Dec. 24, 1957 J. D. LANGDON 2,817,354

CHECK VALVE AND SPOUT COUPLING

Filed Nov. 5, 1949

FIG. 1

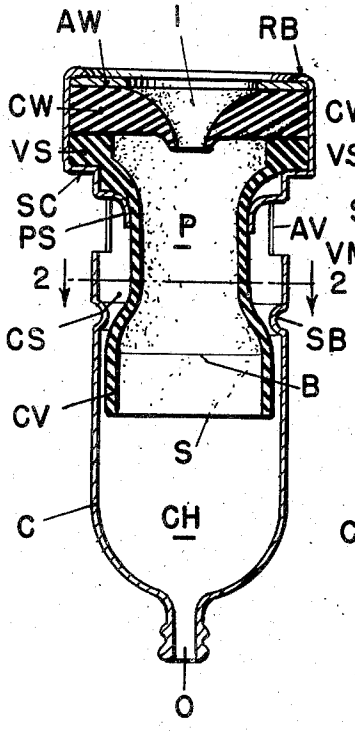


FIG. 3

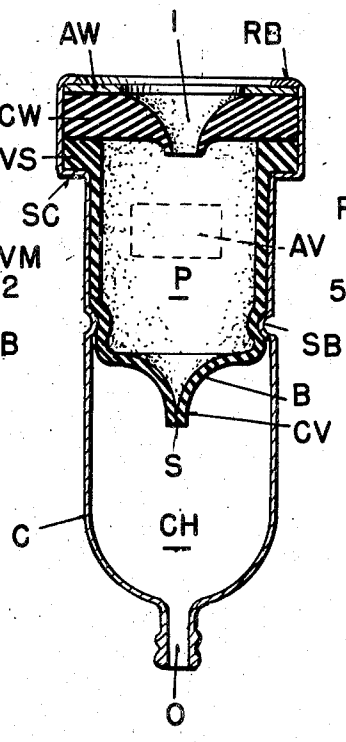


FIG. 4

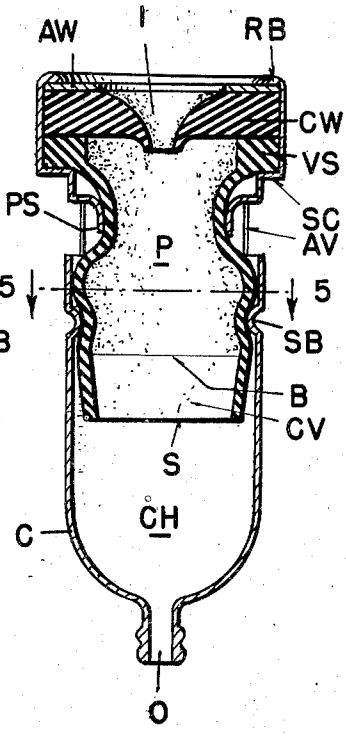


FIG. 2

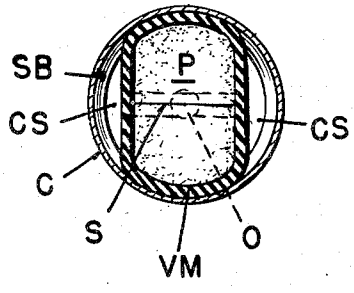
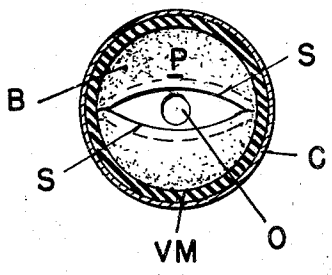


FIG. 5



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CHECK VALVE AND SPOUT COUPLING

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1 Claim. (Cl. 137—218)

This invention pertains to devices for the prevention of back flow of contaminated fluid from a container into a source of pressure fluid supply attached to the container, and is adapted to be installed between the container and the source of supply.

The device comprises a valve unit adapted to permit the flow of fluid in one direction and prevent the flow of fluid in the opposite direction by the use of check-valve means within a casing and a vent to atmosphere through the wall of the casing, whereby back flow or syphonage is prevented.

This application is a continuation in part of Serial No. 522,959 filed Feb. 18, 1944, which in turn was copending with and is a continuation-in-part of Serial No. 410,139 filed Sept. 9, 1941, maturing into Patent No. 2,382,427 dated Aug. 14, 1945, which in turn is a continuation-in-part of Serial No. 347,673 filed July 26, 1940 maturing into Patent No. 2,270,737 dated Jan. 20, 1942. Part of the similar subject-matter is also present in Patent No. 2,328,382 dated August 31, 1943, filed Oct. 8, 1941.

