United States Patent

Nigro

[15] 3,692,215

[45] Sept. 19, 1972

[54] **ASSEMBLY FOR CONTROLLING DISCHARGE OF MATERIAL FROM A PRESSURIZED DISPENSING PACKAGE**

[72] Inventor: **Louis V. Nigro**, 6 Altamont Avenue, Saugus, Mass. 01906

[22] Filed: **Nov. 3, 1970**

[21] Appl. No.: **86,469**

[52] **U.S. Cl.** **222/402.13**

[51] **Int. Cl.** **B65d 83/14**

[58] **Field of Search** 222/402.21, 402.22, 402.23, 222/402.24, 402.13

[56] **References Cited**

UNITED STATES PATENTS

3,558,019	1/1971	Hug	222/402.22
3,169,672	2/1965	Soffer et al.	222/402.22 X
3,388,840	6/1968	Hug	222/402.22 X
2,932,434	4/1960	Abplanalp	222/402.22 X
3,373,908	3/1968	Crowell	222/402.13
3,314,576	4/1967	Focht et al.	222/402.13

Primary Examiner—Stanley H. Tollberg
Assistant Examiner—Norman L. Stack, Jr.
Attorney—Willis M. Ertman

[57] **ABSTRACT**

An actuator cap for a material dispensing package having a material container and a valve structure including a delivery passage for delivering material from the container; the actuator cap comprises an annular wall surrounding the valve structure and securing the cap to the container, and a spout including a discharge passage which spans the annular wall, extends past the cylindrical plane defined by the outer surface of that wall and secured to the valve structure with discharge passage of the spout in communication with the delivery passage of the valve structure, and supporting structure for the spout; the supporting structure is secured to the cap, and also extends past the aforesaid cylindrical plane; the spout is joined to the supporting structure at its outlet end and is otherwise unsupported between the support structure and the valve structure; second, the spout further has an exposed surface located such that application of force to that surface acts to pivot the spout about the supporting structure thereby to operate the tubular valve.

21 Claims, 20 Drawing Figures

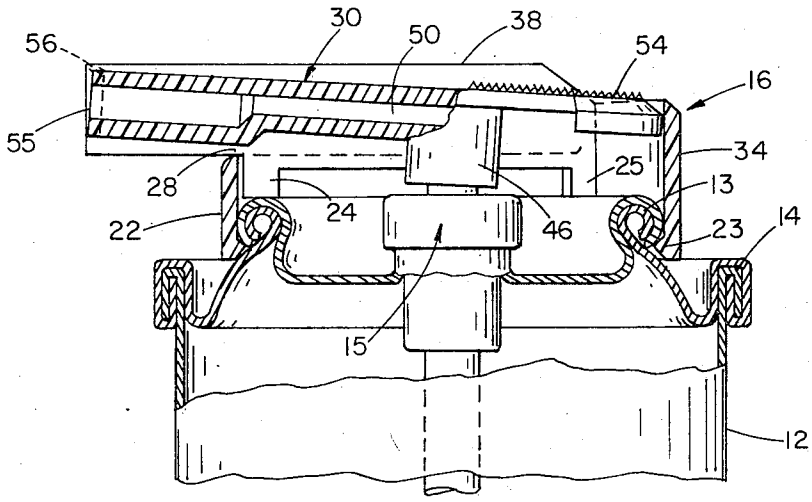
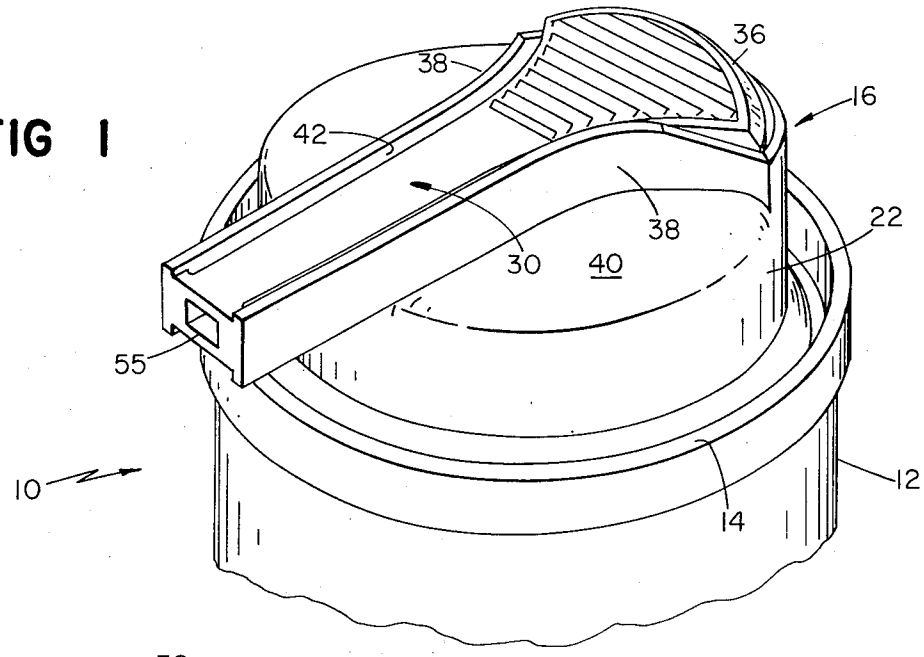


