

Sept. 19, 1944.

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2,358,329

DISPENSING CLOSURE STRUCTURE

Filed Aug. 21, 1941

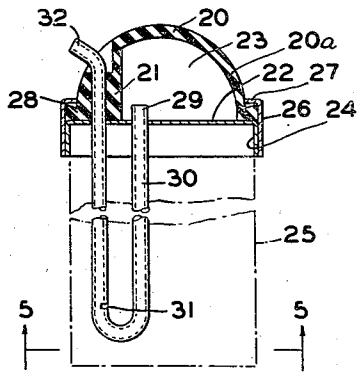


FIG.-4

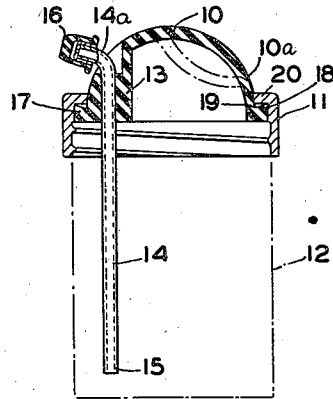


FIG.-1

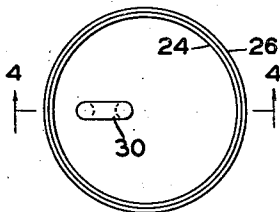


FIG.-5

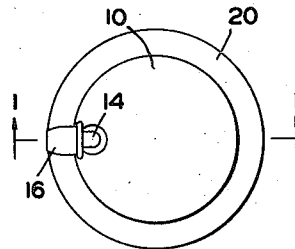


FIG.-2

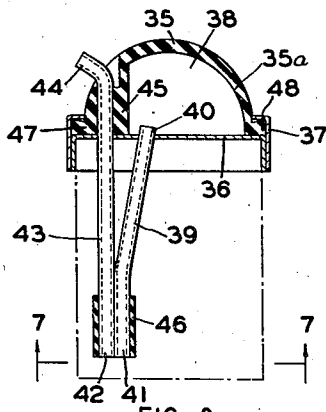


FIG.-6

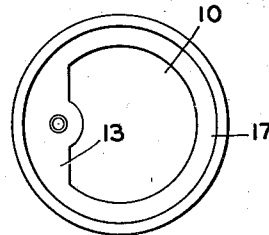


FIG.-3

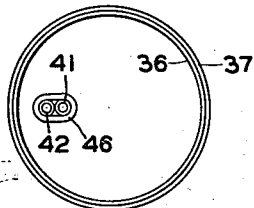


FIG.-7

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2,358,329

DISPENSING CLOSURE STRUCTURE

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Application August 21, 1941, Serial No. 407,752

8 Claims. (Cl. 222—193)

This invention relates to closure structures for containers, and particularly to closure members formed, in substantial part, of flexible resilient material.

One of the objects of the present invention is to provide a closure structure constructed largely of said resilient material adapted, when flexed, to apply pressure to the contents of the container for dispensing purposes, together with a tube extending through the closure member by means of which the contents may be discharged, the structure being specially arranged to limit the possible movement of the dispensing tube.

Another object of the invention is to provide a closure member such as specified in the last preceding paragraph and wherein the flexible portion of the closure member is designed to have a predetermined varying degree of flexibility at respectively different locations thereof.

Other objects and advantages of my invention will be apparent from the accompanying drawing and description, and the essential features thereof will be set forth in the claims

In the drawing,

Fig. 1 is a central vertical section through a container and closure therefor, taken on the line 1—1 of Fig. 2.

Fig. 2 is a top plan view of the closure of Fig. 1.

Fig. 3 is a bottom plan view of the same closure.

Fig. 4 is a central vertical section of another embodiment of my invention, taken on the line 4—4 of Fig. 5.

Fig. 5 is a bottom plan view from the line 5—5 of Fig. 4.

Fig. 6 is a central vertical section of another embodiment of my invention.

Fig. 7 is a bottom plan view from the line 7—7 of Fig. 6.

Before the present invention is described in detail, it is to be understood that such invention is not limited to the details of construction and/or the specific arrangement of parts herein illustrated and/or described, as the invention obviously may take other forms. It also is to be understood that the phraseology or terminology herein employed is for the purpose of description and not of limitation.

In Fig. 1, I show a closure member 10 secured by a ring 11 to a container indicated in dot-dash lines at 12. The particular form of the container is more or less immaterial as my closure member may be applied to various containers used for holding various materials. The

closure member 10 is of a flexible, resilient material, such as rubber, generally bulging outwardly from the container. In the form shown herein the rubber is molded to a substantially hemispherical shape but it will be understood by those skilled in the art that I am not necessarily limited to this form.

The closure member 10 is provided with a depending thickened portion 13 which is perforated to accommodate a tube 14 communicating at its upper end 14a with the closure exterior, and at its lower end 15 with the container interior. A suitable removable cap 16 may be provided to seal the tube when not in use. It is apparent that the cap 16 may be removed, and material may then be expelled through the tube by manually flexing the closure 10 whereby pressure is brought to bear on the contents of the container.