The instant application is a copending continuation in part of Ser. No. 560,841 filed Oct. 28, 1944.

The primary object of the invention is to provide a check valve and vacuum breaking valve to prevent back flow from a container into a pressure fluid supply line attached to the container and aims to provide an improved form of elements combined to increase the efficiency of a device of the nature described.

Other and further objects, purposes and advantages together with the new and novel features will appear during the progress of the specification as illustrated by the drawings, which are diagrammatic and used for the purpose of illustration only.

The drawings illustrate and suggest only one form of reduction to practice which may be changed within the scope of the claim.

Of the drawings:

Fig. 1 is a vertical median section of the valve as at 1—1 of Fig. 2, showing the valve in normal position of rest;

Fig. 2 is a transverse section as at 2—2 of Fig. 1;

Fig. 3 is a vertical median section taken in the opposite direction from Fig. 1 as at 3—3 of Fig. 2. Normal position of rest.

Fig. 4 is a vertical median section taken in the same direction as Fig. 1 and showing the valve member or tubular rubber sleeve VM substantially as it appears when expanded by interval pressure, as at 4—4 of Fig. 5; and

Fig. 5 is a transverse section as of Fig. 4 at 5—5.

The indicating characters denote:

C Casing.
CH Chamber of casing C.
SC Shoulder of casing.
AW Assembly washer.
VS Valve sleeve shoulder resting on shoulder of casing.
RB Retaining bead for valve member, spun over washer AW.
VM Valve member or sleeve of deformable material.

CW Coupling washer superimposed on valve shoulder VS.
I Inlet end adjacent vent means AV.
AV Air vents or vent means communicating with chamber CH.
O Outlet beyond air vents AV.
PS Protective shield means of material partly cut away to form the vent means.
SB Sealing bead or ring forming a seat for valve member VM.
CS Clearance space forming channel means between VM and casing C.
P Passage through valve member VM.
B Baffle means, imperforate, extended substantially transversely of member VM at all times.
CV Check valve formed of paralleled lips bordering a slit S.
S Slit bordered by check valve lips CV supported by baffle means B extending across passage P.

Describing—The check valve and spout coupling as of the figures of the drawings.

Fig. 1 shows the valve member VM, made of distortable material capable of returning to normal shape after being expanded to seat against the adjacent surrounding configuration of the casing C under the influence of internal pressure. The casing C is tubular in form and has an inlet I and outlet O and is provided with shoulder means SC. Air vent means AV perforated through casing between the inlet I and the outlet O, the air vent means being formed by cutting a flap away from the material of the casing wall, the flap being attached preferably at the top of the vent means AV, pressed inwardly and shaped to form protective shield means PS. The valve member VM is inserted from the inlet end I of the casing C with shoulder VS resting on a corresponding shoulder SC of the casing C, the coupling washer CW being superimposed on and impinges the shoulder or flange VS of the sleeve-like valve member VM. The rigid washer AW has a retaining bead RB spun over its periphery and surmounts the assembly washer CW which is made of distortable material which adheres closely to the shoulder VS (and, if desired, washer CW can be cemented to shoulder VS), thus preventing the member VM from being pulled out of place by pressure exerted against the baffle means B which tends to blow the member VM out of position.

The valve member VM is a tubular sleeve and is provided with a passageway P, the baffle means B is extended and secured across the distal end of the passage P, in a manner to remain in position substantially transversely of the tubular passage at all times. When under the stress of internal pressure the effect of the baffle is to cause the sleeve member VM to expand under even very low internal pressure and seat against the bead SB and the wall of casing C below the vents AV; to prevent egress of pressure fluid from the vent means AV.

It will be noted that the figures of the drawing show outlet O to be very much restricted where the type of casing used is that shown by the illustrations. Therefore considerable back pressure exists within the chamber CH when liquid under pressure is flowing thru the passage P of member VM. The member VM being of deformable material is capable of accommodating the flow of more fluid under pressure than outlet O which is made of metal or other rigid material. It is obvious that the tubular valve member VM, which ordinarily clears the casing over the area of clearance space CS in normal state of repose, would not expand enough to close the vent means against dribbling at a certain stage of back pressure in the chamber CH between the lower end of the member VM and outlet O unless the member VM were provided with the baffle means B or the equivalent

thereof surrounded by the imperforate wall of the member VM. The slit S having at least a part of the opening communicating therewith bounded by the baffle means B which in turn is surrounded by the imperforate wall of valve member VM. The effect of the baffle means B plus the resistance of the surrounding wall and the lips CV bordering the slit means S causes the member VM to expand against the sealing bead SB; the wall of member VM being imperforate is further expanded to seat against the wall of the casing between the bead SB and the air vents AV under the influence of internal pressure, thereby preventing fluid in the form of liquid from dribbling thru the vent means AV.

