

May 26, 1964

W. M. BOOTH

3,134,514

VALVE-TYPE METERING DISPENSER

Filed Feb. 6, 1961

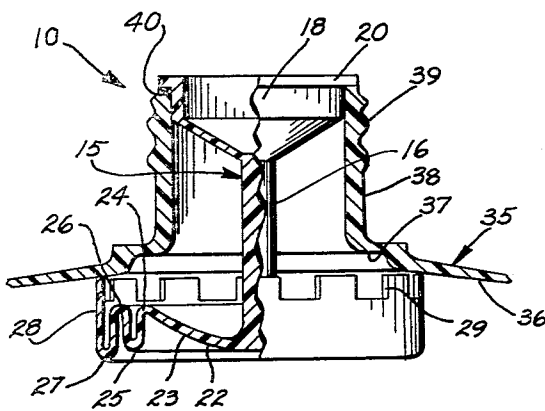


FIG. 2

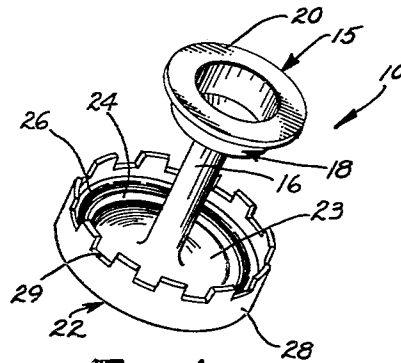


FIG. 1

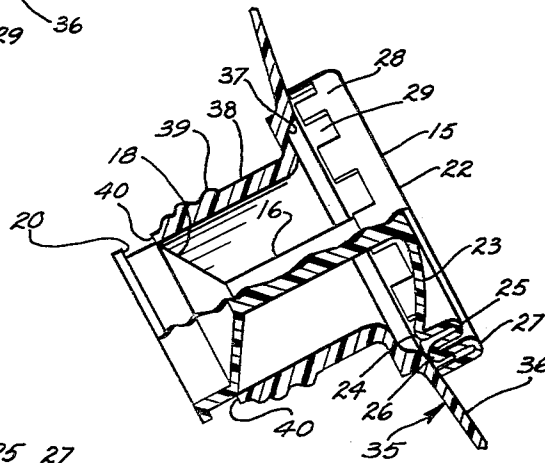


FIG. 3

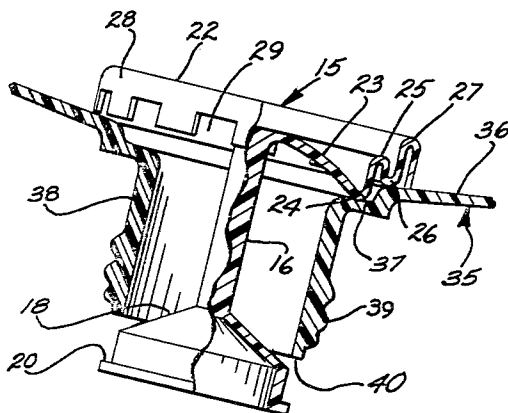


FIG. 4

INVENTOR.
WILLIAM M. BOOTH
BY *Price & Heneveld*
ATTORNEYS

1

3,134,514

VALVE-TYPE METERING DISPENSER

William M. Booth, 2006 Vista Place, Grand Haven, Mich.

Filed Feb. 6, 1961, Ser. No. 87,411

8 Claims. (Cl. 222—207)

This invention relates to a valving and metering dispenser, and more particularly to a dispenser to be utilized with a squeeze type container.

As an attempt to increase sales appeal, a number of liquid detergent manufacturers have attempted to provide a quick and simple means for measuring the quantity of detergent dispensed each time the bottle is inverted. A variety of these dispensing units are presently available. Certain of these dispensers are disclosed in co-pending application Serial No. 822,109, filed June 22, 1959, now U.S. Patent 3,076,581, and entitled Measuring Dispenser for Liquids. These dispensers are particularly designed for use in more conventional rigid type containers in which the only pressure which can be generated on the inside of the bottle is that of the weight of the liquid.

This invention is designed for "squeeze" bottles in which the pressure may be increased by squeezing the bottle. Although the previous dispensers may also be utilized in a squeeze-type bottle, the dispenser of this invention is an improvement in that the increased pressure developed by squeezing can be utilized to operate certain valving structure which makes the measuring operation more accurate and reliable. Furthermore, the valving structure permits only enough air to enter the container during each dispensing operation to fill the space vacated by the dispensed contents. This prevents ventilation of the container and the consequent loss of volatile components of the contents.

