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2,779,514

DISPENSING APPARATUS

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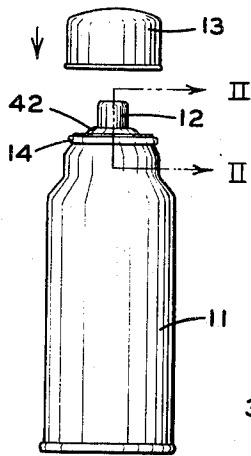


fig. 1

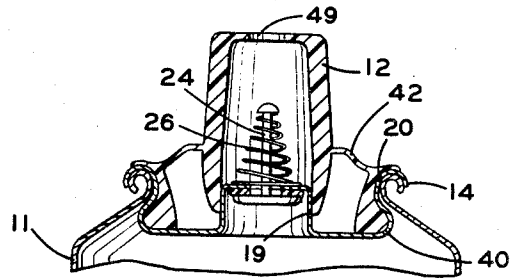


fig. 2

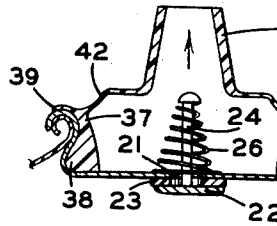


fig. 3

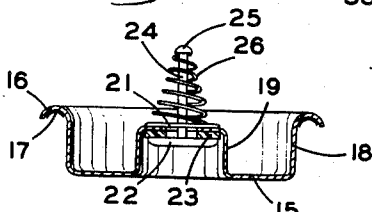


fig. 4

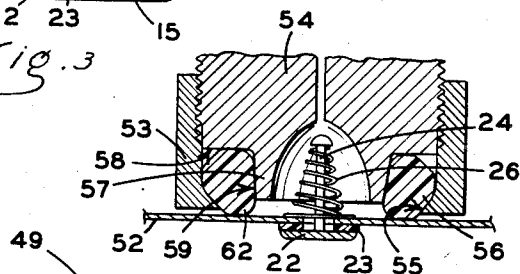


fig. 5

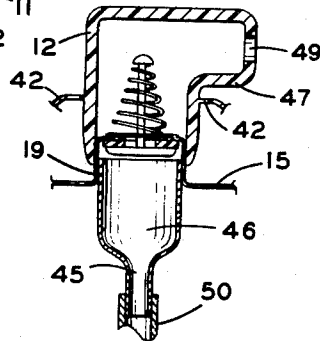


fig. 6

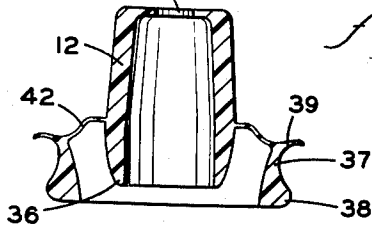


fig. 7

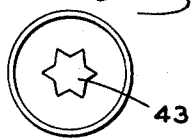


fig. 8

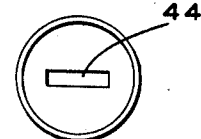


fig. 9

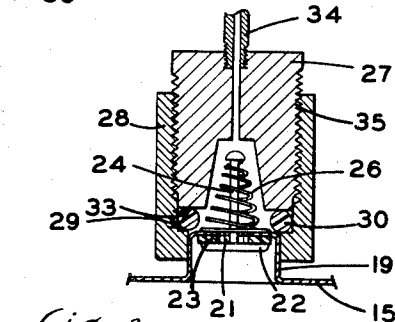


fig. 10

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DISPENSING APPARATUS

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6 Claims. (Cl. 222—394)

This invention relates to a dispensing apparatus, particularly to a valve and spout for dispensing a foam-forming liquid from a pressurized container.

The packaging and shipping of liquids in pressurized non-returnable containers from which they can be dispensed at will has assumed a great deal of importance in commerce. Many of the liquids which are packaged and sold extensively in this way are those which are normally used in the form of a foam. Such liquids include soap solutions for use in shaving, cream for use as whipped cream, hand lotions, leather dressings and many others.

