United States Patent

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[54] **UNITARY NOZZLE, ACTUATOR AND GUARD FOR PRESSURIZED DISPENSERS**
3 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **222/402.22**
[51] **Int. Cl.** **B65d 83/00**
[50] **Field of Search** 222/402.22, 402.13

[56] **References Cited**
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3,388,840	6/1968	Hug	222/402.22X

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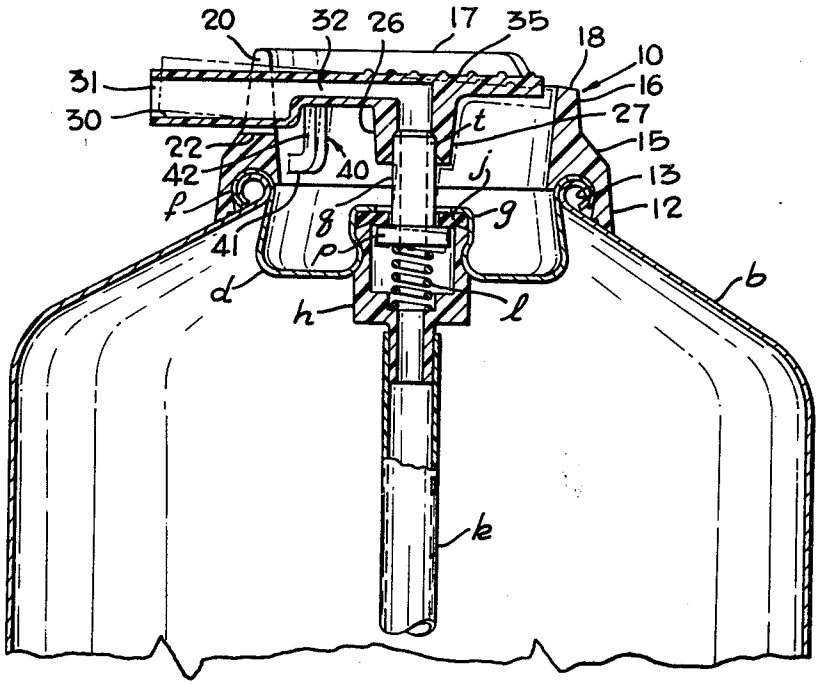
ABSTRACT: A one-piece nozzle, actuator and guard for pressurized dispensing containers is especially adapted for use with tilt-opening valves. A spout actuator portion has a central inlet underlying a disc part, and has a forward-extending spout. This passes freely over an integral circular wall portion which mounts onto the container rim. These two portions are connected by a pair of flexible leg portions, which extend supporting downward from the disc and outward to the wall portion. Their flexibility permits not only tilting of the spout actuator portion with the valve stem, but also takes up any misalignment between the stem and the container rim.