It is therefore an object of this invention to provide a dispenser which may be added to existing "squeeze" bottle constructions without modification of the bottle.

It is still another object of this invention to provide a dispenser which may be inserted in the "squeeze" bottle after it has been molded and filled.

Another object of this invention is to provide a dispenser which is constructed of a minimum number of components and is therefore extremely inexpensive to manufacture.

Still another object of this invention is to provide a dispenser which serves as both a measuring device as well as a seal when the bottle is in storage.

Still another object of this invention is to provide a dispenser with valve means which is operative upon increasing the pressure in the container to stop flow of liquid from the container.

Another object of this invention is to provide a dispenser having valve means which is operative upon sufficient pressure in the container to displace a portion of the dispenser so as to allow the measured quantity of liquid to be discharged.

These and other objects and advantages of this invention will become more apparent upon reading the following specification in conjunction with the accompanying drawings.

In the drawings:

FIG. 1 is a perspective view of the valving dispenser;

FIG. 2 is a cross sectional view showing the valving dispenser located in a container, and showing the head of the valving dispenser sealing the mouth of the container and the diaphragm of the valving dispenser in a position to allow the neck of the container to fill with liquid;

FIG. 3 is a cross-sectional view similar to FIG. 2 showing the diaphragm of the valving dispenser in a sealing position;

2

FIG. 4 is a cross-sectional view similar to FIG. 2 showing the valving dispenser in a sealing and dispensing position.

Basically, this invention discloses a valving dispenser particularly adapted for use with a squeeze-type container. The dispenser has a shank portion which extends through the neck of the container. A head slidably mounted in the neck in sealing engagement therewith is connected to one end of the shank and normally closes the mouth of the container. A valve member in the form of a diaphragm is connected to the other end of the shank and engages the inside of the container. The diaphragm has accordion-like folds positioned adjacent an outer peripheral wall thereof. The wall has ports which permit liquid to flow from the container into the neck of the bottle. The diaphragm and head are subject to the liquid pressure within the container as well as to pressure exerted by squeezing the bottle. Sufficient pressure within the container causes the head to slide outwardly in the neck, pulling the diaphragm with it. This in turn causes the diaphragm to flex until a fold thereof engages the inside top wall of the container, thereby preventing further flow of liquid from the container into the neck. Any additional pressure now applied to the inside of the container is borne by the diaphragm, thereby causing it to flex to a greater extent and thus to move the head out of the neck of the container, allowing the liquid trapped in the neck to be discharged. When the pressure on the bottle is released, the diaphragm will return to its normal position due to its inherent resiliency, and also due to the vacuum created in the container by the release of the pressure.

The dispenser assembly is designated generally by the reference numeral 10 (FIG. 1). It includes the dispenser element 15, which in turn includes the shank 16, head 18 and valve body or diaphragm 22. The dispenser element 15 is associated with a container 35 (FIGS. 2-4).

Referring specifically to the details of the invention, FIG. 1 best shows the valving dispenser 15. The valving dispenser 15 has a shank portion 16 which is an elongated, solid cylindrical member. Fixed to the one end of shank 16 is a head 18 which has a conical guide portion formed integral with a right cylindrical sealing portion. The apex of the conical portion is fixed to the end of shank 16. The right cylindrical portion of the head has a diameter substantially identical to the diameter of the neck opening of the container. A limit flange 20 is connected to the right cylindrical portion of the head and extends transversely with respect thereto. It is adapted to overlie the mouth of the container 35 and acts both as a seal and as a stop to prevent the dispensing device from falling into the container. Fixed to the other end of the shank 16 is a valve body or diaphragm 22. The diaphragm 22 has an umbrellalike web portion 23. A series of accordionlike folds are formed on the edge of the web 23, there being four folds which are numbered 24 through 27 consecutively (FIGS. 2-4). The fourth fold 27 is formed integral with an outer peripheral wall 28 which surrounds the diaphragm. Inlet ports 29 are formed in the lower edge of wall 28 at equally spaced intervals about the circumference thereof. The inlet ports 29 are rectangular shaped apertures which extend inwardly from the lower edge of the wall.

The dispenser element 15 is molded from a pliable and resilient material such as rubber or any one of several plastics such as polyethylene. The dispenser must be pliable so that it can be inserted in a bottle which has already been molded and filled. Also, the diaphragm must be sufficiently flexible to be affected by the pressure variations within the bottle created by squeezing the bottle.

