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J. W. KINNAVY ET AL

3,450,305

VENTING MEANS FOR CONTAINERS

Filed Oct. 12, 1966

FIG. 1

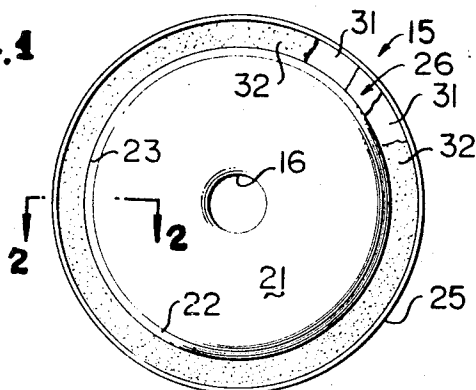


FIG. 2

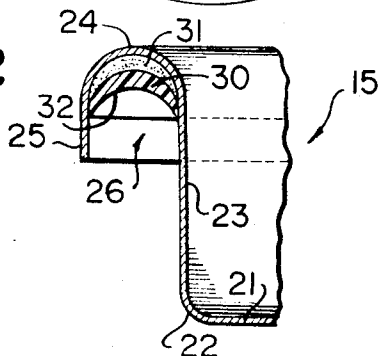


FIG. 3

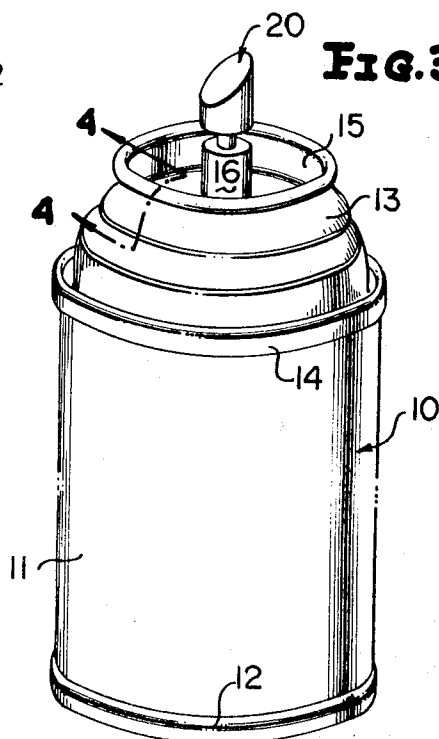


FIG. 4

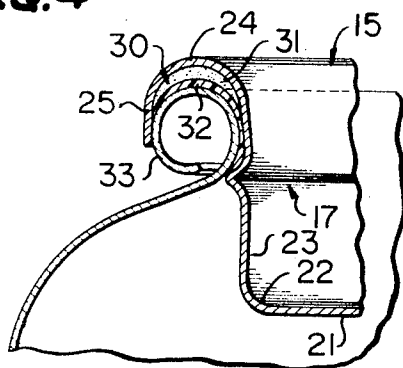


FIG. 5

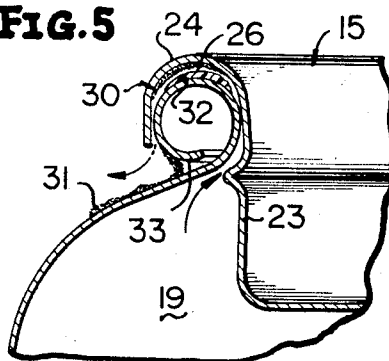


FIG. 6

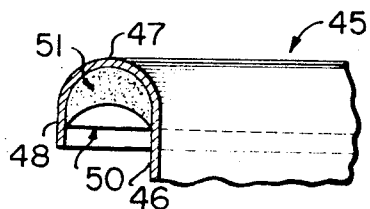
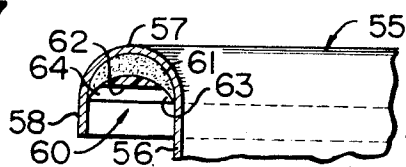


FIG. 7



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VENTING MEANS FOR CONTAINERS

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11 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to a dispensing container having a valve cup secured to a peripheral curl of a container body by a generally inverted U-shaped peripheral edge which defines a chamber with the curl in which is disposed means for forming a hermetic seal at room temperature and also being effective for releasing the hermetic seal when the container is subjected to elevated temperatures whereby media can be vented from within the container and rupture thereof thereby precluded.