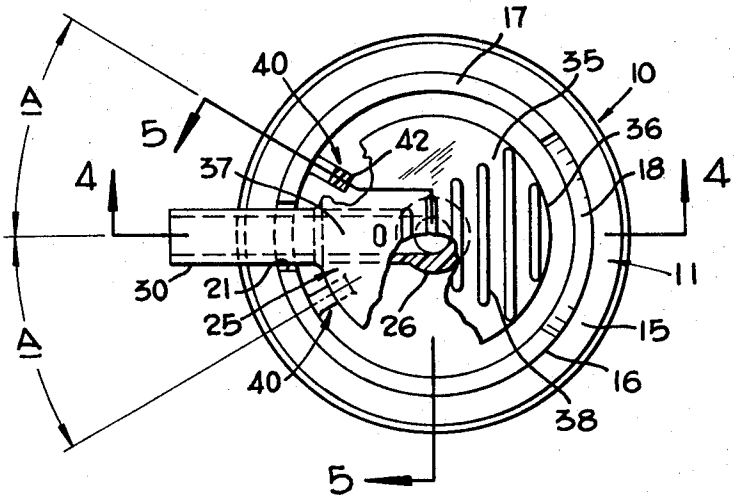


FIG. 1

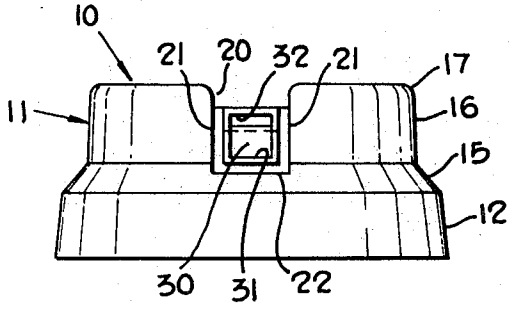


FIG. 2

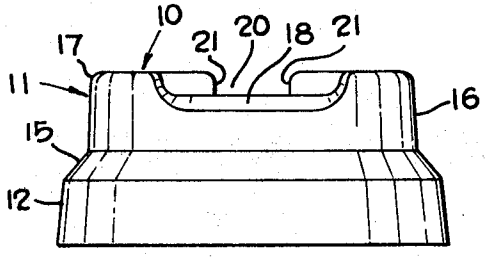


FIG. 3

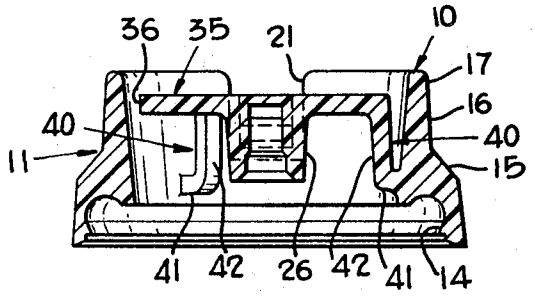


FIG. 5

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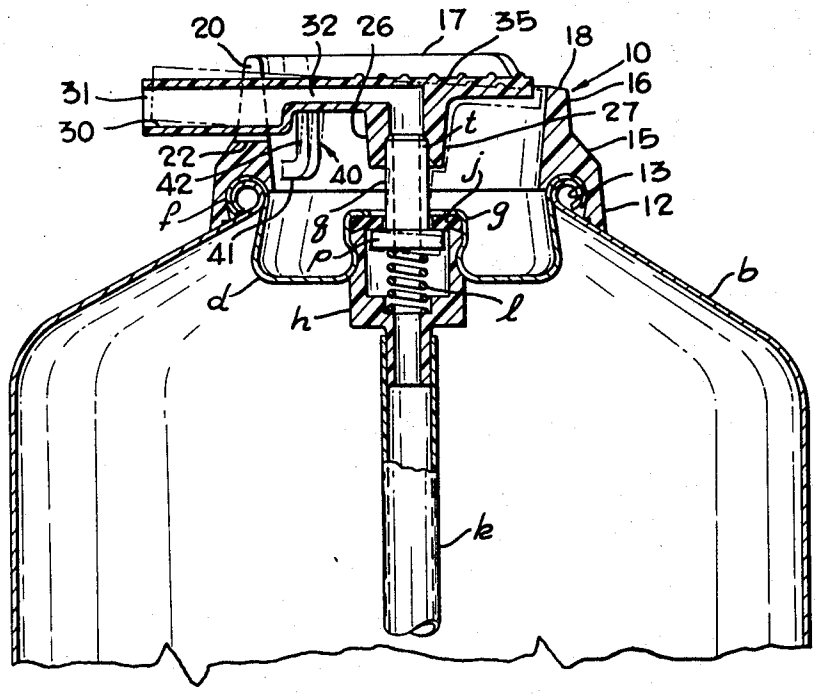

FIG. 4

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UNITARY NOZZLE, ACTUATOR AND GUARD FOR PRESSURIZED DISPENSERS

BACKGROUND OF THE INVENTION

This invention relates to a one-piece nozzle and guard actuator for dispensing substances packed in pressurized containers, and is particularly adapted for use with tilt-opening valves.