FIG 1



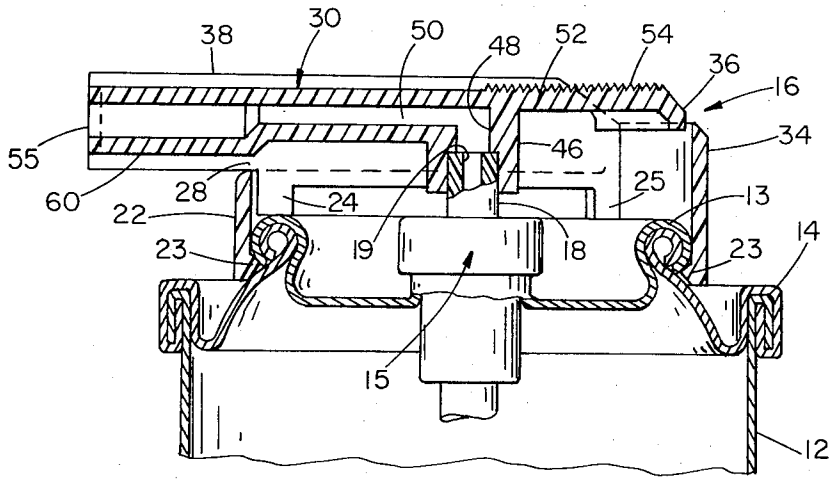


FIG 2

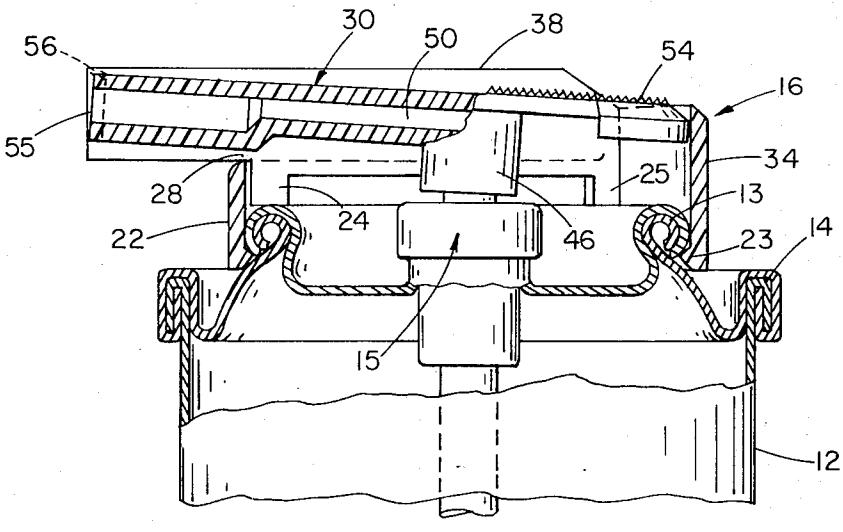
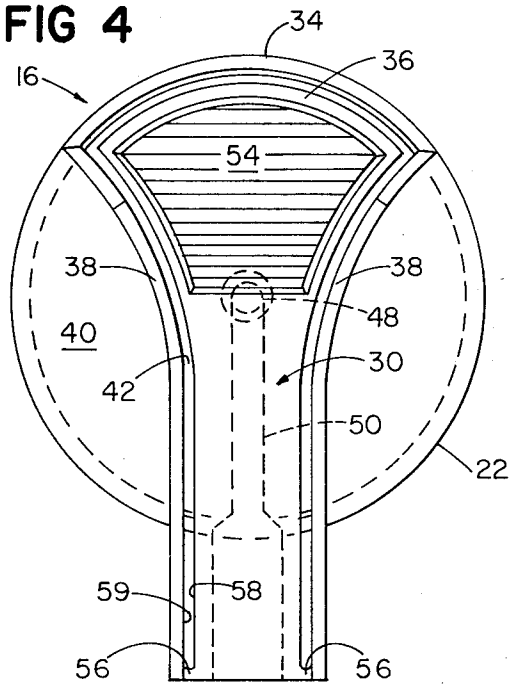


