Aug. 1, 1967 F. C. MEYERS 3,333,743

PLASTIC CONTAINER AND VALVES FOR STORING AND DISPENSING PRESSURIZED PRODUCTS

Filed Jan. 11, 1966 4 Sheets-Sheet 1

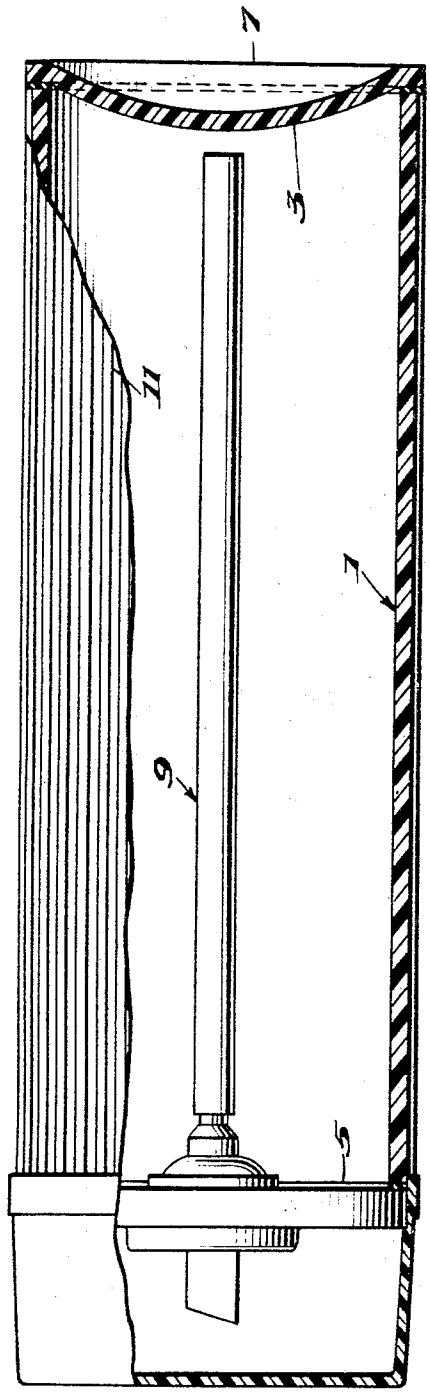

Fig. 1.

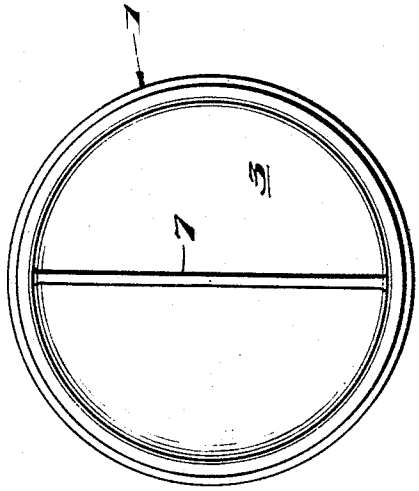

Fig. 3.

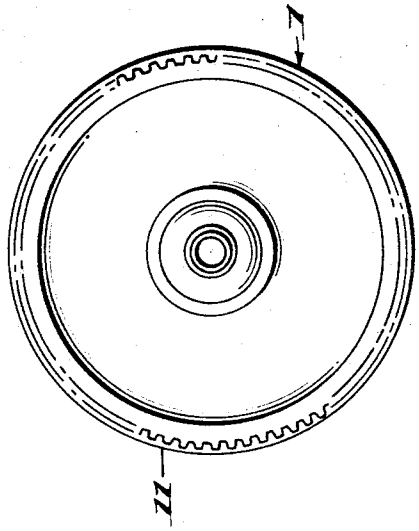

Fig. 2.