Heretofore actuators molded of somewhat flexible plastic material and consisting principally of a circular guard wall portion and a nozzle-actuator portion, have been produced with relative success for use with valves of the type which open by direct downward movement. For this use, the parts may be so molded as to provide a continuous juncture, around the entire outer surface of the nozzle, with the wall portion portion which mounts it. The plastic material will permit sufficient bending at and inward of such juncture to provide the required downward movement on an inlet, at the center of the wall, which connects to the tip of a tubular valve stem. Such construction, which is well known, is illustrated in the U.S. Pat. No. 2,819,116 to Abplanalp.

Such an actuator is not well suited for valves which open by tilting, such as shown in U.S. Pat. No. 3,081,916 to Rhodes and Hug. Such a tilt-opening valve normally opens by rotating about a center well below the tip of the tubular stem; hence the tip will rock either forward or aft on tilting of the stem tip. Even when used with a valve which opens by direct downward movement, a unitary actuator of the type shown in the Abplanalp Pat. No. 2,819,116 provides little tolerance, either for lack of concentricity between the valve stem tip and the container rim, or for the vertical height of the valve stem tip with reference to the container rim.

SUMMARY OF THE INVENTION

The principal purpose of the present invention is to provide a one-piece actuator, as used for pressurized dispensing foams, products of liquid or creamy consistency, and the like, which provides for a great amount of departure of the valve stem tip from concentricity with the container rim, both to take up tolerances on assembly and to accommodate forward and aft rocking of the stem tip of tilting the valve stem to open it. Other purposes will be apparent from the disclosure which follows.

Briefly summarizing the present invention, without limiting its scope, the present unitary actuator utilizes certain conventional features, including: a circular wall portion having means to grasp onto the rim of such a dispensing container, sidewall parts which guard against inadvertent actuation; a spout actuator portion including an inlet presented downward for engaging onto the valve stem tip; a nozzle part communicating with and extending radially forward from the inlet and an actuator part overlaying the inlet and positioned spacedly within the circular wall portion.

As new features, the nozzle part projects fully through and over the wall portions; and flexible leg portions extend inwardly from the circular wall portion below the level of the actuator part and upwardly to join the disc part. Flexure of the leg portions, on assembly and during operation, provides for departure from concentricity hereinabove referred to. On tilting the valve stem to open position, such flexure permits the nozzle actuator portion to rock backward or forward, while its nozzle moves easily in a groove in the wall portion.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of a one-piece nozzle, actuator and guard embodying the present invention, shown partly broken away.

FIG. 2 is a front view thereof.

FIG. 3 is a rear view thereof.

FIG. 4 is a sectional view, taken along line 4–4 of FIG. 1, of the one-piece nozzle, actuator and guard of the present invention, shown mounted on a conventional valved dispensing container. The phantom lines show the parts during tilt actuation of the valve.

FIG. 5 is a sectional view taken along line 5–5 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A conventional dispensing container *b*, of a type on which the present one-piece nozzle, actuator and guard is especially useful, is shown fragmentarily in FIG. 4. It utilizes a standard top member *d*, sometimes called a mounting cup, whose circular rim *f* is fitted sealedly over the mouth of the container *b*, and which has a central pedestal portion *g* in which a tilt-opening dispensing valve mechanism is mounted. Such valve mechanism may include a molded adapter *h* whose upper rim seals against the outer edge of a sealing washer *j* and whose smaller-diameter lower end holds a dip tube *k* which extends downward to near the bottom of the container *b*. A compression spring *l* within the adapter *h* presses resiliently upwardly against the head *p* of a tiltable tubular valve stem *q*, which is ported adjacent to the valve head *p*. The outer tip *t* of the valve stem *q* is normally presented vertically upward, substantially concentric with the circular rim *f*.