FIG 3

FIG 4



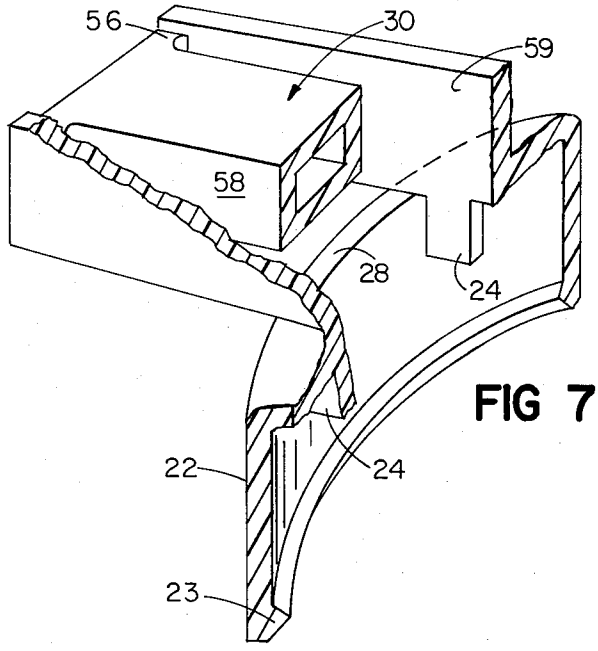


FIG 7

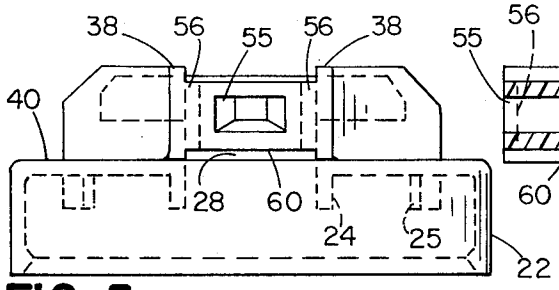


FIG 5

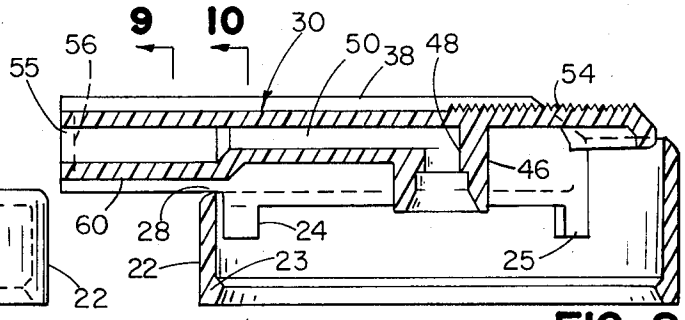


FIG 8

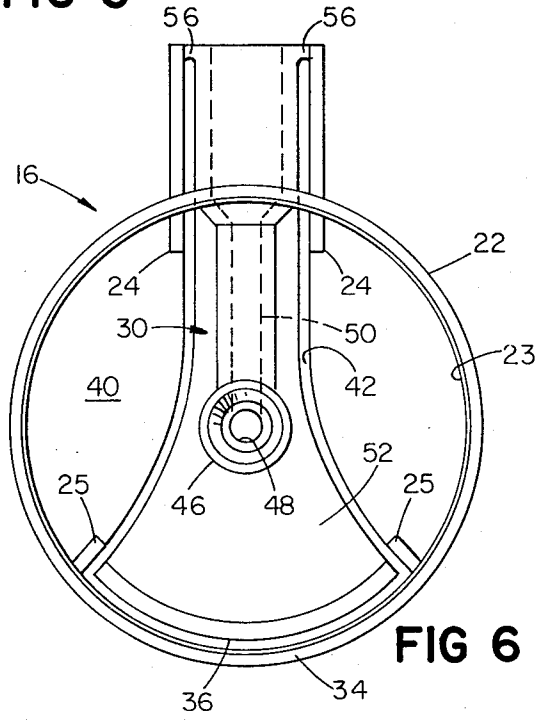


FIG 6

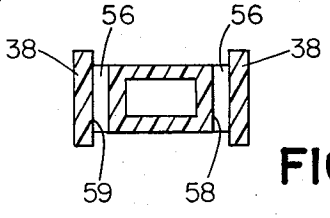


FIG 9

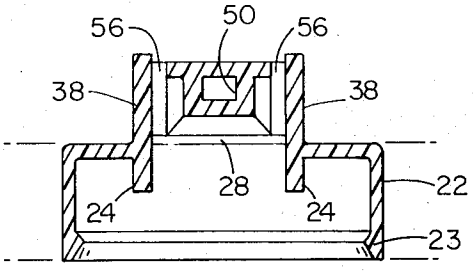


FIG 10

FIG 12

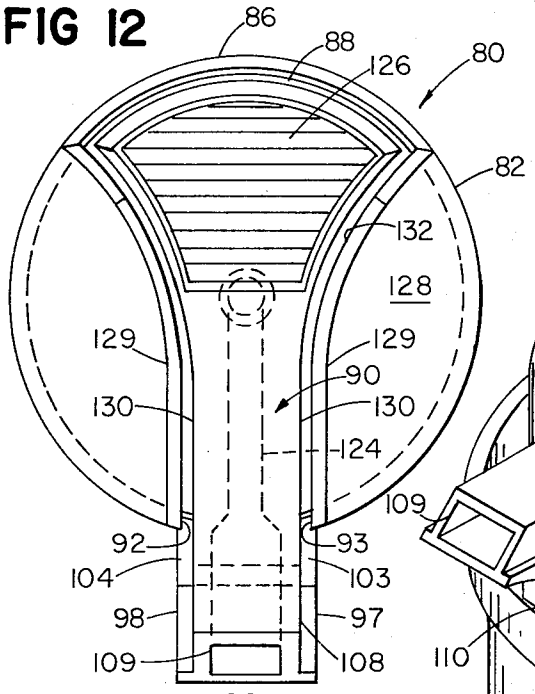
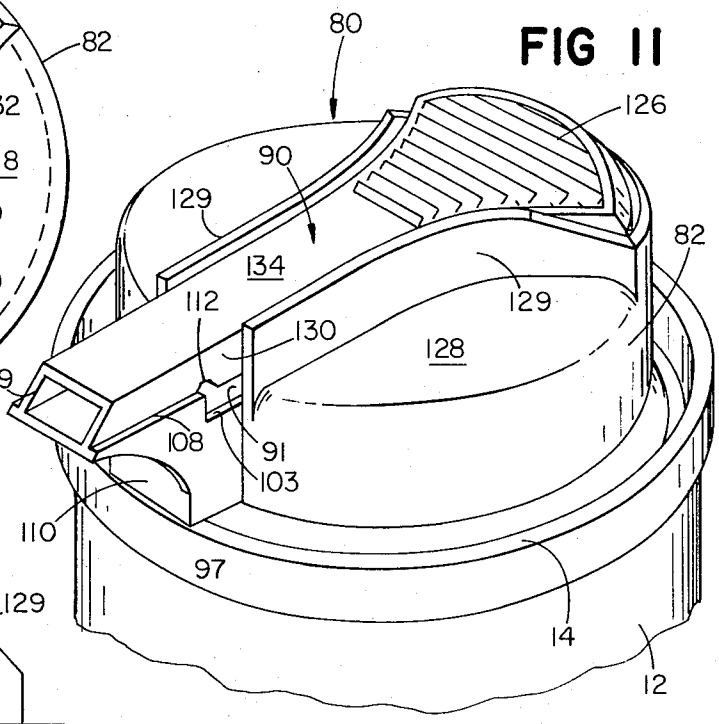


