Sept. 19, 1939. C. J. JESNIG 2,173,571

VALVE FOR VACUUM PACK CLOSURES

Filed Dec. 27, 1938 2 Sheets-Sheet 1

Fig. 1.

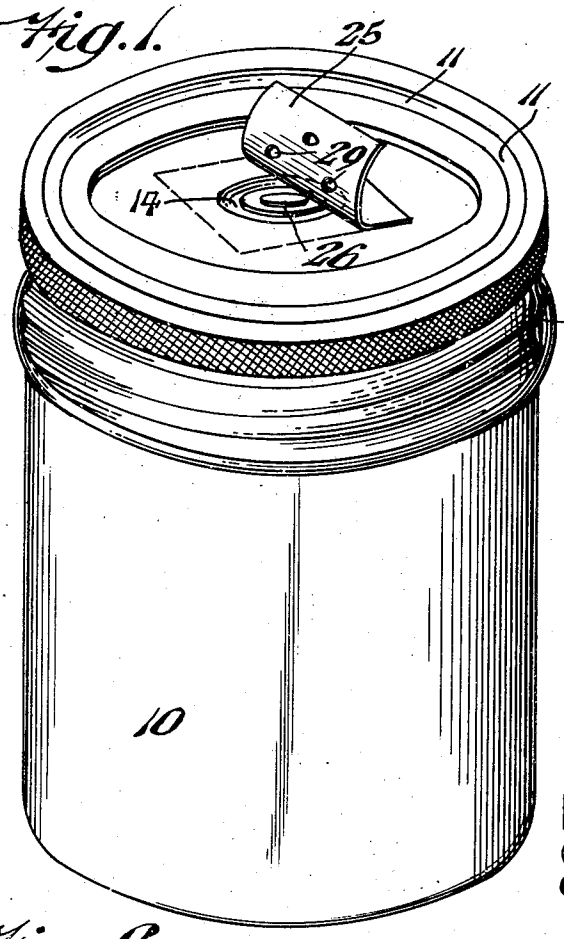



Fig. 3.

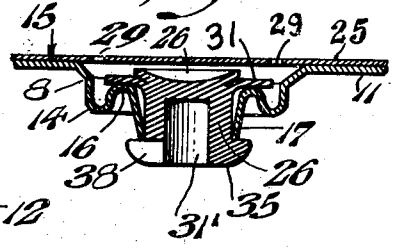



Fig. 4.

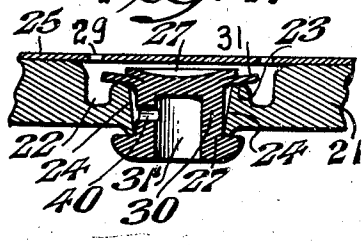



Fig. 5.

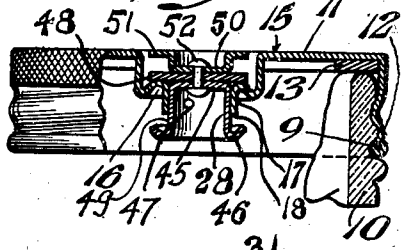



Fig. 2.

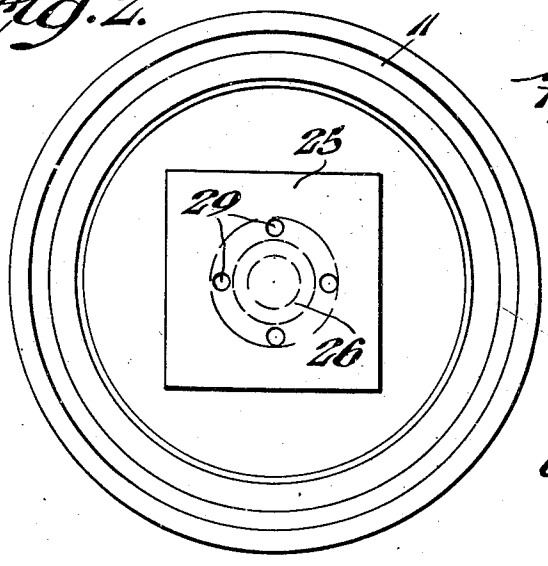



Fig. 13.

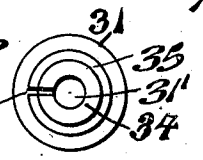
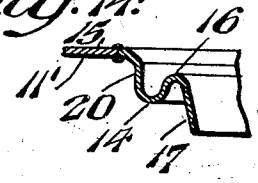



Fig. 14.

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VALVE FOR VACUUM PACK CLOSURES

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Fig. 6.