Packaging of such products is usually accomplished by enclosing the liquid product together with a suitable amount of a suitable gas, such as certain of the halogenated methanes, in a sealed container which will withstand the pressure developed and which is equipped with a dispensing valve. When it is desired to use the product, the valve is opened to allow a desired amount of the product to be forced out of the container by the internal pressure existing in the container. Under the pressure prevailing in the container a considerable proportion of the gas is dissolved in the liquid and this dissolved portion vaporizes immediately upon issuance of the liquid from the valve into a region of lower pressure. The result is that the product is immediately converted to a foam, the stability and density of which depend upon the properties of the particular liquid employed and upon the proportions of liquid and pressurizing gas originally enclosed in the container. In certain instances sufficient of the pressurizing gas may be used to provide a phase of liquefied gas in the container, the container being shaken vigorously before each dispensing operation.

One of the major problems encountered in large scale operations involving this type of product and packaging is that of providing a suitable dispensing valve which is economical to construct, which will not leak after many months of shelf storage and which is simple to operate. Inasmuch as the container is usually discarded when empty, a definite limiting factor is the cost, both of the valve itself and of its installation. In addition, it must not interfere with or complicate the procedure for charging either the liquid product or the pressurizing gas into the container. Many types of valves have been made and utilized for this purpose but each has been characterized either by an excessive cost, by imperfect operation, by short shelf life, by complication of the filling procedure or by some other feature, or by a combination of such features, which detracts material from its overall satisfactory nature.

The present invention is concerned with a new dispensing valve and spout which is especially adapted to the dispensing of foam-forming liquids from a pressurized container. The apparatus of the invention can be constructed easily and at very low cost. It can be operated simply and with ease to dispense precisely the desired amount of the liquid in the form of a foam and will

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not deteriorate or operate less effectively after long periods of storage and intermittent use. The device is also characterized by its ability to dispense a product from the container in a neat and clean manner without the accumulation of the foamed product on the outside of the apparatus in an untidy manner. The filling of the container is simplified greatly using the new device, no complicated or costly apparatus being required to charge either the liquid product or the pressurizing gas into the container.

The invention can be understood readily by reference to the accompanying drawing wherein, in the interest of clarity, certain features are shown on a somewhat exaggerated scale, and wherein:

Figure 1 is an elevation of a container, with the protective cap removed, suitable for packaging and dispensing a foam-forming liquid and embodying dispensing means of the invention;

Figure 2 is a partial sectional elevation taken along the line II—II of Figure 1 and showing clearly the component parts of one modification of the apparatus of the invention assembled in the container ready for the dispensing of a foam-forming liquid from the container;

Figure 3 is a sectional elevation of a sealing member and valve assembly as used in the modification of the invention shown in Figure 2;

Figure 4 is a sectional elevation of a spout and valve operating member as used in the modification of the invention shown in Figure 2;

Figure 5 is a sectional elevation similar to Figure 2, but showing the container and dispensing means as particularly adapted to the dispensing of a foam-forming liquid with the container in a substantially upright position;

Figure 6 is a plan view of the dispensing port of the apparatus of the invention suitable for dispensing a foam as a ribbon of star-shaped cross section;

Figure 7 is a plan view similar to Figure 6 but showing a modification of the dispensing port suitable for dispensing foam in the form of a flat ribbon;

Figure 8 is a partial sectional elevation of apparatus suitable for charging a pressurizing gas into a filled and sealed container of foam-forming liquid embodying the modification of Figures 2 and 3;

Figure 9 is a partial sectional elevation similar to Figure 2 but illustrating alternate forms of some of the parts; and

Figure 10 is a partial sectional elevation of apparatus suitable for charging a pressurizing gas into a filled and sealed container of foam-forming liquid embodying the modification of Figure 9.

The terms "outwardly" and "inwardly," and related terms, are used herein with respect to the interior of the container.

Referring to Figure 1, there is illustrated a can 11 of conventional general design for packaging a foam-forming liquid under pressure and showing, additionally, a portion of a resinous flexible dispensing spout 12 and annular diaphragm 42 which comprise a part of the present invention and which will be referred to later. A conventional protective cap 13, for use during shipping and when liquid is not being dispensed from the container, is shown in detached position. The cap 13 in the illustration given engages frictionally a ridge 14 which encircles the upper end of the container and which, as will be described later, is formed at the time the container is sealed.