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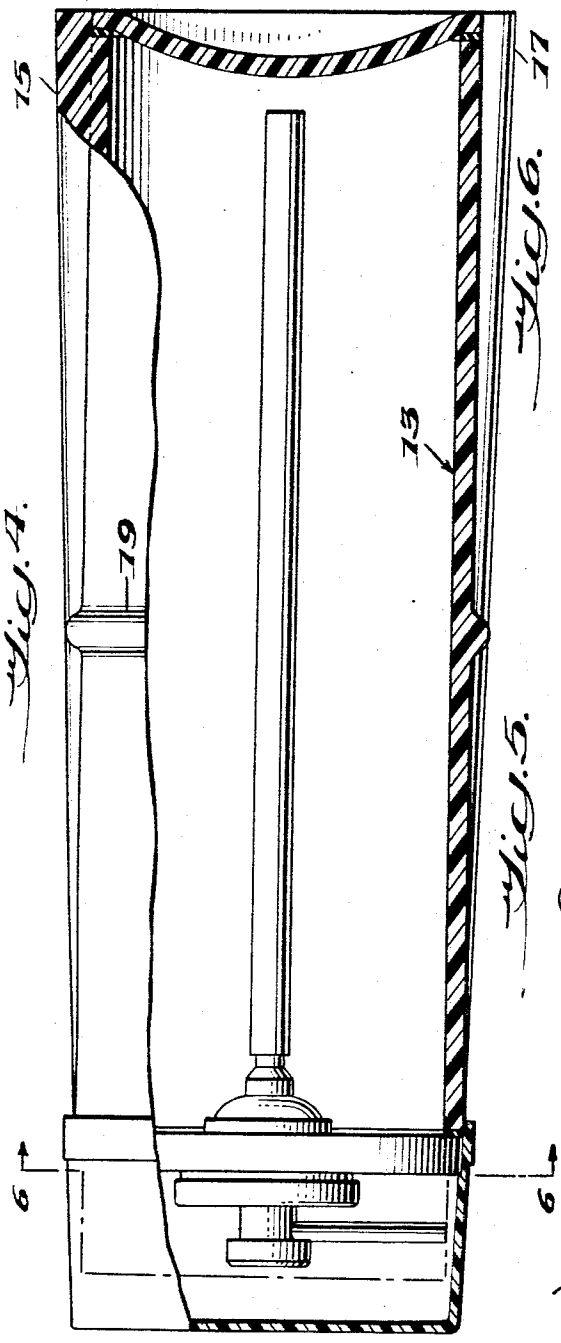

Fig. 4.

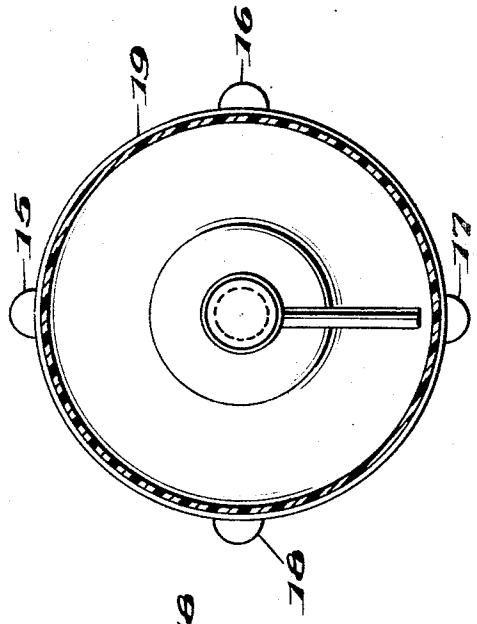

Fig. 6.

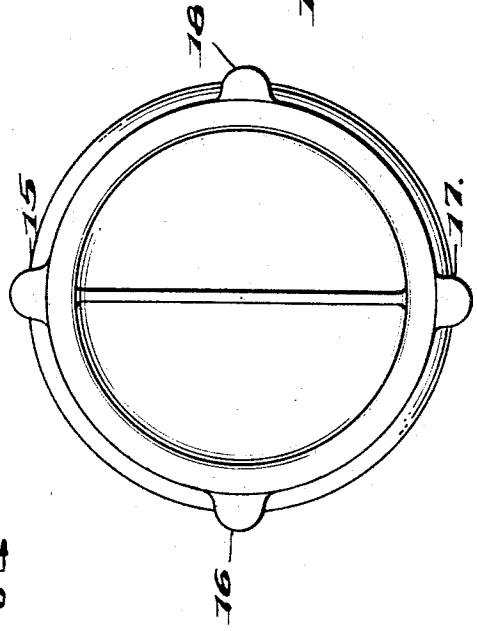

Fig. 5.