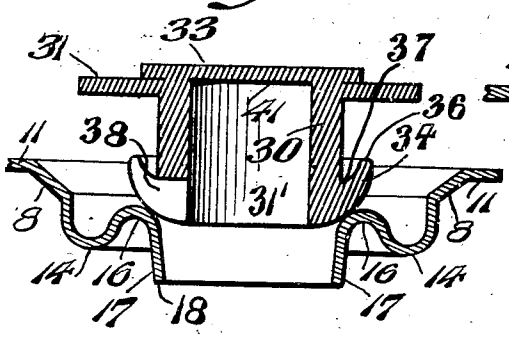



Fig. 10.

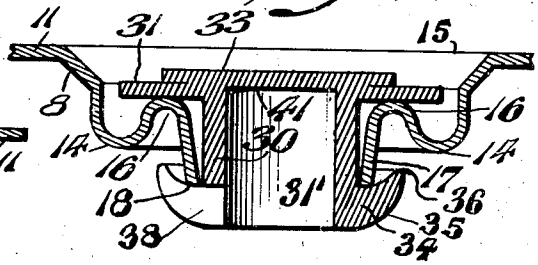



Fig. 7.

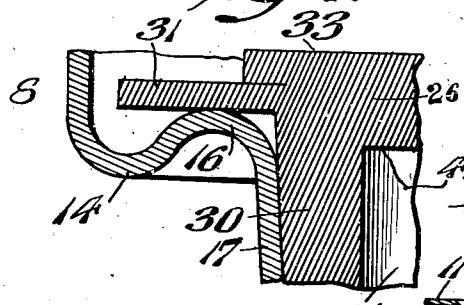



Fig. 11.

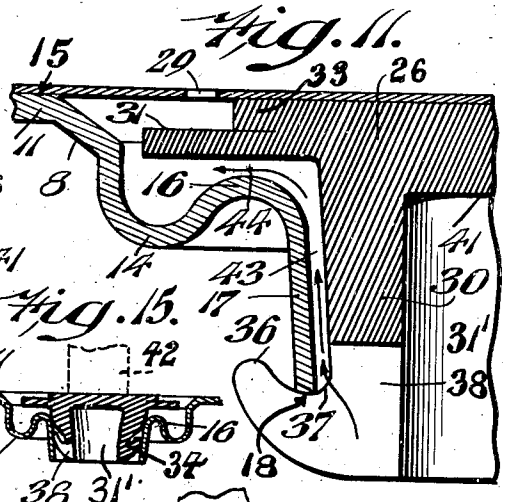



Fig. 15.




Fig. 8.

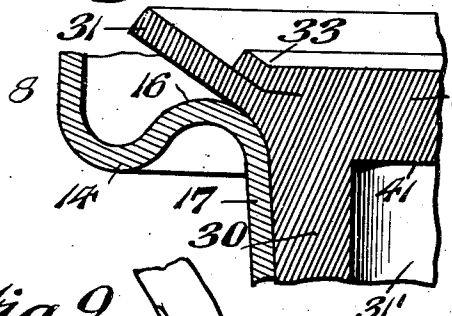



Fig. 12.

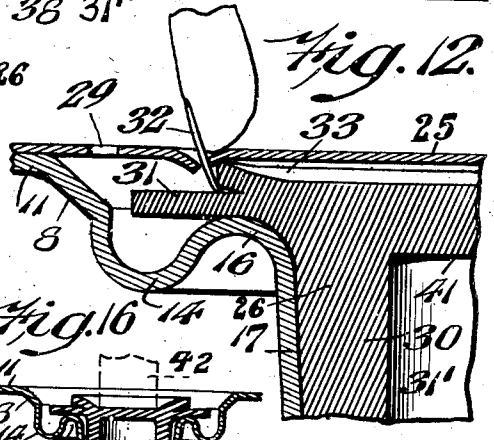



Fig. 9.

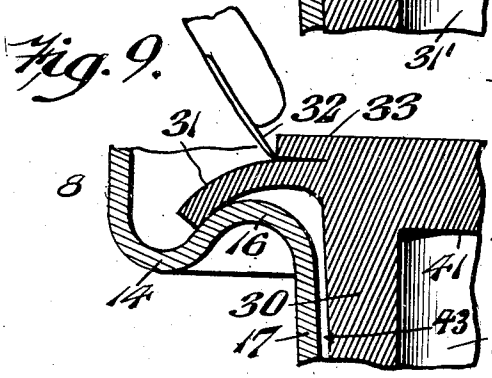
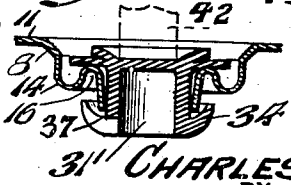



Fig. 16

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# UNITED STATES PATENT OFFICE

2,173,571

## VALVE FOR VACUUM PACK CLOSURES

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Application December 27, 1938, Serial No. 247,797

7 Claims. (Cl. 251—119)

This invention relates to valves for vacuum pack closures, and particularly to valve devices for sealing evacuated containers so as to maintain a high vacuum therein.