In one modification of the invention with which Figures 2, 3, 5 and 8 are primarily concerned, the container 11 is sealed, as shown in detail in Figure 2, with a sealing member carrying a valve assembly. The sealing member and valve assembly as it appears before being

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utilized for sealing the container is shown more particularly in Figure 3. The sealing member comprises a cup-shaped rigid member 15, usually of metal, which is of a size and configuration, usually circular, to seal the container. The circumferential edge of the sealing member 15 is turned outwardly and backwardly toward itself to form a suitably grooved ring 16 which is lined with a coating of a suitable sealing compound 17, such as those which are conventionally used in the forming of rolled seams in the can-forming art. The grooved ring 16 is formed and dimensioned in a manner such that when the cupped portion of the sealing member 15 is inserted into the open end of the container 11 the grooved ring and the rim of the opening of the container can be formed into a seam, as illustrated at 14 of Figures 1 and 2, to provide a strong gas-tight seal. The cupped portion of the sealing member 15 thus projects into the container. The sealing operation is carried out in such a manner that the side wall 18 of the sealing member 15 is deformed to provide an annular recess 40 in the side wall 18 which is overhung by the seal 14 in the form of an annular rounded shoulder 20, the purpose of which will be apparent as the description proceeds.

The sealing member 15 is provided with a valve dome 19, usually centrally located, which projects outwardly from the wall of the member and which communicates with the interior of the container. In practice, the valve dome 19 is generally formed by drawing the central section of the sealing member 15. A valve port 21 is located in the wall of the valve dome, usually centrally in its outer wall, and the section of the valve dome wall immediately around the valve port is shaped, usually flattened, to form a valve seat. The valve port 21 is closed by a valve body 22 inside the valve dome which seats on the valve seat, a gasket 23 of a suitable material, e. g. of rubber or a synthetic resin, preferably being interposed between the valve and the seat to facilitate gas-tight seating of the valve body 22. The valve body 22 is secured to one end of a valve stem 24 of convenient length which projects through the valve port 21 and which is peened, flattened or otherwise modified at its outer end 25 to retain a stressed compression spring 26 between the modified end 25 of the stem and the outer surface of the valve dome 19. The spring thus serves to maintain the valve body 22 normally in a firmly seated position. The valve body 22 can, however, when desired be unseated sufficiently to permit liquid contents of the container to flow past it and out through the valve port 21 by exerting slight lateral pressure on the stem causing the stem and valve to tilt laterally to a slight degree.

In filling and pressurizing the container, using the modification of the sealing member illustrated particularly in Figures 2 and 3, the desired amount of foam-forming liquid is generally first loaded into the container under atmospheric pressure. The sealing member 15 carrying the valve assembly just described is then inserted into the opening in the container and secured in place by forming the seam 14, generally by expanding the section of the cup wall 18 so that it extends under the seam to form the recess 40. By following this procedure and by subsequently introducing the pressurizing gas into the sealed container through the valve port 21, the necessity of carrying out the filling operation either in enclosed equipment under pressure or at a low temperature is avoided.

The pressurizing gas can be introduced into the filled and sealed container of Figure 2 utilizing the pressurizing nozzle illustrated in Figure 8. The pressurizing nozzle comprises a male member 27 which threadably engages a female member 28. The female member 28 is provided at one end, herein referred to as its "lower" end, with a central bore having a diameter just sufficient to enable the member to slip easily over the valve dome 19. At a suitable distance from its lower end the diameter of the bore is increased to provide a substantially square

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shoulder 29 to receive an O-ring 30 which is constructed of a resilient material, such as rubber or a synthetic resin which is unaffected by the foam-forming liquid or the pressurizing gas, and which is dimensioned so that it will rest on the shoulder 29 when dropped into the upper end of the enlarged bore in the female member but so that it will not slide downwardly over the valve dome 19.