FIG 11



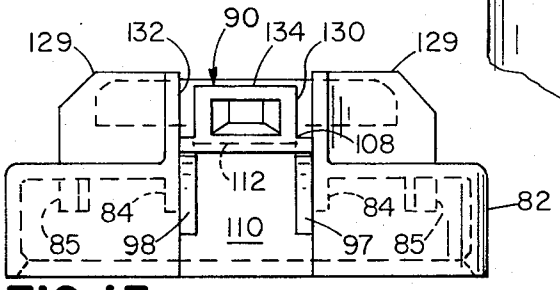


FIG 13

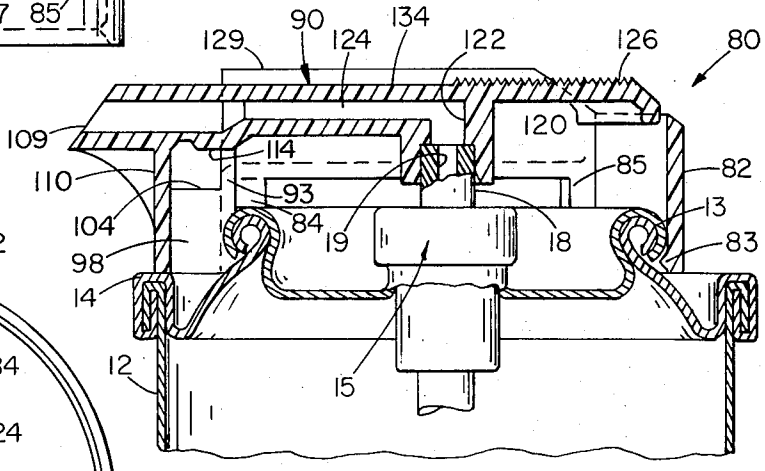


FIG 15

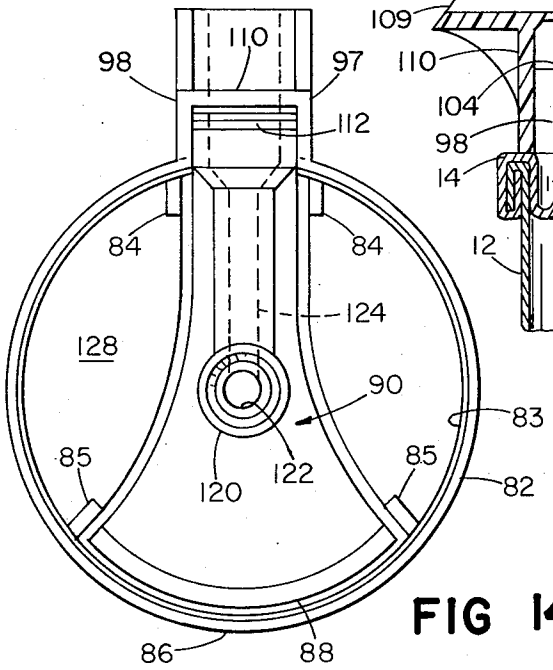


FIG 14

FIG 17

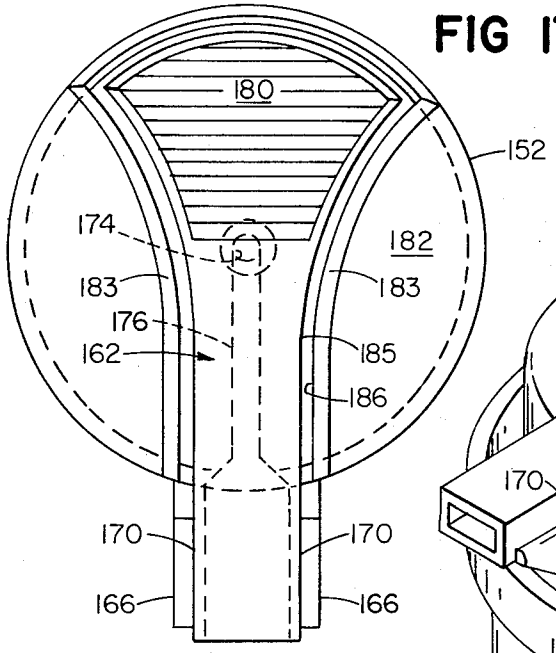
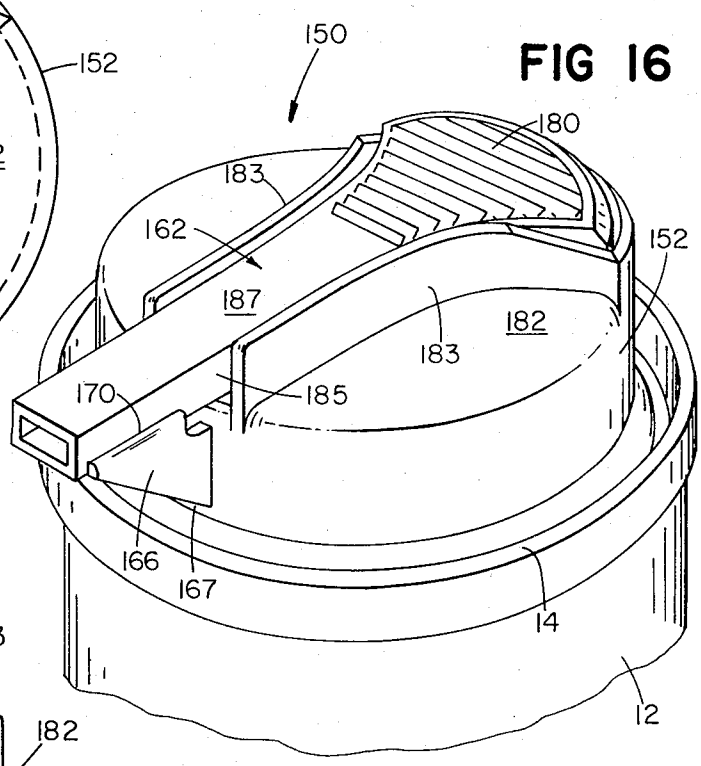