Vacuum packing has well known advantages, but, owing to various factors, it has not attained, as yet, the full efficiency to be expected, so far as commercialization is concerned. One adverse factor lies in the fact that heretofore, in certain types of packages, the complete sealing of the closure has been a matter of manipulating subsequent to the exhaustion in whole or part of the entrapped air, during which atmospheric air leaks back into the receptacle, and in which the very existence of an appreciable vacuum resists or prevents the ultimate closing action until the vacuum has become modified by leakage.

Consider an illustrative case in which coffee is packed in glass jars and is provided with screw-cap lids. The jars being filled with coffee, the lids are partially screwed on but the sealing is purposely and predeterminedly incomplete so that a given series of jars thus treated may be simultaneously evacuated of entrapped air in a closed chamber by lowering the pressure in the chamber to the desired degree for a period long enough to substantially equalize the pressures on the inside and the outside of a given jar in the chamber. It is worthy of note that one undesirable attribute of the processing to this point is that the lighter coffee particles are frequently blown out of the mass, traveling with the suddenly expanding air stream flowing out of the jar, between the edge or rim of the jar and the sealing gasket on the inner surface of the lid or otherwise, and are caught between the contiguous surfaces and may be driven partially into the gasket, to form interruptions to the continuity of smooth sealing area to make it impossible to actually seal the jar. These are called "leakers" and because of them many supposedly vacuum-sealed jars of coffee may actually have no vacuum upon them at all, after delivery to the retailer thereof, because of the slow seepage incident to the disposition of coffee particles (leakers), on the sealing edges.

Assuming that the jars with threaded tops are completely exhausted, after a given time interval, they are removed from the chamber and the lids are then screwed on as tightly as possible. It will be apparent that if the lids were sufficiently unsealed as to permit of exhausting of contained air, they are also unsealed enough to permit some atmospheric air to vent back into the jars before they can be sealed, so that the containers start with less than a complete vacuum. This is because of leakage before or after sealing or because of predeterminedly setting the vacuum at less than maximum to avoid the atmospheric pressure forcing the lid tightly and immovably on the jar as an incident of the high vacuum as the latter creates such friction that the lid may be incapable of rotation to complete sealing and therefore the vacuum either must be partially satisfied or predeterminedly lowered before the differential in pressures outside and inside is established at or decreases to a point where the friction can be overcome and the lid screwed to sealed engagement. It will be evident that the frictional resistance factor in threaded jar or container assemblies thus described is one that must be minimized, and this has been attempted according to past practices, by both the use of a gasket containing or carrying a lubricant such as is common in the art, and the use of glass jars of a very high grade having a smooth well-rounded, non-porous upper sealing edge with which a maximum of frictional freedom could be secured.

In the use of tin containers, it has heretofore been similarly difficult to complete the soldering sealing of the commercial tin under a substantially complete vacuum.

There are many sealing situations in which the differential air pressures involved may be either (or successively), external atmospheric and internally more or less than atmospheric, which it is desired to have sealed under all conditions, but safe against explosions from excessive differential pressures. Thus certain food stuffs may be packaged initially under some degree of vacuum, or at atmospheric pressures, but may generate gases of themselves that would be dangerous unless venting of such gases were permitted without breaking the seals. Similarly the "pack" method of canning requires the raising of the temperature of the jar or can to a boiling point, during which the entrapped air is permitted to expand and to escape through the loosely screwed or fastened cap, followed by the screwing down of the cap to finally sealed position before the temperature is permitted to drop appreciably, thus creating a certain degree a vacuum in the container. Obviously the fact that the container must be left partially unsealed during the elevation of the temperatures establishes a situation analogous to that of the stated coffee container treatment, in that the slightest downward change in temperature establishes differential pressures causing an inward rush of air, unless the operator is quick to secure the lids, so that frequently the incoming

air both introduces non-sterile impurities, oxygen, etc., and also reduces the degree of vacuum.