The upper end of the bore in the female member 28 is threaded to receive the externally threaded lower end of the male member 27 which has a shoulder 33 at its lower end to engage the O-ring 30 when the members 27 and 28 are screwed together with the O-ring in place. The male member 27 has a bore at its lower end of sufficient diameter and length to form a chamber into which the valve stem 24 and the spring 26 can project without contacting the wall of the bore. The bore in the upper part of the male member 27 is of any suitable diameter and is usually threaded internally to threadably engage the end of a suitable gas delivery conduit 34.

In use for introducing the pressurizing gas into the filled container, the lower end of the filling nozzle just described is lowered over the valve and valve dome assembly until the O-ring 30, which is clamped firmly between the shoulders 29 and 33 to prevent gas leakage through the threads 35, is seated firmly in gas-tight relationship on the valve dome 19. A gas supply valve, not shown, for admitting gas to the filling apparatus through the gas conduit 34, is then opened. As the gas passes through the conduit 34 and bore of the male member 27, its pressure on the upper side of the valve body 22 compresses the spring 26 and causes the valve port 21 to open. The gas then passes into the interior of the container. The amount of gas introduced into the container can be measured in any convenient manner. It is generally sufficient to supply the gas to the conduit 34 at a constant pressure and allow it to flow until no further amount enters into the container. The gas supply valve is then closed and the pressurizing nozzle removed. The pressurizing nozzle just described is advantageous because it can be operated and used under conditions of ordinary assembly line procedure without the provision of costly pressurized charging apparatus and also because the wastage of gas at each charging operation is very small, being represented by the volume of the bore in the male member 27 and of the conduit 34 between the male member and the gas supply valve. Inasmuch as the spring 26 is generally of a small overall diameter and the valve stem 24 is short, the total volume of gas thus vented at each pressurizing operation is extremely small. The apparatus is sturdy and compact, simple to construct and operate and lasts indefinitely, the only repair needed being the installation of a new inexpensive O-ring 30 at infrequent intervals.

Following the filling and pressurizing of the container, as described, the spout and valve operating member of Figure 4 is attached. This member, which is constructed of a suitable flexible resinous substance, such as rubber, polyvinyl chloride, polyethylene or other suitable synthetic resin, comprises a generally elongated spout 12, one end of which 36, herein referred to as the "lower" end, is dimensioned so as to slip snugly over the valve dome 19. Inasmuch as the valve dome 19 is generally circular in cross section, the bore of the spout 12 is also usually circular, although it will be apparent that the actual shape of the spout other than its lower end 36 can be varied almost at will.

The spout member also comprises a circular engaging ring 37 spaced from and encircling approximately the lower end 36 of the spout 12. The engaging ring 37 is adapted to engage the inner side of the seal 14 as illustrated in Figure 2 and has near its lower edge an encircling projecting thickened portion 38 which projects under the inwardly projecting portion 20 of the seal 14 referred to previously. Because of the configuration of the seal 14 and of the engaging ring 37, the ring can be

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pushed into the sealing member 15 whereupon the thickened portion 38 of the engaging ring 37 engages the underside of the seal 14 so that the ring is extremely difficult to remove. The upper section 39 of the engaging ring 37 is flared upwardly away from the spout 12 and is of diminishing thickness so that it lies smoothly along the curvature of the seal 14 as illustrated in Figure 2.

An annular diaphragm 42 is formed integral with the spout 12 and with the engaging ring 37 so as to extend between and join them together. The diaphragm 42 is usually joined to the spout 12 near to, but removed from, its lower end and to the engaging ring 37 at a point somewhat above the thickened portion 38. When so formed the resistance of the engaging ring 37 to being disengaged from the seal 14 serves to keep the spout 12 located normally surrounding but out of contact with the valve stem 24 and the spring 26. In the modification described in the preceding paragraphs, the diaphragm 42 also serves to keep the lower end of the spout 12 pulled downwardly into tight leakproof contact with the valve dome 19. The diaphragm 42 is also preferably formed with a non-planar configuration and thinner than either the wall of the spout 12 or the main body of the engaging ring 37 so that it will flex easily, the reason for which will be apparent later. The spout 12 is provided with a suitable dispensing port 42 in its wall, usually in its upper end.