Conventional dispensing-type containers are generally charged with an inert noncombustible gaseous propellant which is either admixed with the product which is to be dispensed or is confined in a separate chamber. Successive dispensing operations can be carried out until such time as the dispensing container is emptied of the product, the propellant and/or both the product and the propellant. If, as has been the case, the dispensing container is inadvertently placed into an incinerator or exposed to excessive heat pressure built-up in the container may cause the same to explode. Such explosions can, of course, cause extensive injuries to persons in the immediate vicinity of the explosion and should, if possible, be avoided.

It has been recognized that the probability of explosion is less when the dispensing containers are depressurized as compared to situations in which the containers are still under internal pressure. Conventional mechanisms have therefore been provided in pressurized dispensing containers for depressurizing the interiors of the containers by venting the same to atmosphere. One such known pressure release mechanism is a pointed valve stem which punctures the propellant chamber which may be, for example, a collapsible rubber or plastic bag. This puncturing is designed to take place after the product has been dispensed from the container but when puncturing takes place earlier complete dispensing of the packaged product is precluded. In addition, such puncturing mechanisms for effecting the pressure release of the propellant are generally of a complex construction and are therefore relatively expensive to manufacture.

Another pressure release mechanism which is relatively well known is the provision of a solder-filled hole or aperture in the bottom end closure of a conventional dispensing container. However, due to the relatively high pressure of the propellant and the small surface area to which the solder is adhered such pressure release mechanisms have proved unsatisfactory and tend to vent the containers prematurely when, for example, subjected to rough handling in shipment which can loosen the solder sufficiently to be blown out of the aperture under the influence of the pressurized propellant.

In keeping with the above it is a primary object of this invention to provide a novel pressure release mechanism for pressurized dispensing containers which overcomes the above and numerous other disadvantages of conventional pressure release or venting mechanisms, and includes means between a dispensing container and its associated closure for forming a hermetic seal at room temperature and the hermetic sealing means additionally

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including means for releasing the hermetic seal when the container is subjected to temperatures in excess of room temperature whereby a gaseous media within the container body can be vented and explosion of the container is precluded.

A further object of this invention is to provide a novel mechanism of the type immediately heretofore defined wherein the sealing and releasing means is an admixture of at least two materials, one of the materials having a relatively low melting point and being capable of migrating from the other of the materials when the admixture is heated to substantially the melting point of the one material whereby a vent area is provided between the closure and the container through which fluid pressure is vented to atmosphere.

A further object of this invention is to provide a container of the type adapted to be vented to atmosphere, the container including a body and an end closure, sealing means between the end closure and the body for forming a hermetic seal at room temperature, and means for releasing the seal when the container is subjected to temperatures in excess of room temperature whereby media within the container can be vented to atmosphere and rupture of the container is thereby precluded.

Still another object of this invention is to provide a novel container of the type heretofore defined wherein the sealing and releasing means is defined by at least two layers of material disposed in generally superimposed relationship, and an outermost one of the layers is constructed of gas impervious sealing material.

A further object of this invention is to provide a novel container of the type heretofore described wherein the two materials are copolymeric plastic material, at least one of the materials has a relatively low melting point, the one material being capable of migrating from the other of the materials when the admixture is heated generally to the melting point of the one material whereby a vent area is provided between the closure and the container body thereby precluding pressure build-up internally of the container and the eventual rupture of the latter.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by a reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawing.

