is centrally disposed of the opening 35 and preferably does not project below the lowermost edge of the baffle member 34. The lowermost end of the spring 38 bears against the bottom 22 of the inverted cup member 23 and the spring acts to maintain the bottom of the cup against the supporting arms 19 and prevent upward raising of the cup.

The liquid 24 may be readily put into the housing through a filler connection 40, and the upward extent of this connection determines the level of the liquid within the housing. For draining the housing of liquid, a suitable drain plug 41 is placed in the bottom 11.

The vent valve described above may be readily and easily disassembled by removing the bolts 14 which permit the top member 13 with its hood member and the baffles together with the spring 38 to be removed as a unit. The cup member 23 may then be readily removed through the top of the housing. With these parts removed, the interior of the housing may be easily and conveniently cleaned.

From the above description, it will be noted that the cup member 23 divides the interior of the housing into two compartments, one of these compartments being defined by the interior of the cup member 23, and the other compartment by the remaining interior of the housing. It will be noted that the tank A communicates through the tubular member 15 with the interior of the cup member and that the atmosphere surrounding the valve communicates through the hood and extension 25 with the other compartment of the housing. Moreover, the two compartments communicate with different areas of the liquid 24 which is movable under a differential pressure acting on these areas into one compartment or the other to bring the level of the liquid in one of the compartments adjacent or below the rim of the cup 23 and permit the passage of gas or atmosphere from one compartment to the other. Normally, and when the pressures acting on the different portions of the liquid 24 are equalized, the liquid levels of the two compartments will correspond and the liquid will seal the passageway between the compartments.

More specifically, the operation of the device will be as follows:

Assuming that a pressure builds up in the tank A, this pressure being transmitted to the compartment within the cup 23 will force the liquid level therein downwardly and discharge the liquid into the other compartment of the housing. The liquid in this latter compartment will rise around the cup and may even reach a level above the cup. When the liquid level within the cup 23 reaches the brim or lower edge of the cup, gas will be permitted to bubble up through the liquid in the other compartment and pass out through the hood 26 to the atmosphere.

Should the pressure within the tank A be increased suddenly and tend to blow the liquid out of the housing, such action will be prevented by the baffles 34 and 36.

Upon the occurrence of vacuum within the tank A due to the withdrawing of liquid therefrom, or for some other reason, the differential pressure acting on the surface of the liquid 24 will cause the liquid to move into the compartment within the cup 23 and in a similar manner allow air to be sucked into the tank under the brim of the cup 23.

Applicant's arrangement provides a single valving medium both for pressure and vacuum. During the operation of the valving mechanism, it will be noted that the cup 23 does not raise from its position as shown in Figure 1, the cup being held down in position by the action of the spring 38.

By utilizing a liquid valving medium, the use of

seating metallic surfaces, which readily get out of order, is entirely eliminated.

By proportioning the liquid areas in the respective compartments, the valve may be made to operate at different values of pressure and vacuum. For example, by utilizing areas of four to one, the valve may be made to operate upon the occurrence of a pressure of four ounces in the tank and a vacuum of one ounce.

From the foregoing description, it will be apparent that the present invention provides an improved vent valve of simple and inexpensive construction which is efficient and reliable in operation, may be easily cleaned, and is not liable to get out of order during long periods of use; in which moving parts and metal to metal seating surfaces are eliminated; which utilizes a liquid valving medium which is automatically controlled by differential pressure resulting from the occurrence of either pressure or vacuum in a tank to which the valve may be connected; and wherein the liquid medium not only acts as a valve but also serves as a sealing medium.

It is, of course, to be understood that although I have described in detail a preferred embodiment of my invention, the invention is not to be thus limited but only insofar as defined by the scope and spirit of the appended claim.

I claim as my invention:

A vent valve construction comprising an open top container, a removable top closure for the container having a central atmospheric opening therein, a tubular connection in the bottom of the container having its innermost end disposed above said bottom, a cup-shaped member supported inverted over the innermost end of the tubular connection with its open end edge spaced above the container bottom, a liquid in the container normally sealing the open end of the cup member, a double baffle within the container positioned between the cup bottom and closure opening, said baffle including a conical member and a frusto-conical member disposed in axial alignment with their base portions adjacent and the conical member uppermost, and common means for supporting the baffle members from the closure member for enabling removal thereof as a unit.

WILLIAM N. GLAB.