The dispenser element 15 is associated with a con-

3

ventional squeeze-type bottle or container 35. The top interior 36 of the bottle must be a relatively smooth surface which can be engaged by the diaphragm. A shoulder 37 is formed in the top of the bottle adjacent its connection with the neck 38. The shoulder 37 is thus formed at the base of the neck or neck inlet. The outer periphery of the neck 38 is provided with threads 39 which are adapted to receive a conventional closure cap (not shown). The top edge of the neck 38 forms the mouth 40 of the bottle. The mouth 40 receives the flange 20 of the dispenser element.

Operation

The dispenser element 15 is fabricated of pliable material and its diaphragm 22 may be collapsed to facilitate passage thereof through the neck 38 of the bottle. This is preferably done by the bottling machine after the bottle has been filled. Due to the inherent resiliency of the diaphragm, it will return to a position such as that shown in FIG. 2 after being inserted in the bottle. The web portion 23 of the diaphragm is of a diameter such that the fold 24 is aligned with the shoulder 37. The fold 26 is aligned with the bottle top interior 36. The enclosure wall or peripheral wall 28 lies outside the accordionlike folds, as previously described, and the edge thereof normally engages the bottle top interior 36.

For purposes of illustration, it will be assumed that the dispenser is installed in a "squeeze" bottle which is in upright position. The dispenser element 15 will thus assume a position similar to that shown in FIG. 2. The position of the dispenser element 15 remains substantially the same even when the container is in a horizontal position. When the dispenser is in horizontal position, liquid within the container is free to flow through the ports 29 into the neck 38. However, the head 18 is in sealing engagement with neck 38 and prevents discharge of the liquid. As the container moves from the horizontal position in the process of inversion to a completely inverted position, the pressure created in the liquid by squeezing the container acts first against the head 18 to push it outwardly against the resilient bias of diaphragm 22 into the position shown in FIG. 3. At this point, fold 26 is pulled into engagement with the surface 36 of the container and prevents additional liquid flow into the neck 38. Consequently, any further pressure created in the liquid can no longer be transmitted to the liquid in the neck, and a pressure differential is created between the neck and the interior of the container. This pressure differential is applied to the diaphragm 22 and causes it to move outwardly, thereby pushing the head 18 completely out of the neck 38 to allow discharge of the liquid from the neck 38, as shown in FIG. 4. As the pressure differential between the neck 38 and the interior of the container increases, additional sealing is provided by the fold 24 engaging shoulder 37.

The liquid trapped within the neck 38 is a measured quantity, dependent upon the size of the interior of neck 38. The dispenser element 15 thus cooperates with the neck 38 to measure a given amount of liquid. The diaphragm 22 in a sense uncoils as it flexes, since the accordionlike folds move parallel to the shaft 16 in a sinuous manner.

When the squeezing pressure on the bottle is relaxed, the dispenser element 15 will return to the position shown in FIGS. 1 and 2. This is due not only to the inherent resiliency of the diaphragm, but also to the vacuum created in the container by its release and applied successively to the diaphragm 22, and to the head 15 when the fold 26 becomes disengaged from the surface 36. If the container remains in the inverted position, the neck will again fill with liquid, and the next squeeze of the container will result in another measured quantity being dispensed.

From the above description, it is apparent that the dispenser disclosed herein is constructed from a minimum number of component parts. The design of the dispenser is so simple, and the dispenser is so inexpensive

4

to manufacture, that it may be given away with the product or with the container without appreciably affecting their cost. Another advantage is that it prevents children from squeezing all the liquid out of the container because the harder they squeeze, the tighter it forms a seal, limiting the amount of liquid which can be dispensed from the container in any one squeeze. The dispenser can be added to existing squeeze-type containers without modification of the container. The dispenser can also be sold as a separate commodity since it can be inserted in a squeeze bottle after the bottle has been molded and filled. The limit flange which engages the mouth of the bottle acts as a seal when the bottle is in storage and also acts as a safety seal after the bottle has been opened and is in use, thereby preventing caking of the liquid between the cylindrical sealing portion of head 18 and the wall of neck 38.

While a preferred embodiment of this invention has been described, it will be understood that modifications and improvements may be made thereto. Such of these modifications and improvements as incorporate the principles of this invention are to be considered as included in the hereinafter appended claims unless these claims by their language expressly state otherwise.

I claim:

1. A valve type dispenser adapted to be placed in the hollow neck of a squeeze-type container comprising; a member having a shank, a head connected to said shank and adapted to close the mouth of said container, and a valve element means connected to the opposite end of said shank, said valve element means having a body with a peripheral wall and with flexible accordion-like fold means adjacent said wall, ports formed in said wall to allow liquid from said container to flow into the base of the neck and fill the neck of the container around said shank when inverted, said fold means being movable parallel to said shank by pressure in said container to engage said container at the base of said neck and close said ports, and said fold means being movable further by additional pressure within said container to displace said head from said mouth to allow discharge of only the liquid in said neck.