With the flexible spout and valve operating member of Figure 4 installed on the filled container in the manner described, and as illustrated in Figure 2, it is only necessary in order to open the valve port 21 so that foam-forming liquid can flow from the container to apply lateral pressure to the spout 12 from any direction so that it flexes and engages the spring 26 or the valve stem 25 sufficiently to tilt the valve stem slightly to one side. Foam-forming liquid charged with the pressurizing gas then flows through the valve port 21 into the interior bore of the spout 12 where it foams instantly and issues as a ribbon of foam from the dispensing port 49. When the pressure on the spout 12 is released, it assumes its original position, the valve body 22 reseats closing the valve port 21 instantly and foam ceases to flow from the dispensing port 49. The arrangement described is of particular value in that the flow of foam from the dispensing port 49 is arrested immediately upon reseating of the valve body. Foaming takes place entirely inside the spout 12 and there is thus no residual foaming which occurs outside the spout 12 to give the container an untidy appearance. Because of the location, thinness and non-planar configuration of the diaphragm 42, the spout 12 can be flexed repeatedly to the desired degree without disturbing the contact of its lower end with the valve dome 19 or of the engaging ring 37 with the seal 14. The entire spout, diaphragm and engaging ring present a smooth artistic appearance, the surface of which is entirely free of dirt-retaining pockets and crevices.

The dispensing apparatus described is adapted to the dispensing of a foam-forming liquid when the container is in an inverted position, it being noted that in the dispensing of this type of product it is essential that the liquid itself rather than the gas above it in the container be withdrawn through the dispensing valve. When it is desirable that the liquid be dispensed with the container not inverted, it is convenient to provide the cup-shaped sealing member with a down pipe whereby liquid is withdrawn from the bottom of the container. One such arrangement is illustrated in Figure 5 wherein the lower part 50 of the down pipe 45, which may conveniently be of a flexible material, extends to the bottom of the container and is enlarged at its upper end to form an enlarged section 46 which can be pressed into the valve dome 19 to form a gas-tight seal. When such an arrangement is provided, the spout 12 is also preferably modified in any suitable manner, as by providing a lateral extension

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47 to enable the foam to be dispensed in a horizontal direction.

The shape of the dispensing port 49 can be varied to give desired decorative effects because the foam issues from the port as a stiff, completely foamed ribbon which maintains its shape for a long period of time. In Figure 6 there is illustrated schematically a dispensing port 43 by means of which the issuing foam acquires the shape of an elongated rod with a star-shaped cross section. In similar manner the dispensing port 44 of Figure 7 will produce a flat ribbon of foam. Other desirable effects can also be obtained.

In the modification of the invention illustrated in Figures 9 and 10, certain of the parts are shown in a somewhat altered form although they perform the same functions as those of the corresponding parts described previously. In Figure 9 the cup-shaped sealing member 52 is formed without a valve dome, the valve seat being formed on the inner surface of the flat bottom of the cup around the valve port 21, the gasket 23, the valve body 22, the valve stem 24 and the spring 26 being substantially the same as those shown in Figure 2. The seal 14 and the recess 40 are also formed as described previously. However, in this instance, since there is no outwardly projecting valve dome formed on the bottom of the cup-shaped sealing member 52, the lower end of the spout 12 is merely secured to the diaphragm 42 and its lower end is not necessarily prolonged as at 36 of Figure 4. The engaging ring 37, including the annular projection 38 and the outwardly tapering upper edge 39, is formed integral with the diaphragm 42 and the spout 12.