It is among the objects of this invention: to obviate the disadvantages of the prior art; to provide a sealing closure valve for vacuum jars which may be permanently sealed prior to evacuation and subsequently evacuated; to provide a vacuum pack closure valve by which a substantially perfect instantaneous seal may be secured retaining any predetermined degree of vacuum that can be imposed upon the container; to provide a vacuum pack closure valve for coffee and the like in which "leakers" are obviated between the sealing surfaces or the jar or closure and the lid as well as between the valve and its seat; to provide a vacuum closure valve having a large primary seal which is always a perfect seal because it is established in the absence of differential pressures, and during evacuation is forced axially only to effect a tightening of the seal; to provide a vacuum sealing closure valve which needs no tools either to apply the closure or to remove same following evacuation; to provide a vacuum closure pack in which the valve parts may be assembled and disassembled in sealing evacuated relation time after time to facilitate home use of commercially initially sealed receptacles or otherwise provided containers; to provide a vacuum sealing closure valve in which the disruption of the sealed relation may be accomplished by the finger nail of the operator pursuant to which the container may easily be opened for access to the contents; to provide a vacuum closure valve assembly subject to opening without injury to the elements so that the container may be reclosed even without vacuum, as a container; to provide a vacuum closure valve pack or assembly with a rupturable seal so disposed as to give visual indication of tampering, failing which if the seal remains unbroken the vacuum also remains unbroken; to provide a vacuum pack closure valve of such efficiency as to enable the use of a cheaper container than has heretofore been considered practicable; to provide a vacuum pack closure valve of extreme economy both of costs and utilization costs; to provide a vacuum pack closure valve which is so arranged that after a cover has been easily applied to the container and the container evacuated the maintenance of the vacuum thus created is automatic; to provide a closure valve device of improved efficiency and simplicity; to provide a closure valve device capable of venting internal pressures without admitting air from the atmosphere surrounding the container and thus to secure a package for gas producing elements such as cheese and the like without the high cost of the tempered glass structures normally necessary for withstanding the internal pressures that otherwise develop; to provide a vacuum pack closure and valve having no external excrescences or protuberances so that piling in stacks is facilitated without danger of affecting the vacuum seal of the valve on its seat; to provide a vacuum pack closure valve and seat enabling the use of small cheap individual evacuating elements operable with a single container assembly; to provide a vacuum pack closure valve and seat such as to obviate the use of expensive cap-applying, and large capacity evacuating, equipment; to provide a vacuum pack closure valve and seat assembly of equal availability for home as well as commercial use; to provide a vacuum pack closure having a valve and valve seat with a sealing cover arranged to withstand high vacuum which may be formed of sheet metal, or a molded or otherwise formed thicker element, of a plastic or glass or the like; to provide a simple unitary deformable molded valve button arranged for sealing purposes in a container and capable of simple and easy association therewith; to provide a valved vacuum pack closure in which threads are eliminated; to provide a valve and valve seat assembly for a vacuum container applicable to cans, bottles, or molded or plastic containers; to provide a vacuum valve assembly arranged for automatic venting internal relative pressure, and for venting external relative pressures into the container when the valve is lifted from its seat to provide a sealing flexible member on a valve with a valve aperture concentric of a transversely curved valve seat so that contact of the flexible member with the curved valve seat maintains during relative axial surges or movements of the valve and valve seat; and many other objects and advantages will become more apparent as the description proceeds.

In the accompanying drawings forming part of this description:

Fig. 1 represents a perspective of a container with an illustrative form of cover embodying the invention and showing a covering seal partially swung back to show the valve button.

Fig. 2 represents a plan of the same with the seal in position.

Fig. 3 represents a vertical transverse section through a preferred embodiment of the invention applied to a fragment of a sheet metal closure.

Fig. 4 represents a similar section through a slightly modified form of valve element associated with the fragment of a molded closure.

Fig. 5 represents a similar section, partially in elevation of a still further modified form of the invention in which the valve element is rigid and not deformable.

Fig. 6 represents a section through the preferred form of valve button in superposed relation to a fragmentary section of closure prior to the axial association of the parts, on an enlarged scale.

Fig. 7 represents a fragmentary section on an enlarged scale showing a portion of the valve element in seated relation to the valve seat.

Fig. 8 shows a similar section with the flexible washer element of the valve element bent upwardly as the valve is pulled inwardly.

Fig. 9 represents a similar section with the valve elongated and pulled from its seat, as by the operators nail shown in elevation.

Fig. 10 represents a vertical section through a fragment of closure element and the mounted button or valve device anchored operatively therein, as a sequel to insertion from the positions indicated in Fig. 6.

Fig. 11 represents a fragmentary enlarged section through a valve seat element and the valve, showing the venting action of one type of valve, and the attenuation thereof under elongation attending unseating from the valve seat.

Fig. 12 represents a fragmentary section through a valve and valve seat and the rupturable sealing element covering same, with the tip of a finger of a user in elevation.

Fig. 13 represents an end elevation of the button valve device.

Fig. 14 represents a fragmentary transverse section through a modified form of lid section having an independent inserted valve seat device.

Fig. 15 represents a fragmentary section of a valve seat element with a crowded valve device

shown in an intermediate position between the relative positions shown in Fig. 6, and that of Fig. 16.