2. A valve dispenser as defined in claim 1, said head being cylindrical in cross-section and having a diameter approximately equal to that of the neck of the container, and said head tapering towards its connection at said shank.

3. A valve dispenser in combination with a squeeze-type container comprising; a member having a shank operative in the neck of the container, a head connected to said shank and having a flange overlying the mouth of said container, a valve body connected to said shank, said body having a series of accordion-like folds formed adjacent an outer peripheral wall, said wall having ports for admitting liquid into said neck when said container is inverted, pressure from said liquid and squeezing action on said container causing one of said folds to close said ports, further pressure causing said head to move from said mouth to allow liquid to discharge from said neck.

4. A valve type dispenser adapted to be placed in the neck of a squeeze-type container comprising; an elongated member having head means on one end for closing the mouth of container, and being connected to diaphragm means located in said container, said diaphragm means having peripheral apertures which allow liquid to flow from said container into said container neck when said container is inverted, said neck forming a measure for said liquid, said head means being shiftable by increased pressure in said container to pull said diaphragm means and close said peripheral apertures, said diaphragm means having a shiftable flexible portion to close said apertures and prevent liquid flow solely upon said increased pressure in said container, said diaphragm being shiftable to flex further by added pressure within said container so as to displace said head means from said neck in such

5

a manner as to allow said measured liquid to be discharged.

5. A valve dispenser adapted to be placed in the neck of a squeeze-type container comprising; an elongated member having head means for closing the mouth of container, said head means being connected to diaphragm means located in said container, said diaphragm means having apertures which allow liquid to flow from said container into said container neck when said container is inverted, said neck forming a measure for said liquid, said diaphragm being flexible to close said aperture and seal said measured liquid from other liquid in said container solely upon increased pressure in said container, sufficient pressure in said container causing said diaphragm to flex further and further seal said measured liquid from said other liquid, and to displace said head means in such a manner as to allow said measured liquid to be discharged.

6. A valving and measuring dispenser adapted to be placed in the neck of a squeeze-type container comprising; a head; a diaphragm; a shank member connected between said diaphragm and said head, said head being associated with a neck portion of the container and having a flange for normally closing the mouth of the container when in an upright position, said diaphragm including valve means operative upon inversion of said container to allow said neck to fill with liquid, subsequent increased pressure in said container by squeezing causing said valve means to close, sufficient pressure within said container being operative to move said diaphragm and shank to displace said head from said mouth to allow discharge of liquid from said neck, said liquid in said neck being a measured amount.

7. In combination with a flowable material container having a neck, a measuring device comprising a closure element means slidably received within said neck, a valve element means resiliently movable solely by creating pressure within said container, means connecting said closure element means to said valve element means for movement therewith, said valve element means being arranged to permit flow of said material therethrough in its rest position but to stop said flow when said valve element means is moved by pressure from within said container, said closure element means being so positioned with respect to said valve element means as to permit flow of said material out of said neck upon further movement of said

6

valve element means, said closure element means being movable by increased pressure in said container acting upon said closure element means to move said connecting means and thereby move said valve element means into a closed position, and said valve element means being further shiftable in its closed position by further pressure in said container acting on said valve element means to shift said connecting means and thereby shift said closure element means out of said neck for discharge of liquid in said neck.

8. In combination with a resilient flowable material container having a neck, a measuring device comprising a head means sealingly and slidably received within said neck, a diaphragm means resiliently outwardly movable solely by creating pressure within said container, means connecting said head means to said diaphragm means for movement therewith, said diaphragm means being arranged to permit flow of said material therethrough in its inwardmost position but to stop said flow when said diaphragm means is moved outwardly by pressure from within said container, said head means being so positioned with respect to said diaphragm means as to come out of said neck upon further outward movement of said diaphragm means, said head means being movable by increased pressure in said container acting on said head means to move said connecting means and thereby move said diaphragm means outwardly to stop flow into said neck, and said head means being further shiftable by said pressure in said container acting on said diaphragm means to shift said connecting means and shift said head means out of said neck for flow discharge from said neck.

References Cited in the file of this patent

UNITED STATES PATENTS

1,949,661	Schell	Mar. 6, 1934
2,248,958	Christensen et al.	July 15, 1941
2,252,542	Beeh	Aug. 12, 1941
2,270,794	Feldmar	Jan. 20, 1942
2,516,578	Kreiner	July 25, 1950
2,640,481	Conley	June 2, 1953
2,857,080	Elias	Oct. 21, 1958

FOREIGN PATENTS

1,123,729	France	Sept. 26, 1956
-----------	--------	----------------