In the drawing:

FIGURE 1 is a bottom plan view of a closure constructed in accordance with this invention provided with a novel pressure venting mechanism, and illustrates the mechanism formed by two superimposed layers of material housed in an annular channel of the closure.

FIGURE 2 is a highly enlarged fragmentary sectional view taken generally along the line 2—2 of FIGURE 1, and illustrates an outermost layer of sealing compound material superimposed upon an innermost layer of metallic material having a relatively low melting point.

FIGURE 3 is a top perspective view of a dispensing container to which the closure of FIGURES 1 and 2 has been secured, and illustrates a valve mechanism for dispensing a product from the interior of the container on the influence of a gaseous propellant.

FIGURE 4 is a highly enlarged fragmentary sectional view taken generally along the line 4—4 of FIGURE 3, and illustrates the assembled position of the closure and the container body.

FIGURE 5 is an enlarged fragmentary sectional view taken generally along the line 4—4 of FIGURE 3, and illustrates the formation of a vent passage between the closure and the container as the metallic material melts and flows outwardly of a channel defined between the closure and the container body.

FIGURE 6 is a fragmentary sectional view of another closure constructed in accordance with this invention taken generally along a line similar to the line 2—2 of FIGURE 1, and illustrates a pressure release mechanism in the form of two admixed materials.

FIGURE 7 is a fragmentary sectional view of another closure taken along a line corresponding to the line 2—2 of FIGURE 1, and illustrates an outermost layer of sealing compound material is partially overlying relationship to an innermost layer of metallic material having a relatively low melting point.

Referring first to FIGURE 3 of the drawing, a dispensing container constructed in accordance with this invention is generally designated by the reference numeral 10 and includes a tubular metallic container body 11 having a bottom closure (not shown) secured thereto by a conventional double seam 12. An upper dome-like closure 13 is similarly secured to the container body 11 by a conventional double seam 14. Another closure or valve cap 15 having a cylindrical upstanding stem 16 is secured by means 17 (FIGURE 4) to the closure 13. The stem 16 houses a conventional push button dispensing valve 20 which dispenses a suitable product (not shown) from an interior 19 of the container body 10.

The closure 15 is best illustrated in FIGURES 1 and 2 of the drawing and, in addition to the central cylindrical stem 16, includes an annular end panel 21 joined by a radius portion 22 (FIGURE 2) to an innermost peripheral wall 23. The peripheral wall 23 is joined by an integral bead 24 to a depending peripheral skirt 25. The bead 24, the peripheral skirt 25 and the annular wall 24 cooperate to define a generally annular downwardly opening inverted U-shaped channel 26 housing the pressure release mechanism 30 of this invention.

The pressure release mechanism 30 is defined by two superimposed layers of material 31, 32. The layer 31 is sandwiched between the layer 32 and a portion of the bead 24, and is preferably constructed from metallic material having a relatively low melting point, such as low melt solder having a melting point ranging between 120–160° F. The solder material 31 is melted and “flowed” into the channel 26 when the closure 15 is inverted from its normal position, i.e., when the closure 15 is in the position illustrated in FIGURE 1 of the drawing. When the solder material 31 cools it fuses to the innermost wall or surface (unnumbered) of the bead 24 thereby forming a gas impervious seal between the bead 24 and the material 31. In an actual working embodiment of the invention 0.6 gram of molten solder having a melting point ranging between 142°–150° F. was placed in the channel 26, cooled and solidified after which the layer 32 was applied in superimposed relationship in the manner illustrated in FIGURE 2 of the drawing.

The layer 32 is conventional elastomeric sealing compound having a melting point appreciably higher than the melting point of the layer of material 31 as, for example, 170°–250° F. The layer 32 of sealing material may also be constructed from synthetic thermoplastic material, such as vinyl chloride resins, vinyl acetate resins, styrene resins, acrylate and methacrylate resins, phenolic modified resins, and copolymers of these materials. As will be more apparent hereafter, the sole purpose of the layer 32 is to effect a hermetic seal between the closure 13 of the container body 11 and the closure 15. Therefore, irrespective of the particular material from which the layer 32 is constructed, it must be air and gas impervious and also, but not necessarily, of a higher melting point than the layer of metallic material 31.