Fig. 16 represents a section similar to that of Fig. 15, after the valve has been extruded or extended in the valve guide to its maximum extended condition to secure the valve in position.

Referring to Fig. 1, it will be understood that the container or receptacle **10** is diagrammatic in disclosure and is intended to represent bottles, jars, tins and other containers for any packaged commodity or product, whether solid, fluid or mixtures thereof, including illustratively coffee, peanut butter, olive oil, medicines, chemicals, or the like. It may have threads at its upper opening as at **9** (Fig. 5), so as to receive a cap **11** having the threaded barrel **12**. Alternatively the cap or lid **11** may be provided for axial attachment to the container **10** without threads, or by bayonet joints or the like, so as to be retained in sealing engagement by the atmospheric pressure effective externally on the lid. The cap or lid disclosed in Fig. 5 may be considered illustrative of one form of cap for the purpose, and usually this will carry or be arranged to abut a gasket **13**, which may be of rubber or the like, or of a compound that incorporates a wax or other lubricant to facilitate sealing closure with a minimum of frictional resistance to rotation. It is a further feature of the invention that the lid **11**, in place of being a separate and independent entity, as in the preferred embodiment, may be a substantially integral part of the main body of the container, and formed so either before or after filling the container. In this case the valve opening to be described may be used as the filling opening and the valve unit inserted therein after the goods are disposed in the receptacle. This is particularly valuable for commodities such as oils, milk, soups, or the like, although solids may equally well be so packaged.

It is a feature of the invention that at a desirable point in the container outer periphery, and usually concentrically in the upper surface thereof, a valve opening and valve seat are formed. In the disclosures of valve seats, in all but Fig. 4, the lid or cap is drawn or spun to form an annular moat or recess **14** of any desired depth or shallowness relative to the upper surface **15** of the closure member **11**, and of any desired cross sectional contour or internal width. The material of the lid toward the perpendicular axis of the lid is spun into the rounded crest, peak or valve seat **16**, leading into the substantially cylindrical valve guide portion **17** having the lower edge or terminal portion **18** of predetermined axial spacing from the ridge or crest of the valve seat **16**. The annular crest or peak **16** is laterally spaced from the inner surface of the tubular guide **17**. It will be understood that with relatively soft sheet metal lids, the valve opening and seat may be spun, or stamped. As shown in Fig. 14, the valve seat assembly may be formed as a separate stamping or swaging **20**, subsequently soldered or cemented into a lid **11'**. As shown in Fig. 4, the same contours may be secured in a molded or plastic lid, such as of phenolic resins, glass, or the newer plastics, as may be desired, as at **21**, with the recess **22**, valve seat **23**, and cylindrical valve guide **24**.

While the size of valve opening may vary according to demands, it is preferred that it be quite small so that the cost of the molded or otherwise formed valve "button" to be associated therewith, will be so minute that the cost of changing over to the package illustrated will be economically favorable. Purely by way of illustration, very favorable and desirable results have been achieved with a valve opening of the order of $\frac{3}{16}$ of an inch. Obviously this is illustrative and not limitative. Equally illustrative and not limitative is an axial extent of valve guide or opening for such stated diameter of a length of approximately $\frac{1}{8}$ of an inch, as a length that has proven useful.

It is preferred but is not essential that the upper ridge or peak surface of the valve seat **16** be spaced slightly inwardly or downwardly of the surface **15** of the lid **11**, and this may be accomplished by providing a sloping connecting surface **8** leading to the recess **14**, or otherwise, so as to bring the level of the entire valve to a point not projecting above the plane of the surface **15** of the lid **11**. This for the purpose of permitting the application of a planar seal, of fibrous material such as paper, or the like shown at **25** in Figs. 1 and 2, and preferably having apertures **29**, and also to enable stacked relation of the containers relative to and upon each other.

In order to seal the openings through the valves there are needed valve elements, such as that shown at **26** in Fig. 3, and at **27** in Fig. 4, or as shown at **28** in Fig. 5. The valves **26** and **27** are substantially identical and like parts will be similarly designated. Each comprises a relatively short hollow tubular barrel **30** having an internal recess **31'** and arranged for either loose or tight fit within the guide member, with the barrel spaced, radially or laterally from the peak of the valve seat by at least a substantially arcuate surface transversely of said peak, in order to permit relative flexing of the washer to be described without unseating, and at one end the barrel carries the relatively thin flexible washer element **31** of such diameter as to overlie the peak in all reasonable relative positions of barrel and valve guide, whether in the mid position with the flexible washer element substantially perpendicular to the axis of the valve as in Fig. 7, or when the valve has been pulled inwardly under extreme differential relative pressures, as in Fig. 8, or in the opposite extreme position shown in Fig. 9, as a result of a surge of liquid, for instance against the inner surface of the valve, or of prying pressure by the finger nail **32** or the like used by the operator. The closed end of the valve, carrying the flexible washer element, also carries the reinforcing overlying plug element **33**, of a diameter at least not less and preferably greater than the external diameter of the barrel so that it is impossible for the valve element to slide axially downward into the container through the valve opening under extreme differential pressures. In predetermined spaced relation to the washer or flexible margin **31**, is the inner or base guiding anchoring flange **34**, preferably having the tapering guiding lower surface **35** for guided insertion into the upper portion of the guide cylinder or valve opening **17**. The anchor **34** has an upwardly and outwardly flared skirt portion **36**, preferably terminating at a higher level than the peripheral recess **37** adjacent to the barrel **30**.