The present one-piece nozzle, actuator and guard is generally designated **10**, and is best seen in the plan view FIG. **1** and the sectional view FIG. **4**. It is molded preferably of one of the flexible plastic materials such as polyethylene. From a functional standpoint it has three principal portions, which will now be described.

A circular guard wall portion, itself generally designated **11**, has an enlarged diameter base wall **12** including a convex or hollow rounded rim-fitting part **13** and an undercut or grasping part **14**, which serve as means to grasp onto the rounded rim *f* of the container top member *d*. Above a taper part **15** is a nearly vertical guard wall part **16**. It includes side guard parts **17** which are highest and serve to prevent inadvertent actuation of the valve mechanism. At the rear, between the side guard parts, the height of the guard wall part **16** is reduced by a broad finger access cutout **18** best seen in FIG. **3**. At the front, between the side guard parts **17** is a nozzle groove **20**, defined by a pair of substantially vertical side edges **21** which extend downward to the circular guard wall portion **11**, and by a horizontal lower edge **22** in the wall taper **15**, as best seen in FIG. **2**.

A second functional portion of the present unitary nozzle, actuator and guard **10** is the nozzle-actuator portion generally designated **25**. Best shown in FIGS. **1** and **4**, it includes a hollow hublike inlet part **26** having a downwardly presented opening **27** which may be tapered as shown, to engage sealedly onto the valve stem tip *t*. Communicating with the upper end of the hollow inlet part **26** and extending therefrom forwardly along a radial line, to project freely through the nozzle groove **20** over its lower edge **22**, is a hollow nozzle part **30**. In the embodiment shown the nozzle part **30** has a relatively large tubular nozzle outlet **31** at and forwardly of the circular guard wall portion **11**; and also has a communicating passage **32** of substantially smaller cross section which joins the hublike inlet part **26**.

An actuator part **35** of the nozzle actuator portion **25** is, in the embodiment shown, substantially disclike in plan form **35**, as best shown in FIG. **1**. It has a nearly circular outer edge **36** spaced inward from the guard wall portion **16**; however its forward portion **37** is continuous with the top wall of the spout **30**. Commencing with a portion which overlays the hublike inlet part **26** and rearwardly, its upper surface area forward of the finger access cutout **18** is provided with ridges **38** which aid in finger actuation.

The third functional portion of the present device are novel flexible leg portions generally designated **40**, which connect the circular guard wall portion **11** and the nozzle-actuator portion **25**. As best seen in FIG. **5**, each of the leg portions **40** has a nearly horizontal part **41** which extends inward from the circular guard wall portion **11** immediately above its rim-fitting part **13**, well below the level of the disclike actuator part **35**, to

span the space outwardly of its circular outer edge **36**. Continuing from said inwardly extending parts **41**, the leg portions **40** have upwardly extending parts **42** which connect integrally with the undersurface of the actuator part **35** outwardly of the hublike inlet part **26**.

In designing the present unitary nozzle, actuator and guard, the angular positions of the flexible leg portions **40**, with reference to a radial line from the inlet part **26** through the hollow nozzle part **30**, may be varied substantially, to take into consideration the manner in which the valve stem *q* tends most naturally to tilt within the sealing washer *j* during the most naturally applied opening movement.

Referring to FIG. **5**, the phantom lines show how the presently-illustrated valve tends most readily to open. The stem *q* rotates within the sealing washer *j* and partly moves downward, because of contact of the edge of the valve head *p* against the undersurface of the sealing washer *j*; hence this valve mechanism is one which opens principally by angular tilting but with a small component of downward movement. It is desirable that the actuator mechanism utilized be capable of imparting such opening movements to the valve stem tip *t*.

The flexibility of the leg portions **40** make the present invention uniquely suited for this purpose. Choosing an optimum angular location, with reference to the centerline of the hollow nozzle part **30**, is of some importance. Thus, if no movement of the valve stem *q* was required other than a pure tilting or rocking movement, the flexible leg portions **40** might be advantageously located along a diameter perpendicular to the centerline of the hollow nozzle part **30**. In the illustrated embodiment, however, the valve opens in part by downward movement; in all cases there is a natural tendency on the part of the user to exert a substantial component of downward force. The location of the flexible leg portions **40** should not be such as to resist unduly any natural movement of the components.