FIG 16



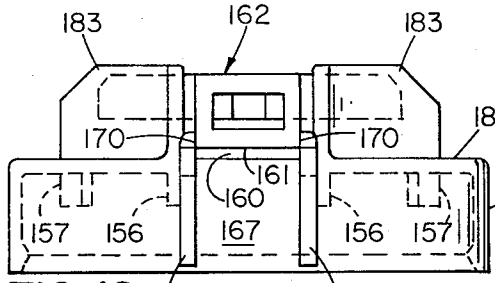


FIG 18

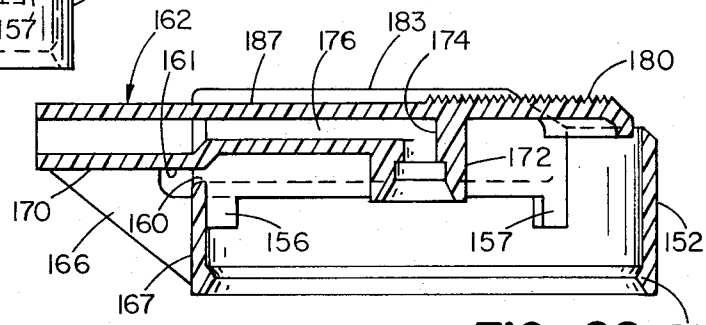


FIG 20

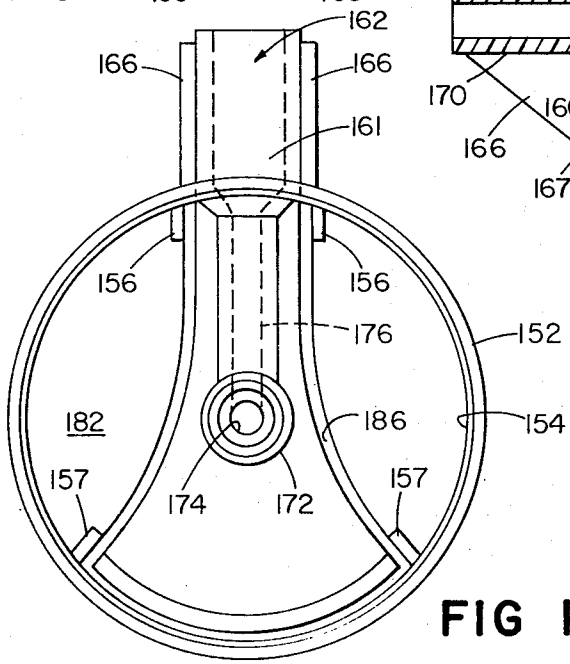


FIG 19

ASSEMBLY FOR CONTROLLING DISCHARGE OF MATERIAL FROM A PRESSURIZED DISPENSING PACKAGE

This invention relates to pressurized dispensing packages, and particularly to assemblies for controlling discharge of material from such packages.

Valves for pressurized dispensing packages are typically actuated by pushing or tilting the valve toward the package. Such valves are simple, economical and reliable, but are also inconvenient to operate, and must be covered for storage and shipment, and to prevent accidental discharge. Such valves are therefore advantageously coupled to some auxiliary structure or cap which is easier to operate, establishes a desirable exit path for material from the container, reduces the irregularity of container configuration, and, in general, reduces the possibility of accidental discharge. Such caps often take the form of pivoted actuator levers which have an exposed surface which the user depresses to operate the valve. Where these caps are made of plastic, the pivoting usually occurs because of a temporary, elastic deformation of the actuator. The greater the deformation required to actuate this lever, the stronger must the material be, and hence the more carefully must it be molded to avoid premature breakdown. In addition, to allow for such deformations, levers must be very flexible, and hence the more subject to accidental discharge.

It is therefore an object of this invention to provide actuator structures for actuating tilt or push-type valves of pressurized dispensing packages which are easy to manufacture and operate, are of improved durable construction, and which reliably and consistently provide desired material discharge from such packages.

Another object is to decrease the possibility of accidental discharge of the contents of pressurized containers.

Another object is to reduce premature breakdown or breakage, both before or during periods of use, of valve actuating structures.

Another object is to provide novel and improved structures for actuating tubular valve stems, and which are also of regular, easy to store and package conformations.

The invention features an actuator cap for a material dispensing package having a material container and a valve structure including a material delivery passage from the container. This actuator cap comprises a base secured to the container (e.g., by an annular base wall generally surrounding the valve structure); actuator structure including a discharge passage for coupling to the valve structure with the discharge passage in communication with the delivery passage of the valve structure; and actuator support structure. The actuator support structure is secured to the base, and also extends past and terminates outside of the outer surface of the base (or a vertical extension thereof—e.g., outside the cylindrical plane defined by the aforesaid annular wall). The actuator structure and actuator support structure are joined to each other in a region lying outside of this outer base surface and the actuator is otherwise unsupported between the actuator support structure and the valve structure. The actuator structure further has an exposed surface located such that application of force to that exposed surface pivots the actuator structure about the actuator support structure, thereby to operate the valve structure.

In one preferred embodiment, the actuator comprises a spout having its outlet outside the outer surface of the base. The spout is disposed between a pair of spaced apart support arms and is joined thereto adjacent its outlet end. In the preferred embodiment, the spout and support arms both extend substantially parallel to the discharge direction of the spout, and elongated web members having longitudinal axes substantially perpendicular to the discharge direction of the spout join the spout to the arms. In preferred aspects of this embodiment, the support arms are arranged to span the annular wall, being spaced from portions of the annular wall directly beneath, the spout has a rectangular cross-section at its discharge passage, and the support arms have planar walls parallel, adjacent and joined to planar walls of the spout.

A cap is also provided having a base wall which forms a top across the annular wall and has an opening sized to receive so much of the spout as is located within the aforesaid cylindrical plane and to permit pivotal movement of the spout in the opening. A pair of upstanding wall portions are arranged along opposed edges of the opening and define therebetween a region in which the spout is freely pivotal, the wall portions extending upwardly from the base wall at least slightly further than the uppermost exposed surface of the sput between the wall portions. The support structure may be secured to this base wall, and, where this structure comprises support arms as previously described, these wall portions may be integral extensions of those arms. In a preferred cap structure the exposed or operating surface is located inside of the aforesaid cylindrical plane—e.g., entirely within the opening in the base wall.