The pressurizing nozzle shown in Figure 8 can be modified as shown clearly in Figure 10 to enable it to be used for pressurizing a container sealed with the sealing member and valve assembly shown in Figure 9, the pressurizing operation being, of course, carried out before the spout is attached. In the modified version of the filling nozzle shown in Figure 10, the female member 53 and the male member 54 engage one another threadably as before, the male member being suitably bored as before. In this instance, however, the shoulder 55 of the female member 53 against which the O-ring 56 rests is formed with its surface sloping downwardly toward the center of the member. The male member 54 is projected downwardly as at 57 past the shoulder 58 which engages the upper side of the O-ring 56. The projection 57 is formed with its outer surface 59 sloping upwardly away from the center of the member so that as it is screwed into the female member 53 the surface 59 will engage the O-ring 56 and force it against the sloping shoulder 55, thus clamping it securely between the shoulder 55, the shoulder 58 and the sloping surface 59. This desirable effect is accomplished by forming the surface 59 of projection 57 and the surface of the shoulder 55 so that if prolonged downwardly they would intersect at a suitable acute angle. Further tightening of the members 53 and 54 deforms the O-ring, which is usually circular in cross section, and forces a lobe 62 of it to protrude downwardly below the lower end of the female member 53 sufficiently to form a gas-tight seal with the bottom of the cup-shaped sealing member 52 when the pressurizing nozzle is lowered over the valve stem 24 and the spring 26 into pressure contact with the bottom of the cup-shaped member. The filling and pressuring operation can thus be carried out precisely as illustrated in Figure 8 except for the modifications just described.

Although certain modifications of the invention have been shown and described in detail, it is pointed out that still other modifications are possible and are contemplated by the invention. For example, the sealing member can be formed similar to that shown at 15 of Figure 3, but with a valve dome which projects into the container rather than outwardly of the container as shown in Figure 3. In this instance the valve body would, of

course, seat on the surface of the dome inside the container and the valve stem and spring for tensioning the valve body on its seat would lie partially within the dome. In this instance also the lower end of the flexible spout can be prolonged downwardly and formed so as to engage the side wall of the dome with its outer surface, if desired.

As indicated previously, an important feature of the invention is the formation of the spout 12, the engaging ring 37 and the diaphragm 42 in the manner described and as an integral unit so that the spout is normally retained in its position surrounding, but out of contact with, the valve stem 24 and the spring 26 but so that it can be flexed or tilted to open the valve. The retention of the spout member is effected by the engagement of the encircling projection 38 of the engaging ring 37 with the underside of the seal 14 forming the shoulder 20. When the seal 14, the shoulder 20, the recess 40 and the encircling projection 38 are formed as shown, a great deal of force is required to dislodge the engaging ring 37 from its position within the cup of the cup-shaped sealing member.

It has been mentioned previously that the diaphragm 42 is preferably non-planar and that it is generally somewhat thinner than the wall of the spout 12 or the main body of the engaging ring 37. The thinner diaphragm enables the spout to be tilted to operate the valve with a minimum of flexing or deformation of the spout body itself, most of the deforming occurring at the diaphragm. At the same time the diaphragm should, of course, not be so thin that it will fail to return and retain the spout 12 in its normal position where it furnishes considerable protection against accidental opening of the valve. Although it is preferable that the diaphragm 42 be of any suitable non-planar form especially when the lower end 36 of Figure 4 of the spout engages a valve dome, it is apparent that in the modification of Figure 9 the diaphragm 42 can without appreciable disadvantage be substantially planar and also substantially parallel with the bottom of the cup-shaped sealing member 52, if desirable.

I claim:

1. Apparatus for dispensing a foam-forming liquid from a pressurized container including, in combination: a container; a cup-shaped sealing member projecting into the container having a valve port in its wall; a valve body in the container seating around the valve port to close the valve port and maintained normally in its seated position by a spring encircling a valve stem secured to the valve body and extending outwardly through the valve port and confined compressively between the outer end of the valve stem and the surface of the cup-shaped sealing member around the valve port; a seal joining the rim of the cup-shaped sealing member and the main body of the container wall forming a shoulder projecting over a recess in the sealing member wall below the shoulder; a flexible resinous spout encircling and enclosing the extending valve stem and spring in normally non-contacting relationship; an engaging ring of flexible resinous material encircling the lower end of the spout extending into the recess below the seal and engaging the seal to resist displacement from the recess; and a flexible resinous diaphragm extending between and integral with the spout and the engaging ring.