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Fig. 7.

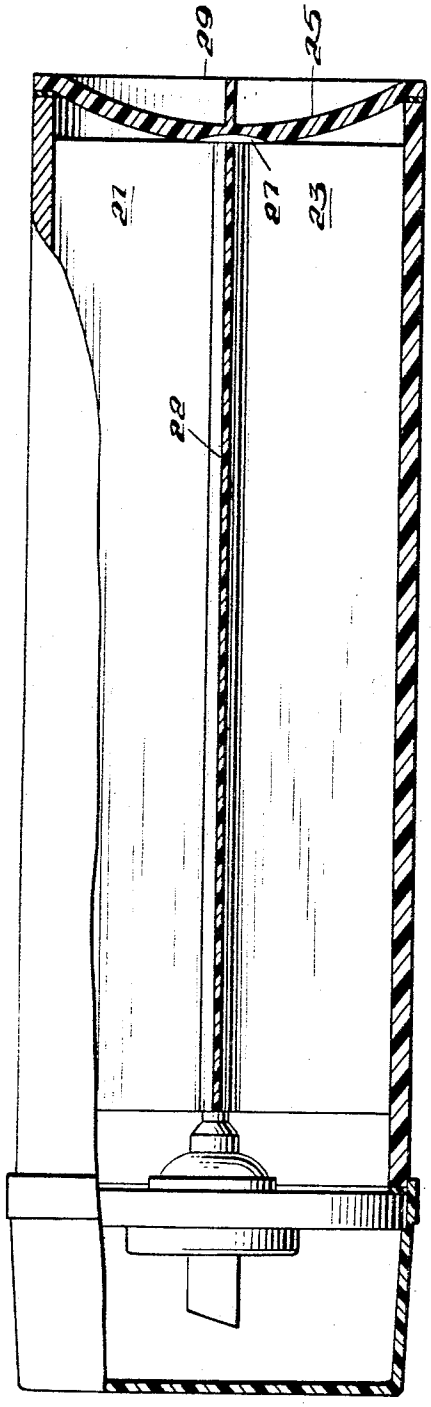


Fig. 10.

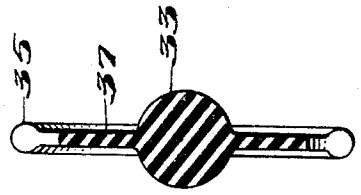


Fig. 9.

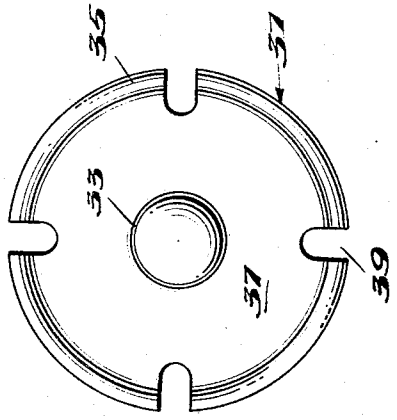
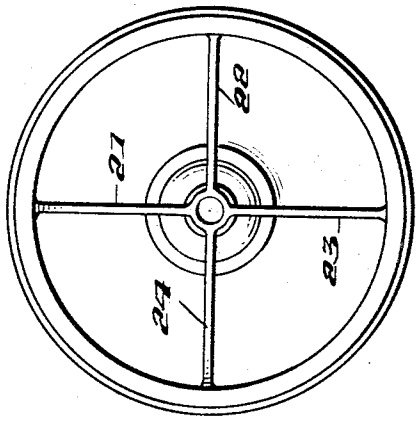


Fig. 8.



