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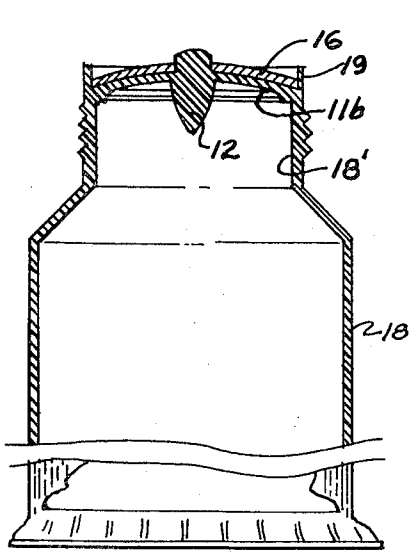


FIG. 10

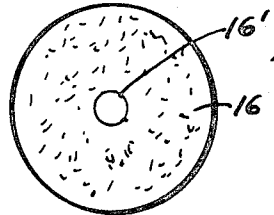


FIG. 12

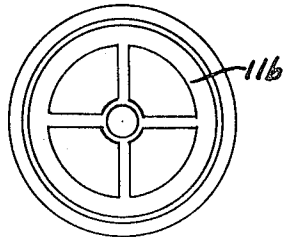


FIG. 13

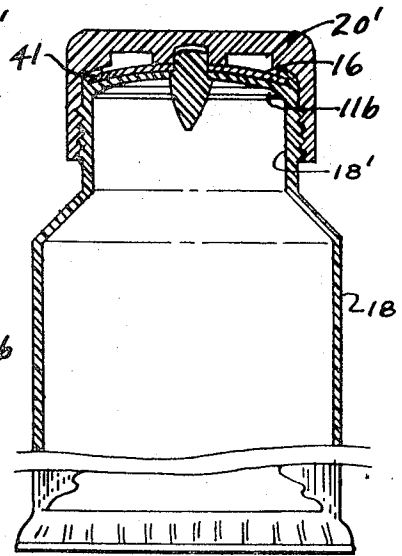


FIG. 11

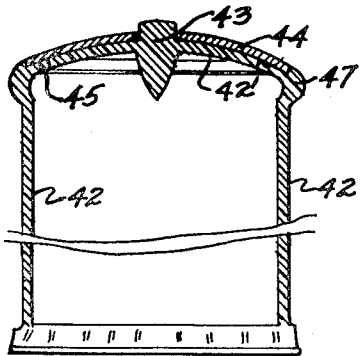


FIG. 14

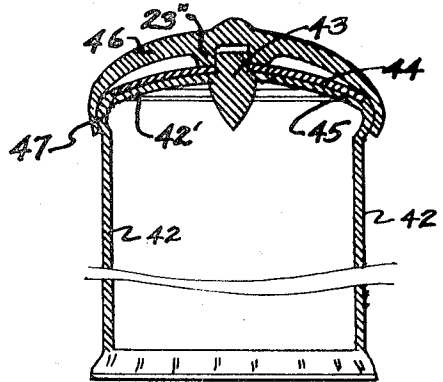


FIG. 15

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CLOSURE FOR DISPENSING SPOUT

The invention relates to a closure for general use with nozzles, spouts and like outlets where the closure functions to cut off material in the spout adjacent the outer end of the nozzle or spout and is particularly adaptable for liquids and semiliquids of various kinds.

It is the primary object of the invention to produce a closure for spouts which will automatically open and allow discharge of the material contained therein when pressure is applied to the material and which will automatically close upon the reduction or removal of the pressure from the material.

It is another object to produce a closure which when closed will readily allow use of all the material discharged therefrom but prevent unwanted oozing and dripping and thereby make for a clean and neat operation.

Still another object of the invention is to provide such a closure which is economical to produce, simple to assemble and reliable in its operation which may have a substantial number of its elements formed in a single molding operation. The term "closure" as used herein is intended to mean any type of closure whether associated with a container or with a material-conveying conduit.

While several objects have been pointed out, other objects, uses and advantages will become more apparent as the nature of the invention is more fully disclosed wherein reference is made to the accompanying drawing which forms a part of this specification.

In the drawing:

FIG. 1 is an exploded fragmentary sectional view of a collapsible tube having a spout formed on one end thereof showing one form of my invention.