2. Apparatus for dispensing a foam-forming liquid from a pressurized container including, in combination: a valve dome projecting outwardly from the wall of the container having therein a valve port; a valve body spring-tensioned inside the dome in a position normally closing the valve port and having a valve stem extending outwardly through the valve port whereby the valve can be tipped from its seat to open the port by lateral pressure on the stem; a flexible resinous spout engaging the valve dome at its inner end and encircling and enclosing the extending valve stem in normally non-contacting relation-

ship to form a chamber around the stem except for a dispensing port in the wall of the spout; and means integral with the inner end of the spout to retain it in gas-tight engagement with the dome when it is flexed by lateral pressure against the valve stem to open the valve.

3. In a device useful for dispensing a foam-forming liquid from a pressurized container, the combination including: a cup-shaped rigid sealing member adapted to be secured around its edges in a port in a wall of a container with the cup projecting into the container; a generally centrally located outwardly projecting valve dome in the wall of the sealing member having a valve port in the wall of the dome surrounded by an internal valve seat; a valve body located internally of the dome adapted to cooperate with the valve seat to close the valve port and having a valve stem projecting outwardly through the valve port, the valve being spring-tensioned in a seated position by a compression spring confined between the outer surface of the valve dome and the outer end of the valve stem and being adapted to be opened by lateral pressure on the valve stem sufficient to tilt the valve on its seat; a flexible resinous spout engaging at its inner end the valve dome in gas-tight relationship and surrounding and enclosing the valve stem and spring in normally non-contacting relationship but being adapted to flex under lateral pressure into contact therewith to cause opening of the valve, the spout having a dispensing port in its wall; a flexible resinous engaging ring encircling and spaced from the inner end of the spout engaging and being retained by the rim of the sealing member; and an annular flexible resinous diaphragm extending between and integral with the spout and the engaging ring.

4. In a device useful for installing in a port in a container to assist in the dispensing of a foam-forming liquid contained under pressure in the container, the combination including: a cup-shaped rigid sealing member adapted to be inserted in a port in a container wall with the cup projecting into the container and to be sealed around its rim in gas-tight relationship to the wall of the container; a valve dome projecting outwardly from the wall of the sealing member in communication with the interior of the container and having a valve port in its wall surrounded by an internal valve seat; a valve body within the valve dome adapted to seat on the valve seat and close the valve port, the valve having a valve stem projecting outwardly through the valve port; and a compression spring encircling the valve stem confined between its outer end and the outer surface of the valve dome whereby the valve is maintained normally in a seated position but is adapted to be opened by lateral pressure on the valve stem sufficient to tip the valve body on its seat.

5. In apparatus for dispensing a foam-forming liquid from a pressurized container, a spout and valve operating member comprising, in combination: a tubular spout adapted in its normal position to encircle in non-contacting relationship a valve operating means operable by tipping to open a dispensing valve; an engaging ring encircling and spaced from the spout and adapted to engage and resist dislodgement from a formed recessed surface of the sealed container; and an annular diaphragm extending between and integral with the lower part of the spout and the engaging ring, the spout, diaphragm and engaging ring being formed from a flexible resinous material whereby, with the member installed on the container, the spout can be tipped by laterally exerted pressure without disengagement of the engaging ring from the recess to open the valve port and permit foam-forming fluid to flow from the container through the valve port and the spout and whereby the spout will return to its normal position upon cessation of the lateral pressure.

6. In apparatus for dispensing a foam-forming liquid from a pressurized container having a valve port in an

outwardly projecting valve dome formed in the wall of a cup-shaped sealing member projecting into the container and sealed around its rim to the wall of the container, the valve port being normally closed by a spring-tensioned valve body inside the valve dome having a valve stem projecting outwardly through the valve port and the valve being adapted to be opened by lateral pressure on the valve stem sufficient to tip the valve body, the combination of a spout and valve operating means including: a generally elongated flexible resinous tubular spout adapted to encircle and enclose the valve stem in normally non-contacting relationship and, at its inner end, to engage the outer wall of the valve dome in gas-tight relationship, the spout having a dispensing port in its wall removed from the valve dome and being adapted

ed to flex under lateral pressure to cause tilting of the valve stem to open the valve port in the valve dome; a flexible resinous engaging ring spaced from and encircling the inner end of the spout adapted to engage and be retained by the rim of the sealing member; and a flexible resinous annular diaphragm extending between and integral with the spout and the engaging ring.

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