Prior to charging the container 10 with the product and a suitable gaseous pressurized propellant, the closure 15 is secured to a radially outwardly, downwardly and inwardly directed curl 33 (FIGURE 4) of the closure 13 by the securing means 17 which is merely a radially outwardly directed conventional crimp. During the crimping operation the sealing means or layer 32 is compressed slightly and a hermetic seal is formed between the clo-

sures 13 and 15 in the manner clearly illustrated in FIGURE 4 of the drawing. If after the product has been completely dispensed from the container 10 and the latter is accidentally thrown into an incinerator or is otherwise subjected to a relatively high temperature, the layer of metallic material 31 rapidly melts and flows outwardly of the channel 26 between the curl 33 and the peripheral skirt 25, in the manner clearly illustrated in FIGURE 5 of the drawing. This permits the propellant to escape or vent to atmosphere in the manner indicated by the unnumbered headed arrows in FIGURE 5 thereby precluding the build-up of internal pressure and the subsequent explosion or rupturing of the container 10. In the actual working embodiment of the container 10 heretofore noted conventional sealing compound was applied in the manner illustrated in FIGURE 2 of the drawing after which the closure 15 was crimped to the closure 13 and charged with a pressurized gaseous propellant. Thereafter, the pressurized container was subjected to heat and at a temperature of 150° F. the layer of solder 31 flowed out of the channel 26 in the manner illustrated in FIGURE 5 to release the propellant to atmosphere.

One major reason for the excellent operability of the venting mechanism heretofore described is the large vent area provided above the entire periphery of the curl 33 and the bead 24 upon the outward flow of the material 31. Prior to being subjected to elevated temperatures the closure 15 is tightly crimped upon the curl 33 of the closure 13. However, as the material 31 flows outwardly of the channel 26 the tight crimp between the closures 13, 15 is, in effect, loosened (FIGURE 5) resulting in the equivalent of a very loose crimp through which the pressurized propellant can readily and rapidly escape to atmosphere.

Another closure constructed in accordance with this invention is illustrated in FIGURE 6 of the drawing and is generally designated by the reference numeral 45. The closure 45 is basically identical to the closure 15 of FIGURES 1–5 of the drawing, and includes an annular wall 46, an integral peripheral bead 47 and a peripheral skirt 48 which cooperate to define an annular downwardly opening generally inverted U-shaped channel 50 corresponding to the channel 26 of the closure 15. However, in lieu of the two superimposed layers 31, 32 of the closure 15, the closure 45 includes a single layer 51 of admixed materials which form a hermetic seal at room temperature and cause this seal to be released or break down when the closure 45 is subjected to elevated temperatures. The sealing and releasing layer 51 may be, for example, an admixture of thermosetting and thermoplastic resins. Thermoset resins are relatively well known and soften under heat and pressure subsequently undergoing a chemical change which imparts to them a permanent rigidity and includes, for example, phenol or cresol formaldehyde condensation products, urea formaldehyde condensation product, thiourea formaldehyde condensation product, and the amino resins. The thermoplastic materials include those products heretofore noted which soften under heat and pressure and include such materials as vinyl chloride resins, vinyl acetate resins, styrene resins, acrylate and methacrylate resins, phenolic modified resins and copolymers of these materials. Both the thermoset and the thermoplastic resins are impervious to gas or air and an admixture thereof would produce an effective hermetic seal between, for example, the curl 33 of the dispensing container 10 and the bead 47 when the closure 45 is crimped in the manner heretofore described relative to the closure 15. By selecting a thermoplastic resin having a lower melting point than the point at which the thermoset resin begins to rigidify or set, the thermoplastic resin would migrate from the thermoset resin and flow outwardly between the skirt 48 and the curl 33 forming the loose crimp heretofore noted and permit gaseous propellant to vent from the container interior to atmosphere. If, for example, the melting point of the thermoplastic material or the admixture 51 was 140° F. and the thermosetting