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Filed Jan. 11, 1966 4 Sheets-Sheet 4

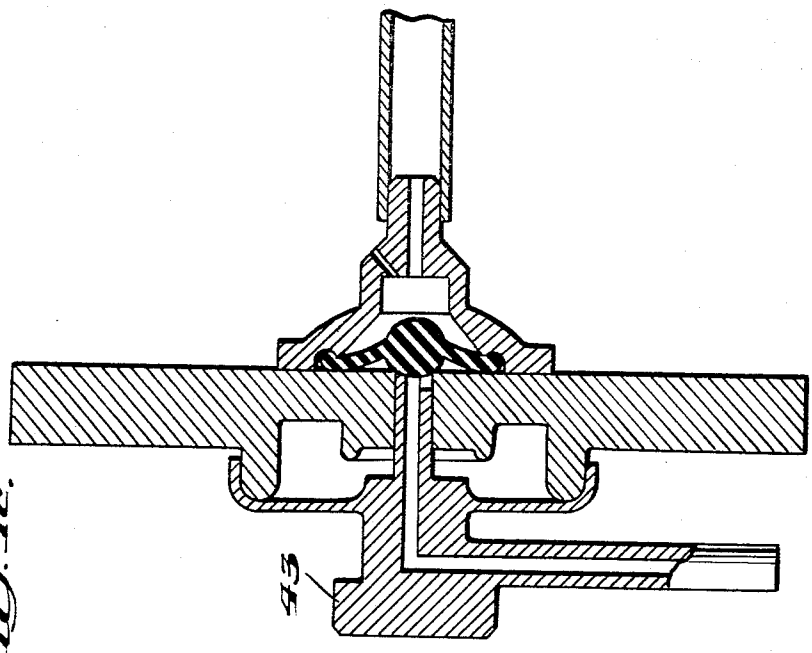

Fig. 12.

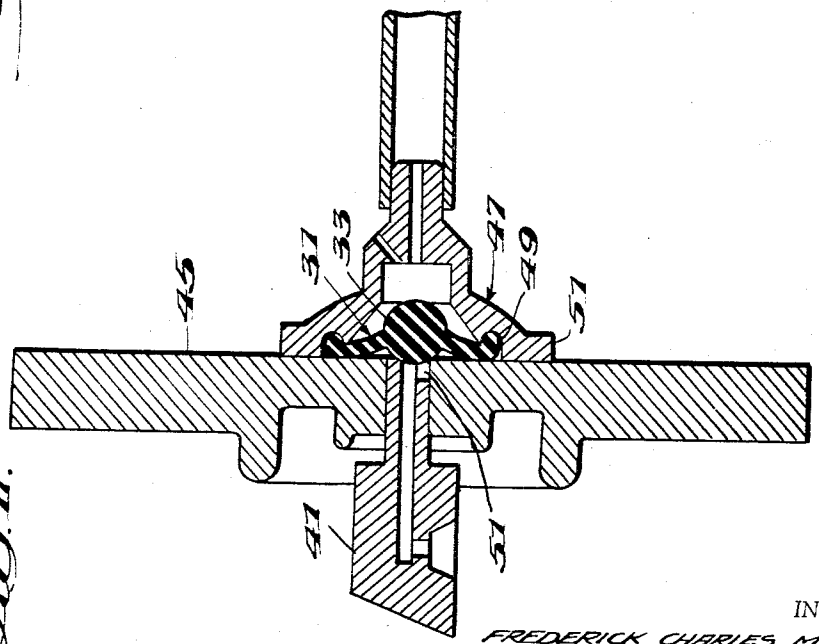

Fig. 11.

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PLASTIC CONTAINER AND VALVES FOR STORING AND DISPENSING PRESSURIZED PRODUCTS

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4 Claims. (Cl. 222—402.1)

This disclosure relates to containers for pressurized products and to a dispensing valve structure for use with the same.

An aerosol is a suspension of fine, solid or liquid particles in a gas. Many products are packaged and sold on today's market as aerosols. A typical aerosol container is made of metal to withstand the high internal pressures produced by the gas vehicle used to effect the valved discharge of the packaged product.