It is self evident that the check valve CV surrounded by the wall of the member VM is formed by the juxtaposition of the baffle means plus the parallel lips bordering the slit means S, said baffle means circumscribed by the imperforate wall of member VM, constitute a structure adapted to resist the passage of pressure fluid thru the slit S to such an extent that the imperforate wall of the member VM is distended and impinges the seat means formed by the wall of casing C and sealing bead SB prior to the time a back pressure is built up in the chamber CH between the check valve CV and the outlet O; at which time the pressure within the member VM and the lower portion of the chamber CH is equalized.

According to the amount of internal pressure and coincident with increased internal pressure, the member VM will be expanded more and more to conform with the contour of the inside of casing C; it is therefore obvious that the extent to which the imperforate wall of the member VM contacts the wall of casing C below the air vents AV, is only limited by the amount of internal pressure.

In the reduction to practice illustrated by the drawing, the sleeve VM is shown by Fig. 3 to be normally resting impinged against the wall of casing C and the bead SB. The impingement pressure of the imperforate wall of the member VM, in normal state of rest against the casing C as of Fig. 3, is caused by the convergent thrust of the shield means PS against opposite wall portions of the member VM as shown by Fig. 2. The wall of the member VM being compressed convergently between the shield means PS is urged to spread divergently in the opposite direction to an extent limited by the confining wall of the casing C. Therefore the member VM cannot be spread laterally out of shape, as it would be if not confined within and compressed by the casing. The wall of the member VM displaced by and beneath the shield means PS cannot be bulged laterally because the ensuing surplusage of the wall area is depressed and bagged inwardly away from the seat means provided by the wall of casing C and the sealing bead SB. Thus a redudant area exists below the shield means PS when the member VM is in a normal state of repose.

Fig. 2 shows the clearance space CS when the member VM is in a normal position of rest. The outer diameter confines of the member VM adjacent the baffle B are pushed in from the wall of the casing C concomitant with the support afforded by shields PS due to the stress exerted inwardly and upwardly by the shields PS, the tubular wall of the member VM on both sides of space CS is piled up by the contact wall of the casing either side of the shields PS, thus the most redundant portion of the member VM lies below the shields PS and either side of the clearance space or channeled portion CS of the member VM forming a passageway for atmosphere communicating from the vent element AV to the outlet O.

Fig. 5 shows the member VM seated against the apex of the bead SB and the casing C thus closing the clearance

space CS under the effects of internal pressure, while Fig. 4 shows the approximate seating against the internal seating surfaces of the bead and casing under the effects of internal pressure.

The coupling washer CW serves to encompass the end of a spout connected with a supply line whereby fluid pressure confined beneath the washer will cause the same to seal around a spout such a connection being old in the art.

Having described the invention and the functions thereof, the following claim is made:

A valve construction comprising a chambered casing having inlet and outlet ends and being ported to communicate with atmosphere between the two ends to provide vent means thru the wall of said casing; sealing means formed by a bead providing a seat projecting radially inwardly of the wall of said casing, other sealing means provided by said wall of said casing forming a seat on at least one side of said bead; a tubular valved sleeve member, made of deformable material capable of returning to shape, inserted into and secured to the inlet end of said casing, at least a part of the circumference of the sleeve so supported out of contact with the seats formed by said bead and the casing wall as to normally provide clearance space between said sleeve and said bead and casing wall, said clearance space extended normally to communicate from said vent means to the outlet; the tubular member having an imperforate tubular wall thruout the entire length overlying the seats formed by said bead and said casing wall, baffle means secured in position interposed across and at least partially obstructing the passage encompassed by the wall of said sleeve; a normally closed slit valved end portion for said sleeve formed by the juxtaposition of the wall of said sleeve, said baffle means and the slit end, said tubular valved sleeve having a lipped terminal end shaped to border and form the wall of the slit and projecting beyond the seats and toward said outlet wherein: shield means substantially the width of the vent means project inwardly of said vent means and depresses a limited area of the wall of the tubular sleeve, spaces the sleeve away from said vent means and provides said clearance space between said sleeve and the sealing bead and casing in the form of a channel extending the length of the sleeve member and communicating with the outlet of the casing, said casing normally limiting the lateral distension and spreading of the sleeve either side of said shield means due to the impingement of said shield means against the sleeve, surplus material being crowded toward the said clearance space by the casing and forming a redundant area bordering said channel permitting the redundant channeled wall portion of the sleeve to be easily urged against the sealing bead and the casing with a minimum of internal pressure.

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