point of the thermoset resin was 170° F., the thermoplastic material would flow outwardly from the channel 50 in the manner heretofore described prior to the thermoset resin becoming permanently rigid. Thus, the same venting that is achieved by superimposing the layers 31, 32 of the closure 15 can be equally obtained by admixing suitable resins, as in the case of the closure 45.

Another novel closure constructed in accordance with this invention is illustrated in FIGURE 7 of the drawing, and is generally designated by the reference numeral 55. The closure 55 is substantially identical to the closure 15 and includes an annular wall 56, an integral downwardly opening bead 57 and a peripheral skirt 58 defining an annular generally inverted U-shaped channel 60 corresponding to the channel 26 of the closure 15. A layer of metallic material 61, corresponding identically to the material 31 of the closure 15, is sandwiched between the bead 57 and a layer of material 62 corresponding to the layer 32 of the closure 15. However, the layer of sealing material 62 does not completely overlie the layer of metallic release material 61 and annular portion 63, 64 of the latter are exposed in the manner clearly illustrated in FIGURE 7. When the closure 55 is applied to a dispensing container in the manner heretofore described relative to FIGURE 4 of the drawing, a hermetic seal is formed between the curl 33 and the sealing material layer 62 which prevents the propellant from escaping between the curl and the lowermost surface of the layer 61 under normal room temperature conditions. Since the metallic material 61 is applied to the bead 57 in a molten condition when the closure 55 is inverted the layer 61 is fused to the bead 57 and propellant cannot escape between opposed surfaces of the layer 61 and the bead 57. However, when the container is subjected to elevated temperatures the metallic material 61 melts and readily flows outwardly between the curl 33 and the peripheral skirt 58 in the same manner as that described relative to the closure 15. However, since the layer of sealing material 62 does not completely overlie the layer of release material 61 the latter can flow more rapidly outwardly to achieve a more rapid vent area between the curl 33 and the closure 55 and thus more rapidly vent pressurized propellant from the container to atmosphere.

What is claimed is:

1. A container comprising a container body and an end closure, said container body terminating in a radially outwardly and upwardly and inwardly and downwardly directed curl, said end closure including an end panel terminating at a peripheral edge portion, said peripheral edge portion including a peripheral curl directed radially upwardly outwardly and then downwardly terminating at a peripheral skirt to define with said container body curl a generally annular chamber, means securing said curls to each other, said end panel including aperture means in which is received a valve operative dispensing mechanism, and means in said annular chamber forming a hermetic seal at room temperature and being also effective for releasing the hermetic seal when the container is subjected to temperatures in excess of room temperature whereby media can be vented from within the container and the rupture thereof is precluded.

2. The container as defined in claim 1 wherein said sealing and releasing means is an admixture of at least two materials, and one of said materials is gas impervious sealing material.

3. The container as defined in claim 1 wherein said sealing and releasing means is defined by at least two layers of material disposed in generally superimposed relationship, and an outermost one of said layers is constructed of gas impervious sealing material.

4. The container as defined in claim 1 wherein said sealing and releasing means is an admixture of at least two materials, and one of said materials is gas impervious sealing material.

5. The container as defined in claim 1 wherein said

sealing and releasing means is defined by at least two layers of material housed in generally superimposed relationship in said chamber, and an outermost one of said layers is constructed of gas impervious sealing material.

6. The container as defined in claim 2 wherein said two materials are copolymeric plastic materials, at least one of said materials having a relatively low melting point, and said one material being capable of migrating from the other of the materials when the admixture is heated generally to said melting point whereby a vent area is provided between the closure and the container body thereby precluding rupture of the latter under the influence of pressure build-up internally of the container.