In other embodiments, the support structure comprises spaced apart support arms secured to the spout along elongated regions extending for a substantial length of the spout, having longitudinal axes arranged substantially parallel to the discharge direction of the spout. The spout has a flexible hinge located in its unsupported portion between these elongated regions and the valve structure, such as a reduced thickness strip across the lower wall of the spout adjacent these regions. The support structure also includes a brace member secured to the underside of the spout, located adjacent the interior ends of the elongated regions, and also arranged to rest on the container itself, with the flexible hinge being located between the brace member and the annular wall. Where there is no brace member located beneath the spout, it may not be necessary to form a flexible hinge for the spout even though the spout is supported on the supporting structure for a substantial part of its length.

In another embodiment, the annular wall of the actuator cap is interrupted adjacent each side of the spout, to define an arcuate slot, and the support members, forming the support structure, are coextensive with the axially extending sides of the slot.

Other objects, features and advantages will appear to one skilled in the art from the following description of preferred embodiments of this invention, taken together with the attached drawings thereof, in which:

FIG. 1 is a perspective view of the top of a pressurized dispensing package having an actuator cap embodying this invention;

FIG. 2 is a sectional view of the packages of FIG. 1 with the actuator cap in the rest position (and the valve closed);

FIG. 3 is the same view as FIG. 2, except with the actuator cap moved to its operating position for dispensing material from the package;

FIG. 4 is a top view of the actuator cap of FIG. 1;

FIG. 5 is an end elevational view of the actuator cap of FIG. 1;

FIG. 6 is a bottom view of the actuator cap of FIG. 1;

FIG. 7 is a perspective view, partly cut away, of the spout and cooperating support structure of the actuator cap of FIG. 1;

FIG. 8 is a sectional view of the actuator cap alone, identical to the view in FIG. 2;

FIGS. 9 and 10 are sectional views of the actuator cap of FIG. 1, along and in the direction of the lines 9—9 and 10—10, respectively, of FIG. 8;

FIG. 11 is a perspective view of the top of a pressurized dispensing package having a second embodiment of an actuator cap;

FIG. 12 is a top view of the actoator cap of FIG. 11;

FIG. 13 is an end elevational view of the actuator cap of FIG. 11;

FIG. 14 is a bottom view of the actuator cap of FIG. 11;

FIG. 15 is a sectional view, partly broken away, of the top of a dispensing package and associated actuator cap of FIG. 11;

FIG. 16 is a perspective view of the top of a pressurized dispensing package having a third embodiment of an actuator cap;

FIG. 17 is a top view of the actuator cap of FIG. 16;

FIG. 18 is an end elevational view of the actuator cap of FIG. 16;

FIG. 19 is a bottom view of the actuator cap of FIG. 16; and,

FIG. 20 is a sectional view of the actuator cap of FIG. 16.

FIGS. 1–10 show a portion 10 of a pressurized dispensing package including a container 12 having an annular inner bead 13 and an annular outer bead 14, a conventional tubular valve structure 15, and an actuator cap 16. Valve structure 15 has a tubular valve stem 18 defining a material delivery passage 19 and is biased, in a conventional manner, by resilient means such as a coiled spring (not shown) to the closed position shown in FIG. 2. Depressing or tilting stem 18 allows material from container 12, under pressure of compressed gas, to be discharged through passage 19.

Actuator cap 16, formed of a resilient plastic material, includes annular wall 22, which has on its inner surface an inwardly projecting rib 23 adapted to engage the underside of bead 13, to secure the cap to the container. Two pairs of spaced lugs 24, 25 are sized to rest on top of bead 13 when the cap and container are assembled to further support cap 16 on container 12. Annular wall 22 has an arcuately extending detent or slot 28 beneath the actuator spout 30, and a portion 34 of increased height adjacent the arcuate rear wall 36 of actuator spout 30. Curved spout support arms 38 project above base wall 40 of cap 16 and define therebetween thus a region adjacent opening 42 in which actuator spout 30 is free to pivot. The spout remains separated from adjacent portions of arms 38 by parts of the opening 42. Actuator spout 30 has a mounting structure 46 press fit onto valve stem 18. Mounting structure 46 also has a fluid passage 48 between the delivery passage 19 of valve stem 18 and the rectangular cross-sectional spout discharge passage 50. A rearwardly extending portion 52 of actuator spout 30 has an exposed actuating surface 54. Spout 30 is joined to support arms 38 adjacent its outlet 55 by elongated web members 56, each about 0.070 inch thick, and 0.250 inch high between the side walls 58 of spout 30 and the substantially parallel inner walls 59 of arms 38. The longitudinal axes of members 56 are thus arranged substantially perpendicular to the discharge direction of the spout through its discharge passage 55. The spout 30 is otherwise unsupported between mounting structure 46 and its outlet, its lower surface 60 spanning and suspended (about 0.075 inch) above annular wall 22.

In operation, since actuator spout 30 is formed of such a relatively flexible material, when exposed surface 54 is depressed, as shown in FIG. 3, the entire member 30 is free to pivot generally about hinge members 56, the upper and lower surfaces of spout 30 resiliently expanding or contracting. Because of the long moment arm between web members 56 and the exposed surface 54, only a light angular deflection of the spout (about 0.001–0.125 inch at mounting structure 46) is required to cause mounting structure 46 to be moved sufficiently to actuate valve structure 15. Because of this, the actuator spout may be relatively stiffer than has previously been possible, and hence will be less subject to accidental actuation, and more durable. Furthermore, the outlet end of spout 30 being secured to the container, there is far less danger than with previous unsupported, but similarly projecting spouts, of partially or completely breaking the spout off the cap. The overall rectangular configuration of the spout and the regular, planar exposed surfaces of the spout and arms further provide a dispensing package which is of an easy to store and package conformation.