A feature of great importance lies in the provision of a vent, which in the preferred form, because of its ease of molded formation as shown in Fig. 3 and the related figures, comprises a substantially radial slit or slot **38** extending through the entire anchoring guiding portion **34** to communication with the internal bore **31'**. Obviously this can be molded in a simple two piece mold

and pulled axially apart with ease. On the other hand a perfectly feasible type of vent may be secured by providing a lateral bore, port or opening, as 40, in Fig. 4, extending from completely through a wall of the barrel. Obviously other forms of vents can be provided, and in any numbers, without affecting the fundamental concept of the invention. The vent may be provided, for instance, by fingers or ribs on the anchoring guide portion, or by proper formation of the valve opening itself, all as will be obvious from what is disclosed.

In the preferred form of valve, it is formed of a single molded piece of resilient material such as artificial or natural rubber or the like, and is of quite small size. Preferably the axial extent of the barrel 30 is predetermined with relation to the predetermined axial extent of the guiding valve opening 17, between its rim 18 and the peak 16 of the valve seat, so as to be shorter than such valve guide opening. It will be apparent that the button is so proportioned that the single resilient entity can be guided and forced axially downwardly from above the closure, as in Fig. 6, into the valve guide with the entering guiding anchoring flange or terminal collapsed inwardly into the bore 31, as in Fig. 15, and otherwise under such flowing stress as to permit the entering end to pass through the guide, as in the extended position shown in Fig. 16 to expansion again under the rim 18, to anchor the lower end against retraction because of the engagement of the hook under such rim. The button may be inserted by hand, or by a suitable plunger, as 42, and the entering edge may be coated with a suitable lubricant if necessary, or it may be molded into the rubber itself. It will be observed that after its insertion and permitted contraction to or toward its normal form, due to its elastic nature the flexible margin or washer element 31 will be pulled downwardly in sealing engagement or abutment upon the peak or crest of the valve seat at the same time that the anchoring portion engages the lower rim of the valve guide, so as to maintain normal seating and sealing regardless of gravity or any other factors except deliberate elongation of the valve as by the nail of the operator, or from excess internal pressure as will be made clear.

In the operation of the resilient button as shown in Fig. 11, upon the increase of relative internal pressures over that externally of the container, as in either the case of the location of the containers in an evacuating chamber, or the development of internal pressures exceeding those of the surrounding external atmosphere, the outer pressures effective externally upon the exposed upwardly presenting surfaces of the valve element, will be less than the inner pressures effective upon the downwardly presenting surfaces. The valve will thus be subjected to a force urging it toward unseating. At this instant, either because of the provision of port 40 in Fig. 4, or because of other venting provisions including the slit 38, air internally of the bore 31 will be enabled to pass laterally to the inner surface of the valve guide or passage 17, when it passes axially upwardly and outwardly to raise the flap valve or flexible margin and escape to the outside of the container. In the preferred form of invention with the unitary molded resilient button, elongated longitudinally of the button, either by internal relatively greater pressure as in Fig. 11, or by the nail 32 of the operator as in Fig. 9, causes a slight lateral attenuation of the barrel which slight decrease in diameter therefore facilitates flow of air externally of the barrel and between the barrel and valve guide 17. As indicated in Fig. 11, the attenuation or the normal diameter of the barrel if the latter is predeterminedly normally smaller than the valve guide, forms a channel 43 by which the air may escape under the washer, as through the opening 44 thus formed, and also pulls the inner anchoring end vertically against the end or the rim 18 to cause the slit 38 to be elongated longitudinally so as to lead from the internal bore 31' laterally to the passage 43, above the rim edge 18, and also to limit the axial outward movement of the valve button, because of its hooked enlarged end engaging the rim.