7. The container as defined in claim 3 wherein an innermost one of said layers is constructed from metallic material.

8. A closure adapted for use with a container to prevent the container from rupturing when subjected to elevated temperatures comprising an end panel terminating in a peripheral edge portion, said peripheral edge portion including a peripheral curl directed radially upwardly outwardly and then downwardly terminating at a peripheral skirt to define a generally annular downwardly opening chamber, means wholly within said chamber for forming a hermetic seal at room temperature with a container body to which the closure is adapted to be secured, said last-mentioned means being also effective for releasing the hermetic seal when the container is subjected to temperature in excess of room temperature whereby media can be vented from within the container and rupture thereof is precluded, said sealing and releasing means being an admixture of at least two materials, and one of said materials is gas impervious sealing material.

9. A closure adapted for use with a container to prevent the container from rupturing when subjected to elevated temperatures comprising an end panel terminating in a peripheral edge portion, said peripheral edge portion including a peripheral curl directed radially upwardly outwardly and then downwardly terminating at a peripheral skirt to define a generally annular downwardly opening chamber, means wholly within said chamber for forming a hermetic seal at room temperature with a container body to which the closure is adapted to be secured, said last-mentioned means being also effective for releasing the hermetic seal when the container is subjected to temperature in excess of room temperature whereby media can be vented from within the container and rupture thereof is precluded, said sealing and releasing means being defined by at least two layers of material housed in generally superimposed relationship in said chamber, and an outermost one of said layers is constructed of gas impervious sealing material.

10. A closure adapted for use with a container to prevent the container from rupturing when subjected to elevated temperatures comprising an end panel terminating in a peripheral edge portion, said peripheral edge portion including a peripheral curl directed radially upwardly outwardly and then downwardly terminating at a peripheral skirt to define a generally annular downwardly opening chamber, means wholly within said chamber for forming a hermetic seal at room temperature with a container body to which the closure is adapted to be secured, said last-mentioned means being also effective for releasing the hermetic seal when the container is subjected to temperature in excess of room temperature whereby media can be vented from within the container and rupture thereof is precluded, said sealing and releasing means comprise at least two layers of material housed in generally superimposed relationship in said chamber, an innermost of said layers being metallic material having a relatively low melting point, and an outermost of said layers being constructed of gas impervious sealing material.

11. A closure adapted for use with a container to prevent the container from rupturing when subjected to elevated temperatures comprising an end panel terminating

in a peripheral edge portion, said peripheral edge portion including a peripheral curl directed radially upwardly outwardly and then downwardly terminating at a peripheral skirt to define a generally annular downwardly opening chamber, means wholly within said chamber for forming a hermetic seal at room temperature with a container body to which the closure is adapted to be secured, said last-mentioned means being also effective for releasing the hermetic seal when the container is subjected to temperature in excess of room temperature whereby media can be vented from within the container and rupture thereof is precluded, said sealing and releasing means is an admixture of at least two materials, at least one of said materials having a relatively low melting point, and said one material being capable of migrating from the other of said materials when the admixture is heated generally to said melting point whereby a vent area is provided between the peripheral edge portion of the closure and an associated container thereby precluding rupture of the latter under the influence of pressure build-up internally of the container.

References Cited

UNITED STATES PATENTS

	900,763	10/1908	McNott.	
	908,140	12/1908	Rigby	220—81
5	2,128,091	8/1938	Iversen et al.	
	2,500,119	3/1950	Cooper.	
	2,743,036	4/1956	Wachtell.	
	2,822,961	2/1958	Sequist.	
10	3,081,906	3/1963	Henchert	220—81 X
	3,245,578	4/1966	Sutton.	
	2,177,963	10/1939	Stover	169—26
	2,986,319	5/1961	Bierman et al.	

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U.S. Cl. X.R.

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