FIGS. 11–15 show an actuator cap 80 (formed also of a resilient plastic material) having an annular wall 82 with an inwardly projecting rib 83, and spaced lugs 84, 85 adapted to secure the cap to a container 12, in the manner previously described for securing cap 16 to container 12. Annular wall 82 has a portion 86 of increased height adjacent the arcuate rear wall 88 of actuator spout 90, and an arcuate slot 91 between axial walls 92, 93, located beneath the spout 90. Secured to the sides 92, 93 of the slot are support arms 97, 98, respectively. Arms 97, 98 each include a cut-out section 103, 104, located beneath spout 90 and adjacent the cylindrical plane defined by annular wall 82. Support arms 97, 98 are secured to and support spout 90 along elongated regions 108 (about 0.300 inch long, about 0.400 inch high) extending to the outlet 109 of spout 90 substantially parallel to the discharge direction of the spout through its discharge passage 124. Brace member 110 is located between support arms 97, 98, rests on the outer bead 14 of a container 12, and is secured to the underside of spout 90. A reduced thickness strip 112 cut in the lower wall 114 of

spout **90** provides a flexible hinge adjacent brace member **110**. Actuator spout **90** also has a mounting structure **120** constructed to press fit with a tubular valve stem **18**, and the mounting structure **120** further has a fluid passage **122** between the delivery passage **19** of the tubular valve stem and spout discharge passage **124**. A rearwardly extending portion of actuator spout **90** provides an exposed actuating surface **126**. Actuator cap **80** also includes a base or top wall **128** along which extend upstanding wall portions in the form of curved fin members **129**, these fins extending rearwardly from annular wall **82**, substantially parallel to the side walls **130** of spout **90**, and along the edge of the opening **132** in base wall **128**. Actuator spout **90** is shaped to pivot freely in opening **132**, and the top exposed surface **134** of spout **90** is located below the tops of fin members **129**. Spout **90** is otherwise unsupported between strip **112** and mounting structure **120**.

The operation and advantages of actuator cap **80** are similar to those previously described for cap **16**. Since actuator spout **90** is formed of a relatively flexible material, and has, further, a flexible hinge **112**, when exposed surface **126** is depressed, the entire spout **90** pivots generally about hinge **112**, the upper and lower surfaces of spout **90** resiliently expanding and contracting as required. Because of the long moment arm between the inner end of the support regions **108** and the exposed surface **126**, only a slight angular deflection of the spout (about 0.001–0.125 inch at mounting structure **120**) is required to cause mounting structure **120** to be moved sufficiently to actuate the tubular valve stem **18** of valve structure **15**. Because of the long moment arm, the actuator spout may be relatively stiffer than has previously been possible (although, with hinge **112**, perhaps not as stiff as the embodiment of FIGS. **1–10**) and hence will be still less subject to accidental actuation, and more durable than members having shorter moment arms. Furthermore, the outlet end of spout **90** being secured to the container, and both sides of the spout being well protected by the fin members **129**, there is far less danger than with previous unsupported, but similarly projecting spouts, of partially or completely breaking the spout off the cap.

FIGS. **16–20** show an actuator cap **150**, formed of a resilient plastic material, having an annular wall **152** with an inwardly projecting rib **154**, and spaced lugs **156, 157** adapted to secure the cap to a container **12**, in the manner previously described for securing cap **16** to container **12** (FIGS. **1, 2**). Annular wall **152** has an arcuate portion **160** spaced beneath the lower wall **161** of actuator spout **162**. Support arms **166** (about 0.070 inch thickness) are secured to the outer surface **167** of annular wall **152**, and are also secured to and support spout **162** along elongated regions **170** (about 0.250 inch long, about 0.400 inch high) extending substantially parallel to the discharge direction of spout **162** (through its discharge passage **176**). Actuator spout **162** also has a mounting structure **172** constructed to press fit with a tubular valve stem **18** (FIG. **1**), and the mounting structure **172** further has a fluid passage **174** between the delivery passage of the tubular valve stem and the spout discharge passage **176**. A rearwardly extending portion of actuator spout **162** provides an exposed actuating surface **180**. Actuator cap **150** also includes a base or top wall **182** along which extend upstanding wall portions in the form of curved fin members **183**, these fins extending rearwardly from annular wall **152**, substantially parallel to the side walls **185** of spout **162**, and along the edge of the opening **186** in top wall **182**. Actuator spout **162** is shaped to pivot freely in opening **186** and the top exposed surface **187** of spout **162** is located below the tops of fin members **183**. Spout **162** is otherwise unsupported between support arms **166** and mounting structure **172**.

The operation of actuator cap **150** is similar to that previously described for cap **16**. Since actuator spout **162** is formed of a relatively flexible material, when exposed surface **180** is depressed, the entire actuator spout **162** pivots generally adjacent the inner ends of support regions **170**, the upper and lower surfaces of spout **162** resiliently expanding or contracting as required. Because of the long moment arm between the inner ends of arms **166** and the exposed surface **180**, and further because of the flexibility of these brace arms **166** themselves, only a slight angular deflection of the spout (about 0.001–0.125 inch at mounting structure **172**) is required to cause mounting structure **172** to be moved sufficiently to actuate the tubular valve stem **18** of valve structure **15**. Because of the long moment arm, the actuator spout may be relatively stiffer than has previously been possible, and hence will be still less subject to accidental actuation, and more durable than members having shorter moment arms. Furthermore, the outlet end of spout **162** being secured to the container, and both sides of spout **162** being well protected by the fin members **183**, there is far less danger than with previous unsupported, but similarly projecting spouts, of partially or completely breaking the spout off the cap. This embodiment, and that of FIGS. **11–15**, also has the advantage of streamlined, easy to store and package, conformation.

Other embodiments will appear to those skilled in the art and are within the following claims.

What is claimed is:

1. In a material dispensing package having a material container and a valve structure including a delivery passage for delivering material from said container, a one-piece actuator cap comprising

an annular wall surrounding said valve structure and including structure for securing said cap to said container,

a spout, including a discharge passage, said spout spanning said annular wall, extending past the plane defined by the outer surface of said wall, and secured to said valve structure with said discharge passage in communication in the said delivery passage,

supporting structure for said spout, said structure being integral with said cap and also extending outwardly of said plane,

and coupling structure joining said spout to said supporting structure at the outlet end of said spout outside of said plane,

said spout being otherwise unsupported between said supporting structure and said valve structure, and

said spout further having an exposed surface located such that application of force to said exposed surface acts to pivot said spout about said supporting structure, thereby to operate said valve structure.