The leg portions **40** in the present embodiment are located at an angle A substantially 30° from the centerline of the nozzle part **30**, as shown in FIG. **1**. As shown in phantom FIG. **4**, they will flex and twist slightly to bend aft and downward. Thus they accommodate rocking movement of the valve stem *q* and also its downward component of movement. It has been found that if the leg portions **40** are substantially 30° or more forward of a diameter perpendicular to the centerline of the hollow nozzle part **30**, their deformation will easily permit a substantial amount of downward movement of the inlet part **26** as well as the requisite forward and aft rocking movement. In the course of such forward and aft rocking movement, the nozzle part **30** moves easily within the nozzle groove **20**, as seen from FIG. **4**.

It may thus be seen that the general purpose of the flexible leg portions **40** is to provide for departure of the valve stem tip from concentricity with the rim *f*. In operating the valve, such departure from concentricity comes from rocking the inlet part **26** attendant tilt opening of the valve *q*. A different occasion for lack of concentricity may be original faulty positioning of the parts. While the central pedestal portion *g* is likely to be formed fairly concentric with the rim *f*, crimping its sidewalls to hold the sealing washer *j* and the molded adapter *h* in place may cause an appreciable lack of concentricity of the valve stem *q*, and this may be increased by manufacturing tolerances.

In the prior art U.S. Pat. No. 2,819,116 first referred to, there is a fixed radial distance to an inlet corresponding to the inlet **26**; and no means exists for accommodating such a lack of concentricity on assembly. With the present invention, however, the flexibility of the leg portions **40** permit the inlet **26** to align itself with the valve stem *q* as the tapered downwardly presented opening **27** is applied over the tip *t*. Hence, filled containers which might otherwise be rejected because of lack of concentricity of the valve stem *q* with the rim *f*, are entirely acceptable when the present invention is used.

Variations in construction, from the details here specifically described, may be made without departing from the teachings of this invention. Accordingly, this invention is not to be construed narrowly, but rather as fully coextensive with the claims.

I claim:

1. For use with a pressurized dispensing container having a circular rim surrounding the tip of a vertically presented tubular valve stem, a one-piece nozzle, actuator and guard comprising

A. a circular guard wall portion having:
- means to grasp onto the rim of such dispensing container;
- side guard parts extending upwardly therefrom;
- and a forward nozzle groove between said guard parts; together with

B. a nozzle-actuator portion including:
- an inlet part having a downward presented opening;
- whereby to engage sealedly onto such valve stem tip;
- a nozzle part communicating with and extending along a radial line forwardly from said inlet part and projecting freely through the nozzle groove and over the wall portion; and
- an actuator part overlaying the inlet part and having an outer edge spaced inwardly from and within the circular wall portion, together further with

C. flexible leg portions extending inwardly from the circular guard wall portion on both sides of said radial line and spacedly below the level of the actuator part and thence upwardly to connect to the actuator part, whereby flexure of the leg portions provides for departure of the valve stem tip from concentricity with such container rim.

2. A one-piece nozzle, actuator and guard as defined in claim **1**, wherein:
- the nozzle groove is of such width and depth as to provide clearance for the nozzle part; and
- the flexible leg portions are located angularly from the radial line of the nozzle part, by substantially 30° or more, whereby bending of the flexible portions permits easy forward and aft rocking of the inlet part attending tilt opening of the valve and corresponding easy movement of the nozzle part in the nozzle groove.

3. A one-piece nozzle, actuator and guard as defined in claim **2**, wherein:
- the said angular locations of said leg portions from the radial line of the nozzle part are substantially 30° or more forward of a diameter perpendicular to said radial line; and
- whereby to provide for downward movement of the inlet part as well as such forward and aft rocking movement thereof.