The aerosol containers used on today's market are relatively expensive to manufacture, but this is not the main drawback to their use. The chief disadvantage of metal containers for aerosol products is the safety hazard involved. When the product packaged in the metal aerosol container is exhausted a substantial amount of gas usually remains. If the container is subjected to heat, this gas expands to the point where the container will burst. An aerosol container accidentally thrown on a pile of burning trash or rubbish can become a lethal weapon, since it will produce an explosion similar to a bomb. For this reason, extreme safety precautions must be taken in handling and storing typical metal aerosol containers.

Accordingly, it is an object of this invention to produce an aerosol container which presents no safety hazard when subjected to intense heat or flame.

It is another object of this invention to provide an aerosol container which is relatively cheap and easily manufactured.

It is a further object of this invention to provide a plastic aerosol container which will soften and gently burst upon the application of heat of an intensity which would otherwise cause an extreme pressure rise within the container.

A still further object of the invention is to provide a reinforced container structure which is readily moldable from a variety of suitable plastic materials.

Another object of the invention is the provision of a simplified valve structure which facilitates the use of economical manufacturing techniques and enables the container to be filled readily after manufacture.

In accordance with the invention these objects are realized in a plastic container which includes a hollow body member having a longitudinal axis. Top and bottom closure members are provided for the hollow body member, and, if desired, the bottom closure member may be formed integrally with the hollow body member. The bottom closure member is concave in shape and has a transverse rib member to provide additional reinforcement. On the external surface of the hollow body member longitudinally disposed ribs are spaced to define support members which add to the rigidity of the container and permit relatively thin dimensions of the wall so that the body may be made of moldable plastic. A novel valve structure facilitates the manufacturing process and enables the container to be filled readily after manufacture.

The valve member comprises a resilient annular disc having a spherical-like central portion and a ring-like outer rim. The outer rim is discontinuous because of a plurality of slots or grooves which serve as passageways for the internal contents of the container to escape through the valve opening. The spherical-like center portion seals-off the contents of the container by virtue of the internal pressure of the container, which forces the spherical-like central portion against the opening in the top closure member which serves as the dispensing passageway.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings in which:

FIG. 1 is a partial cross-sectional view of a first embodiment of the invention;

FIG. 2 is an end view of the container of FIG. 1 with the bottom closure member removed;

FIG. 3 is an end view of the container of FIG. 1 with the bottom closure member in position;

FIG. 4 is a partial cross-sectional view of a second embodiment of the invention;

FIG. 5 is an end view of the embodiment of FIG. 4 taken from the bottom;

FIG. 6 is a cross-sectional view taken through the cap member showing the top valve member;

FIG. 7 is a partial cross-sectional view of another embodiment of the invention;

FIG. 8 is an end view of the embodiment of FIG. 7 taken from the bottom with the bottom closure member removed;

FIG. 9 is an elevation of a resilient valve member constructed in accordance with the present invention;

FIG. 10 is a cross-sectional view of the valve member of FIG. 9;

FIG. 11 is a cross-sectional view of an assembled valve constructed in accordance with the present invention; and

FIG. 12 is a cross-sectional view of a second valve structure constructed in accordance with the present invention.

The invention will be understood more readily by referring to FIG. 1 of the drawings which represents the first embodiment of the invention. A hollow cylinder **1** forms the main body of the container provided with end closure members **3** and **5**. End closure member **3** is concave inwardly in shape and has a reinforcing rib **7**, which adds structural rigidity. A dip-tube assembly shown generally at **9** is located in the container body in conventional fashion to serve in dispensing the pressurized contents.

A plurality of external rib members, such as **11**, are formed on the circumferential surface of the container body **1**. By means of this structural arrangement, the walls of the container body **1** are reinforced to an extent such that conventional blow molding and injection molding techniques may be used to form thin plastic cylinders which otherwise would not withstand the high internal pressures of aerosol mixtures.

FIGS. 4 to 6 of the drawings show a second embodiment of the invention in which a container body **13** is molded of plastic material, and is provided with a plurality of longitudinal ribs **15** to **18**, thereby strengthening the wall and compensating for the relatively thin dimension of the general wall structure. An additional circumferential rib **19** is provided to add rigidity and facilitate the handling of the container.