It will be understood that the valve may take many forms other than that described thus far. Thus, for instance, a compound valve element may be built up of individual units subsequently assembled, as shown in Fig. 5. The valve element 28 as there disclosed comprises a cylinder 49 which may be rigid, as by being formed of metal, and has an upper closed end 45 and a lower turned up flange 46, and of such external diameter as to have sliding guided engagement in the valve opening 17, which illustratively in Fig. 5, is disclosed as a substantially untapered cylinder. The cylinder 49 has a lateral port 47 extending through the wall relatively close to the closed end 45 when the cylindrical valve and guide have a close sliding fit as shown. A washer 48 as of soft rubber or the like overlies the end 45 of the cylinder and extends radially outwardly with a flexible margin portion overlying the valve peak 16 of the valve. The cylinder carries an end device comprising a dished metallic element having a planar central portion 50 overlying the washer and of substantially the same diameter as the cylinder 49, from which the raised flange 51 arises. The two rigid elements clamp the washer and are held together by suitable means such as a rivet 52.

The valve, of whatever form used is disposed in the lid or directly in the container, before or after filling same, and initially may be stressed as in the preferred form of rubber button valve shown in Fig. 3, for instance, or may be unstressed as in the relatively longer rubber button or in the partially rigid valve assembly of Fig. 5.

In the case of any commodity or processing that creates a relative differential pressure with a greater internal pressure than atmospheric, as in packaging certain types of cheeses, in packaging hot fresh roasted coffee, from which gases exude as at present understood, or for canning methods in which the container temperature is raised and correspondingly the internal pressures, the pressure is effective either directly or indirectly at point 44 between the valve seat peak and the flexible washer, to raise the washer sufficiently to permit venting of the excess internal pressure. The vent passages 47, 40 or 38 or otherwise each contribute to such automatic venting, as will be clear.

On the other hand exactly the same sort of thing occurs when suction is applied externally of the valves, the valve raises sufficiently from its seat to vent or exhaust air or gas from the inside of the container, with an automatic snapping shut of a flap valve when the washer 31 or 48 is pushed sealingly against the valve seat peak 16 by an onrush of externally applied atmospheric pressure.

The seal 25 is usually formed as a part of the

label, and is preferably substantially out of contact with the end of the button valve so as to be more readily ruptured by a fingernail although contact may be resorted to if desired. The seal may be transparent, or may be a separate diaphragm contiguous to the valve by a separate threaded sub-cap or the like (not shown). In each case it is preferred that the seal have at least one and preferably several venting apertures, as 29 for registration with recess 14.

It will be evident that there is an advantage in disposing the buttons under a normal axial tension between the end of cylinder 17 and the valve seat as in Fig. 3, so that the instant gas ceases to have enough effect to maintain the washer off the peak, the resilient tension pulls the washer tightly against the peak and the seal is resumed.

The pointed or rounded enlarged anchoring end 34 facilitates the guided entry of the valve button into the guiding valve surface 17, with a temporary collapse of the enlarged end to crowded disposition in the channel or aperture 17, and to subsequent expansion beneath the rim 18 to anchor the button in position in the valve guide.

In all of the forms of the device other than that of Fig. 5, it will be observed that the closure of the upper end of the hollow tubular shank is but a relatively thin flexible resilient web although not necessarily of the same order of thinness nor flexibility as attaches to the valve-seat-engaging-flange, so that with preponderating external air-pressures effective upon the outer surface of the valve, the web is caused to flex slightly inwardly as indicated in Figs. 3, 4 and 12 as the flange engages the valve seat crest and so that the energy of surges of material within the container, incident upon such web, causes a primary absorption of the energy through a more or less pronounced diaphragmatic action of the web resisted by its own resilience assisted by the external preponderating air-pressure, secondarily by the resilient extension of the tubular shank by the elongation to which it is subjected as the energy incident upon the web and not absorbed thereby becomes effective to elongate the shank. Such elongation, or movement of the closed end relative to the valve seat is also modified and terminated by the resistance to distortion possessed by the flexible flange as it is held against the valve seat by such preponderating external pressures effective upon the outer side of such flange. While the contribution of each of these factors to the total resistance to surges will change in accordance with various factors such as the degree of resilience of the closure web, of the elongatable shank, and of the flange, yet each will contribute something toward the desired absorption of the surge energy without dislodging the flexible flange from the valve seat crest.

I claim as my invention:

1. A valve element for receptacles exposed to differential internal and external pressures, comprising a short hollow resilient axially extensible shank having an internal bore closed at one end by a transverse web, a thin flexible resilient flange extending laterally from the closed end of the shank and having a substantially uniform flexation thruout its extended area, a reinforcement of smaller diameter than the flange secured to said web and of such proportions that when the flange is in a condition of extreme deflection away from the shank about the reinforcement the total diameter of the reinforcement and deflected flange is larger than that of the shank, an anchoring flange mounted on the lower end of the shank, the element having a venting aperture extending from within the bore to the outer surface of the shank.