FIG. 2 shows a view similar to FIG. 1 with the parts of FIG. 1 fully assembled and an auxiliary cap in place.

FIG. 3 is a view similar to FIG. 1 of a modified form of the invention.

FIG. 4 is a view of the modified form of the invention shown in FIG. 3 fully assembled and an auxiliary cap in place.

FIG. 5 is a plan view of the diaphragm.

FIG. 6 is a plan view of the spider element used in the modification of FIGS. 3 and 4.

FIG. 7 is a sectional view taken on the line 7-7 of FIG. 6.

FIG. 8 is an illustration of a bulk supply container with a closure according to the present invention located at the end of a dispensing hose.

FIG. 9 is an enlarged sectional view of the end portion of the dispensing hose shown in FIG. 8.

FIG. 10 is a view similar to FIG. 1 of an additional modified form.

FIG. 11 is a view of the form shown in FIG. 10 with the auxiliary cap in place.

FIG. 12 is a plan view of the diaphragm.

FIG. 13 is a plan view of the spider element used in the form shown in FIGS. 10 and 11; and

FIGS. 14 and 15 are views of still another modification without and with auxiliary cap respectively.

Referring now in more detail with reference to the drawings, 10 represents the main body portion of a collapsible container usually made of a soft metal or plastic material, although any suitable material will suffice. The main body portion 10 is preferably reduced adjacent one end as shown at 10' to form a nozzle or spout portion. Integrally formed with the portion 10' is a spiderlike portion 11 which spans the open end of the nozzle or spout portion. The spider portion is provided with a central knob 12 and radial legs 13. In this form of the invention the spider is molded integral with the container body, but is similar to that shown in plan view in FIG. 6 which has a central knob and radial legs extending to an outer ring member.

Extending outwardly from the portion 10' is an integrally formed annular lip 14 which is formed at the line of the molding of the container and the spider portion.

Formed separately is a resilient flexible diaphragm 16 which is formed to fit over and adjacent the spider 11 and within the lip 14. The diaphragm is secured in position by turning the lip

14 inwardly over the outer edge thereof as shown in FIG. 2. The diaphragm 16 is provided with an opening 16' which is adapted to fit over the knob 12 and to be in sealing engagement with the outer upper surface adjacent its outer edge, the opening 16' in the diaphragm being of such size as to permit a substantial portion of the surface 12 of the knob to project therethrough.

Referring in particular to the spider, the knob 12 is slightly raised and rounded on its outer surface 12' and is substantially conical on its inner surface 12''. The legs 13 are inclined in an outward and downward direction and extend from the central knob 12 to the outer open end of the portion 10' of the container.

The opening 16' in the diaphragm 16 is sized to fit neatly around the raised outer portion of knob 12 as shown in FIG. 2.

A modified form of construction of the nozzle or spout portion 10' is shown in FIGS. 3 and 4. In this modification the spider portion is shown formed separately and is designated as 11b, the neck or spout portion, now designated as 18 is slightly modified to the extent that the inner surface is made straight or cylindrical or as having the surface tapered slightly in either direction, wherein the separately formed spider 11b may be inserted in the portion 18 under a press fit. The spider may be inserted through the container, or inserted from the open end depending upon which direction the portion 18 is tapered and upon which is more economical and practical. The outer end 19 of the wall 18 extends upwardly beyond the position of the spider and forms a flange to be bent over the diaphragm 16 as shown in FIG. 4.

The form of the device shown in FIGS. 1 and 2 may be provided with an auxiliary cap 20 which is adapted to thread upon the neck 10' as shown at 21. This cap has an internal surface 22 to fit the bentover flange 14 and a centrally located downwardly projecting circular flange 23 which closely surrounds the raised outer portion of the button 12 and presses on the diaphragm 16 adjacent the hole 16' therein to prevent leakage therearound when the auxiliary cap is in place.

The modification of FIGS. 3 and 4 may be provided with an auxiliary cap in similar fashion. In this instance the internal surface is shaped at 22' to fit the flange 19 and the central portion of the cap is provided with a flange 23' to fit over the raised portion of the knob 12 and press on the diaphragm 16.