The closure 10 is provided with a more resilient portion 10a, by reason of the fact that its cross-sectional wall thickness at the location indicated by reference numeral 10a is thinner than at other portions of the closure. If the closure is flexed by pressure at any portion of the top or rear, somewhat removed from the thickened portion 13, the location numbered 10a will yield, for instance to the position shown in dotted lines in Fig. 1 and as a result pressure is brought to bear within the container without substantially affecting the position of the tube end 15.

The closure 10 is provided with a flange portion 17 which extends outwardly and uninterruptedly about the periphery of the closure. It will be noted that the radially outer portion 18 of the flange 17 is of greater thickness than the radially inner portion 19 so that when the ring flange 20 is screwed down into engagement with the rubber flange 17 it engages the thicker portion 18 of the rubber flange so as to insure a leakproof seal when pressure is exerted on the container by flexure of the closure. The same result can be achieved by making the flange 17 generally flat, but with a raised bead around its periphery.

Another embodiment of my invention is illustrated in Figs. 4 and 5. In this embodiment a flexible resilient closure 20 is provided with a thickened portion 21 depending therewithin as in the previously described closure. The closure cooperates with a disk, cap or diaphragm 22 to form therebetween a compression chamber, as will immediately appear. The disk 22 may conveniently be provided with a downturned annular flange 24 which has a forced fit over the

upper edge of the container 25 and a retainer ring 26 likewise has a forced fit over flange 24. By means of an inturned rim 27 the ring 26 cooperates with disk 22 to retain therebetween a flange 28 on the cap 20.

The disk 22 is perforated to hold, in tight fitting relationship, one end 29 of tube 30, which tube extends downwardly into container 25 and is bent upwardly again to issue through the thickened portion 21 of closure 20. Near the lowermost bent portion the tube is provided with one or more perforations or slots 31 the purpose of which will now appear. When pressure is applied to the chamber 23 by inward flexure of closure 20, a current of air is forcibly expelled through tube 30, entering at tube end 29 and issuing at tube end 32. The suction effect produced by this current past slot 31 draws a portion of the powdered or liquid contents of container 25 through slot 31 into the tube, whence it is forced outwardly through tube end 32.

The closure is provided with one portion 20a which is relatively more flexible than the balance of the closure, and the purpose and function of this more flexible portion has already been described in connection with the operation of the closure shown in Fig. 1.

Figs. 6 and 7 illustrate still another embodiment of my invention wherein a closure 35, a cap or disk 36 and a clamping ring 37 mutually cooperate to form a relatively leakproof compression chamber 38 as already described with reference to Figs. 4 and 5. In the present instance a tube 39 opens into the compression chamber at its upper end 40, and into the container at its lower end 41, and a second tube 43 opens into the container at its lower end 42 and, on passing through a thickened portion 45 of closure 35, opens to the atmosphere at its upper end 44. The lower ends 41 and 42 of tubes 39 and 43 may conveniently be held together by sleeve 46 to constitute a relatively stable and inflexible assembly, or they may be soldered, welded, or otherwise joined, as convenient. As in the previously described embodiments the closure is provided with a relatively more flexible portion 35a which will yield inwardly when manual pressure is applied to the closure 35, thereby, through tube 39, applying pressure to the contents of the container, whereupon material from the container is expelled through tube 43. Also, as in previously described embodiments, the closure 35 is provided with a flange 47 having a peripherally thickened rim 48 to accentuate the sealing effect, in cooperation with cap 36 and ring 37.

In the several embodiments shown and described herein, the provision of the thickened portions 13, 21 and 45 of closures 10, 20 and 35 respectively, insures that outlets 14, 32 and 44 will maintain a relatively constant directional position despite any usual, reasonably energetic flexure of the cap. The relatively more flexible area of the closure, secured by localized thinning of the wall, cooperates to this same end and purpose.

What I claim is:

1. A closure structure for a container of powder or powder-like material, said closure structure comprising wall portions forming a closed air chamber, one of said chamber-forming wall portions having a flexible section, tubular means carried by a part of said closure structure, said tubular means having an opening in communication with said closed air chamber and having a discharge opening outside said closure struc-

ture, a portion of said tubular means between such openings being designed to lie within the powder or powder-like material of the container with which the closure structure is used and such portion of said tubular means being provided with an opening to permit said powder or powder-like material to enter said tubular means, whereby on application of pressure to the flexible section of said closure structure wall portion air from said closed chamber is introduced into said tubular means for the expulsion therefrom, through the discharge opening thereof, of the powder or powder-like material which enters said tubular means.

2. A closure structure for a container of powder or powder-like material, said closure structure comprising wall portions forming a closed air chamber, one of said chamber-forming wall portions having a flexible section, tubular means of double arm form carried by a part of said closure structure, one arm of said tubular means having an opening in communication with said closed air chamber and the other arm of said tubular means having a discharge opening outside said closure structure, a portion of said tubular means between such openings being designed to lie within the powder or powder-like material of the container with which the closure structure is used and such portion of said tubular means being provided with an opening to permit said powder or powder-like material to enter said tubular means, whereby on application of pressure to the flexible section of said closure structure wall portion air from said closed chamber is introduced into said tubular means for the expulsion therefrom, through the discharge opening thereof, of the powder or powder-like material which enters said tubular means.