2. A valve element for receptacles exposed to differential internal and external pressures, comprising a unitary molding of resilient material including a short hollow axially extensible cylindrical shank having an axial bore closed at one end by a transverse web, and at the other merging into a transverse anchoring flange, an initially substantially planar thin flexible resilient flange extending laterally from the closed end of the shank and having a substantially uniform flexation in both directions axially of the shank throughout its extended area, a substantially disc shaped reinforcement of smaller transverse diameter than the second mentioned flange integral with the web in the center and having a peripheral margin overlying the second mentioned flange and spaced therefrom by an annular slit to permit limited flexation of the reinforcement relative to the second mentioned flange and arranged to form with the second mentioned flange in a condition of extreme deflection away from the shank a composite transverse thickness of the closed end greater than that of the shank, the element having a venting aperture extending transversely from within the bore to the outer surface of the shank.

3. A valve for receptacles exposed to differential internal and external pressures and to surges within the receptacles, comprising a valve seat having an upper annular crest merging into a generally axially extending guide surface defining an opening radially spaced from the crest and having a lower guide terminal, a valve element in said opening and comprising a shank having an internal bore closed at the upper end by a transverse thin flexible web, an initially substantially planar thin flexible flange extending laterally from the closed end of the shank and having a substantially uniform flexation throughout its extended area and overlying said crest, means anchoring the lower end of the shank to the said terminal, said shank being resiliently axially elongatable between the contact of the anchoring means and the terminal and the upper closed end, said valve flange being constructed and arranged to overlie the crest and to establish a substantial line contact therewith to maintain such contact as the web is axially flexed and the closed end of the shank is axially moved relative to the terminal of the guide incident to the impact of surges against said web.

4. A valve for receptacles exposed to differential internal and external pressures and to surges within the receptacles, comprising a valve seat having an annular crest merging into a generally axially extending guide having a lower terminal axially spaced from the crest and defining a valve opening radially spaced from the crest, a valve element in said opening and comprising a hollow shank closed at one end by a flexible web of such resilience and thinness as to flex in response to surges and having a lower transverse anchoring portion engaging said terminal, a thin flexible flange extending laterally from the upper end of the shank and overlying the crest of the valve seat, and said web being arranged for flexation in response to surges within the receptacle whereby a portion of the surge energy is absorbed without unseating said thin flange from the said annular crest.

5. A valve for receptacles exposed to differential internal and external pressures and to surges within the receptacles, comprising a valve seat having an upper annular crest merging into a generally axially extending guide surface having a lower terminal and defining a valve opening, a valve element in the opening and comprising a hollow resilient axially elongatable shank having an internal bore closed at the upper end by a thin flexible transverse web, an initially substantially planar thin flexible flange extending laterally from the closed end of the shank and having free flexing in both directions axially of the shank, an anchoring flange on the shank engaging said terminal, said valve flange overlying the crest, said shank being predeterminedly shorter axially between the flanges than the axial distance between the terminal and the crest to force the flange out of its planar state into sealing line engagement with said crest without appreciable differentials between the internal and external pressures and said thin flexible web being arranged to flex under surge impacts.

6. A valve comprising a valve seat having an upper annular crest merging into a generally axially extending valve guide having a lower terminal and defining a valve opening inwardly radilaly spaced from the crest, said terminal being axially spaced from said crest, a valve element in said opening and comprising a shank having an internal bore closed at the upper end by a transverse web, a thin flexible resilient flange extending laterally from the closed end of the shank and having a substantially free axial flexing in both directions and overlying said crest, means anchoring the lower end of the shank to the said terminal, said shank being resiliently axially elongatable between the contact of the anchoring means and said terminal and the upper closed end, said valve flange overlying the crest establishing therewith a substantially line contact in response to preponderating external pressures and maintaining such contact as the closed end of the shank is moved axially of the guide, said valve shank defining a space with said guide during axial elongation of the shank and venting means operatively associated with the valve element for venting relatively high internal pressures effective in the internal bore to the outer surface of the shank during a condition of relative elongation of said shank.

7. In containers, a valve seat comprising an inwardly tapering valve guide having a lower substantially annular terminal and at its upper wider end merging into an annular crest spaced outwardly radially from said terminal, a valve element having a substantially cylindrical shank of a diameter externally as to have substantially guided relation with said terminal with the guide angularly divergent therefrom and forming a space above the terminal, said shank having an extension engaging the terminal to restrain outward movements of the shank, a thin flexible non-metallic resilient flange mounted on the shank and extending laterally so as to cover said space and overlie the crest and arranged to flex relative to the shank, means venting preponderating internal pressures from the inside of the valve seat to the space between the divergent guide and shank.

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