FIGS. 8 and 9 illustrate a form of the present device to be used with a large bulk supply of material from a storage tank 26 wherein pressure may be supplied by an air line or supply line 27. The material is conveyed through a conduit 28 and possibly a flexible hose 29 to the nozzle 30. The dispensing arrangement and closure are substantially the same as previously described, taking the form near that shown in FIGS. 3 and 4 wherein the spider is formed separately from the nozzle casing 35. However, any of the forms previously described may be employed.

The mode of operation of the forms shown in FIGS. 1 to 4 is almost self-evident. After removal of the auxiliary cap 20 any pressure on the contents of the container such as may be produced by squeezing the container will cause the contents to be pushed outwardly through the reduced neck 10' or 18 and through the open spaces in the spider element 11 or 11b, which will cause outward deflection of the diaphragm 16 and permit discharge of the material through opening 16', around and over the rounded outer surface of the knob 12. Upon release of the pressure on the contents of the container the diaphragm will return to its closed position and automatically cut off the discharge.

With reference to the operation of the device shown in FIGS. 8 and 9, the material supplied from a bulk supply such as the container 26, pressure is supplied to the material by means of compressed air, for example, through a pipe 27. Material is then forced through the conduits 28 and 29 to the nozzle 30. The material being supplied is controlled by a valve 31 operated by controls 39 and 40. While these controls are shown to be manual, any other manual means or automatic means may be employed. When the valve 31 is opened,

material is supplied to the nozzle 30. The improved closure and dispensing nozzle acts in substantially the same manner as previously described for the device shown and described for FIGS. 1, 2 and 3. However, any of the forms shown in the remaining figures are adaptable. This arrangement for remote supply has the same advantages as do the portable type container wherein the cutoff at the extreme outer end of the dispensing operation allows the snipping off of any material that may be clinging to the end such as semifluid plastics, greases and the like.

The modification of FIGS. 10 and 11 is substantially identical with that shown in FIGS. 3 and 4, previously described, and like reference characters have been employed. In this form, however, the flange 19 is crimped down against the diaphragm 16 by screwing the auxiliary cap 20' onto the container neck 18. As may be seen, the cap 20' has an internal rounded and inclined portion 41 which contacts the flange 19 as the cap is screwed on and bends or crimps the same inwardly and downwardly against the diaphragm 16.

In the modification shown in FIGS. 14 and 15 the spider member 42' and central knob 43 of the container 42 are made integral with the end of the discharge spout in somewhat the same manner as the corresponding elements of FIGS. 1 and 2. In this form however the diaphragm, here designated 44, is cemented or otherwise adhered to the end of the spout at 45. In this form also the auxiliary cap 46 is made to snap on and off the container. To accomplish this the container has a peripheral rounded flange or bead 47 at its end adjacent the spider and the cap has a somewhat turned-in peripheral flange adapted to readily snap over the rounded bead. The auxiliary cap in this modification may also be provided with a central circular flange 23'' for engaging the diaphragm adjacent the knob 43 for holding the same closed as is done in the previously described forms.

I claim:

1. In a dispensing device in combination with a continuous wall portion having an outlet opening therethrough, through which fluid flows from a supply source, the improvement which comprises:

- a. a resilient diaphragm of uniform thickness supported by the said wall and extending over the outer end of the outlet opening, the diaphragm having an opening substantially through the center thereof and having its outer edge only fixedly sealed over the outlet opening in the wall adjacent the outer end thereof;
- b. a dome-shaped open spider support member for the diaphragm extended over a substantial area occupied by the diaphragm, the diaphragm being supported by the said wall inwardly from the inner face of the diaphragm adjacent the outer end of the said opening;
- c. a closure element for said diaphragm opening integrally formed with and centrally of the dome-shaped spider support for closing the opening when the diaphragm is in normal contracted position, the closure element having a step about the periphery above the dome-shaped spider support for supporting the diaphragm about the edge of the opening, the resilient diaphragm normally lying adjacent the dome-shaped spider support member and in contact with the step of the closure element for closing the central opening in the diaphragm and said diaphragm being deflectable outwardly and away from said support and closure element by the forcible discharge of the fluid adjacent the diaphragm when pressure is applied thereto;
- d. an auxiliary closure for the outlet opening said auxiliary closure having means to releasably fasten the same to the outlet opening and having means cooperating with the diaphragm adjacent the opening for holding the same against the step about the first closure element.

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