3. A closure structure for a container of powder or powder-like material, said closure structure comprising wall portions forming a closed air chamber, one of the chamber-forming wall portions being an inner wall portion and another being an outer wall portion, said outer wall portion having a flexible section, tubular means of double arm form, one arm of said tubular means extending through said inner wall portion and having an opening in communication with said closed air chamber, the other arm of said tubular means extending through a part of said closure structure and having a discharge opening outside said closure structure, a portion of said tubular means between such openings being designed to lie within the powder or powder-like material of the container with which the closure structure is used and such portion of said tubular means being provided with an opening to permit said powder or powder-like material to enter said tubular means, whereby on application of pressure to the flexible section of said outer wall portion air from said closed chamber is introduced into said tubular means for the expulsion therefrom, through the discharge opening thereof, of the powder or powder-like material which enters said tubular means.

4. A closure structure for a container of powder or powder-like material, said closure structure comprising wall portions forming a closed air chamber, one of said chamber-forming wall portions having a flexible section, tubular means of double arm form carried by a part of said closure structure at one side of said chamber, one arm of said tubular means having an opening in communication with said closed air chamber and the other arm of said tubular means having

a discharge opening outside said closure structure, a portion of said tubular means between such openings being designed to lie within the powder or powder-like material of the container with which the closure structure is used and such portion of said tubular means being provided with an opening to permit said powder or powder-like material to enter said tubular means, whereby on application of pressure to the flexible section of said closure structure wall portion air from said closed chamber is introduced into said tubular means for the expulsion therefrom through the discharge opening thereof of the powder or powder-like material which enters said tubular means.

5. A closure structure for a container of powder or powder-like material, said closure structure comprising wall portions forming a closed air chamber, one of said chamber-forming wall portions having a flexible section, tubular means in the form of two tubes, one tube extending through a part of said closure structure and having an open discharge end outside said closure structure, the other tube having an open air-inlet end in communication with said closed air chamber, each of said tubes having another open end designed to lie within the powder or powder-like material of the container with which the closure structure is used, the latter open ends of said tubes lying close together, whereby on application of pressure to the flexible section of said closure structure wall portion air from said closed chamber is caused to flow through said second mentioned tube into said first mentioned tube for the expulsion therefrom, through its outside discharge end, of the powder or powder-like material of said container.

6. A closure structure for a container of powder or powder-like material, said closure structure comprising wall portions forming a closed air chamber, one of said chamber-forming wall portions having a flexible section, tubular means in the form of two tubes, one tube extending through a part of said closure structure at one side of said air chamber and having an open discharge end outside said closure structure, the other tube having an open air-inlet end in communication with said closed air chamber, each of said tubes having another open end designed to lie within the powder or powder-like material of the container with which the closure structure is used, the latter open ends of said tubes being secured close together, whereby on application of pressure to the flexible section of said closure structure wall portion air from said closed chamber is caused to flow through said second mentioned tube into said first mentioned tube for the expulsion therefrom, through its outside discharge

end, of the powder or powder-like material of said container.

7. A closure structure for a container of powder or powder-like material, said closure structure comprising outer and inner walls, said outer wall having a hollow dome-shaped portion forming with said inner wall a closed air chamber, a side part of said dome-shaped portion being of increased thickness and another part of said dome-shaped portion being of flexible resilient character, tubular means carried by the thickened part of said dome-shaped portion, said tubular means having an opening in communication with said closed air chamber and having a discharge opening outside said closure structure, a portion of said tubular means between such openings being designed to lie within the powder or powder-like material of the container with which the closure structure is used and such portion of said tubular means being provided with an opening to permit said powder or powder-like material to enter said tubular means, whereby on application of pressure to the flexible part of said dome-shaped portion air from said closed chamber is introduced into said tubular means for the expulsion therefrom, through the discharge opening thereof, of the powder or powder-like material which enters said tubular means.

8. A closure structure for a container of powder or powder-like material, said closure structure comprising outer and inner walls, said outer wall having a hollow dome-shaped portion forming with said inner wall a closed air chamber, a side part of said dome-shaped portion being of increased thickness and another part of said dome-shaped portion being of flexible resilient character, tubular means of double arm form, one arm of said tubular means extending through the thickened part of said dome-shaped portion and having a discharge opening outside said closure structure and the other arm of said tubular means extending through said inner wall and having an opening in communication with said air chamber, a portion of said tubular means between such openings being designed to lie within the powder or powder-like material of the container with which the closure structure is used and such portion of said tubular means being provided with an opening to permit said powder or powder-like material to enter said tubular means; whereby on application of pressure to the flexible part of said dome-shaped portion air from said closed chamber is introduced into said tubular means for the expulsion therefrom, through the discharge opening thereof, of the powder or powder-like material which enters said tubular means.

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