2. The package of claim 1 wherein said supporting structure comprises a pair of spaced apart support arms, and said spout is disposed between said arms, and said coupling structure secures said arms to said spout adjacent the outlet end of said spout.

3. The package of claim 2 wherein said support arms extend in a direction substantially parallel to the discharge direction of said spout.

4. The package of claim 3 wherein said spout extends in a direction substantially parallel to said support arms.

5. The package of claim 2 wherein said coupling structure includes a pair of elongated web members for securing said spout to said support arms, said web members having longitudinal axes arranged substantially perpendicular to the discharge direction of said spout.

6. The package of claim 2 wherein said coupling structure includes elongated regions extending for a substantial length of said spout, said regions having longitudinal axes arranged substantially parallel to the discharge direction of said spout.

7. The package of claim 6 wherein said spout has a flexible hinge located in its unsupported portion between said elongated regions and said valve structure.

8. The package of claim 7 wherein said hinge is defined by a reduced thickness strip across the lower wall of said spout.

9. The package of claim 8 wherein said strip is located adjacent said elongated regions.

10. The package of claim 6 wherein said supporting structure also includes a brace member secured to the underside of said spout, adjacent the interior ends of said elongated regions, said brace member arranged to rest on said container.

11. The package of claim 10 wherein said spout has a flexible hinge located in its unsupported portion between said brace member and said annular wall.

12. The package of claim 1 wherein said supporting structure is secured to the outer surface of said annular wall.

13. For use in a material dispensing package having a material container and a valve structure including a delivery passage for delivering material from said container, a one-piece actuator cap comprising

an annular wall surrounding said valve structure and including means for securing said cap to said container,

a pair of spaced apart support arms, secured to said cap, and extending outwardly of the outer surface of said wall,

a spout spanning said annular wall, disposed between said arms and also extending outwardly of the outer surface of said wall, said spout including a discharge passage with an outlet end outside of said outer surface and a coupling end for securing to said valve structure with said discharge passage in communication with said delivery passage, and

a pair of web members connected between said spout and said support arms at the outer ends of said spout and said support arms to support said spout, said web members having longitudinal axes arranged substantially perpendicular to the discharge direction of said spout,

said spout being otherwise unsupported between said support arms and said coupling end, and

said spout further having an exposed surface located such that application of force to said surface acts to pivot said spout about said web members, thereby to operate said valve structure.

14. The package of claim 13 wherein said support arms and said spout extend in parallel directions substantially parallel to said discharge direction.

15. The package of claim 14 wherein said support arms are arranged to span said annular wall, being spaced from portions of said annular wall directly beneath.

16. The package of claim 14 wherein said support arms and said spout have opposed parallel planar walls adjacent said outlet end, and each said web member joins a planar wall of said spout to the opposed planar wall of the adjacent support arm.

17. The package of claim 16 wherein said discharge passage of said spout is of rectangular cross section at the outlet end of said spout.

18. The package of claim 13 wherein said cap includes a base wall forming a top for said annular wall, said base wall including an opening sized to receive said exposed surface, and upstanding wall portions extending upwardly from said base wall along opposed edges of said opening, said upstanding wall portions being integral extensions of said support arms, and said upstanding wall portions and said opening defining a region in which said spout is freely pivotal.

19. For use in a material dispensing package having a material container and a valve structure including a delivery passage for delivering material from said container, a one-piece actuator cap comprising

an annular wall surrounding said valve structure and including means for securing said cap to said container,

a pair of spaced apart support arms, secured to said cap, and extending outwardly of the outer surface of said wall, and

a spout spanning said annular wall, disposed between said arms, and also extending outwardly of the outer surface of said wall, said spout including a discharge passage with an outlet end outside of said outer surface and a coupling end for securing to said valve structure with said discharge passage in communication with said delivery passage,

said spout jointed to said support arms at its outlet end along elongated regions extending for a substantial length of said spout, said regions having longitudinal axes arranged substantially parallel to the discharge direction of said spout,

said spout being otherwise unsupported between said support arms and said coupling end, and

said spout further having an exposed surface located such that application of force to said surface acts to pivot said spout, thereby to operate said valve structure.

20. The package of claim 19 wherein said actuator cap also includes a brace member secured to the underside of said spout, adjacent the interior ends of said elongated regions, said brace member arranged to rest on said container, and said spout has a flexible hinge located in its unsupported portion between said brace member and said annular walls.

21. For use in a material dispensing package having a material container and a valve structure including a delivery passage for delivering material from said container, a one-piece actuator cap comprising

a base including structure for securing said cap to said container and defining an opening,

spout structure defining a discharge passage, and including a portion disposed for movement in said opening, a coupling end for securing to said valve structure so that said discharge passage is in communication with said delivery passage, and an outlet end outside of said base,

spout support structure comprising a pair of spaced apart support arms secured to said base and extending outwardly of and terminating outside of the outer surface of said base,

the outlet end of said spout structure being disposed between said support arms in a region also lying outside of the outer surface of said base, and coupling structure joining the outlet end of said spout structure to said support arms,

said spout structure being otherwise unsupported between said spout support structure and said valve structure, and

said spout structure further having an exposed surface located in said opening such that application of force to said exposed surface pivots said spout structure about said spout support structure, thereby to operate said valve structure.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,692,215 Dated September 19, 1972

Inventor(s) Louis V. Nigro

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

After the data under "Inventor" insert --Assignee: The Gillette Company, Boston, Mass.--;

Column 3, line 4, "packages" should be --package--;

Column 4, line 30, "light" should be --slight--;

line 57, "tIon" should be --tion--.

Signed and sealed this 10th day of April 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334