FIG. 7 shows a plastic container body having internal partitions **21** to **24** to provide the requisite rigidity. The dip-tube in this embodiment is formed integrally with the radial partitions. In this embodiment the concave bottom closure member **25** has an interior recessed portion **27** which permits communication of the contents of the interior among the partitioned sections. A transverse external rib **29** serves to support the bottom closure member **25**.

FIGS. 9 through 12 of the drawings relate to a novel valve structure for use in aerosol container structures of conventional design as well as the present aerosol container structure set forth in this application. The main valve member is a resilient disc member of annular con-

figuration shown in elevation and cross-sectional views in FIGS. 9 and 10. The disc member 31 has a ball-like central portion 33 and an outer ring-like rim portion 35. A connecting membrane 37 of lesser thickness to provide the flexibility necessary connects the outer and central portions. A plurality of cut-out portions, such as shown at 39, are spaced around the circumference of the outer rim 35.

The assembled valve structure is shown in FIGS. 11 and 12, which differ only in the types of valve actuators 41 and 43 utilized. The top closure member 45 of the container is provided with a substantially flat under surface. The valve disc member 31 is held in position by a flanged retainer member 47 having an internal annular recess 49 of a shape complementary to the rim portion 35 of the disc member 31. The flange 51 of the retainer member 47 is secured to the under surface of closure member 45 by suitable means such as sonic welding. This locks valve member 31 in position, and the resilient material from which the valve member 31 is constructed causes the ball-like central portion 33 to be urged in sealing relationship to the orifice located in top closure member 45. The seal is further aided by the internal pressure of the contents in the container. The flanged retainer member 47 holds the outer rim 35 so that the spaced-apart sides of the cut-out portions 39 are held in fixed relationship at the outer circumference of the rim 35.

The valve is opened by means of valve actuator 41. A downward movement of valve actuator 41 causes the ball-like central portion 33 of the valve member to disengage the aperture, and permits the fluid contents of the container to be propelled through the cut-out portions 39 of the valve member 31 and out through the orifice. Valve actuator member 41 contains a slot 51 to permit passage of the fluid contents to the exterior of the container.

The action of the valve member is variable by means of the downward pressure on valve actuator 41. Since the sides of the cut-out portions 39 are held in spaced-apart relationship by the flanged retainer member 47, it will be appreciated that the cut-out portions 39 of the valve member 31 will be enlarged as the valve member is stretched and distended by the downward action of valve actuator member 41. This action may be further enhanced by using cut-out portions of shapes different from that shown in FIG. 9 of the drawings, which is meant to be only illustrative of one type of cut-out portion which will function satisfactorily.

Any suitable plastic material may be chosen from which to mold the containers of the present invention. One criterion to be considered is the melting point of the particular plastic. It is desirable to choose a plastic having a melting point such that a temperature tending to cause excessively high pressures of the aerosol contents will also produce a softening of the plastic. The softened plastic will permit the container to distort into extended configuration until finally the thin walls gently burst to allow escape of the contents without explosion or violent aftermath, as would be expected from normal aerosol containers. In this fashion the safety hazard presented by conventional metal aerosol containers is completely eliminated, and a container is provided which is inexpensive and easily manufactured.

The external rib structure employed strengthens the container to the point where it is commercially feasible to produce these plastic containers by conventional processes such as blow molding and injection molding. The strength and rigidity imparted to the container by the external ribbing of the present invention makes the container constructed of thin wall plastic entirely adequate and suitable for the intended purpose insofar as structural strength is concerned. At the same time the material

readily distorts in the presence of heat to eliminate the safety hazard previously explained.

While the invention has been shown and described with particular reference to preferred embodiments, it will be understood by those skilled in the art that various changes in form and details may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A plastic container for pressurized products comprising
a hollow body member having a longitudinal axis,
a top closure member,
a bottom closure member,
valve means for discharging the pressurized products,
said valve means comprising an annular resilient valve member having a ball-like central portion and an outer rim portion,
said outer rim portion being discontinuous and having at least one cut-out portion with spaced-apart sides therein,
means for securing said outer rim portion so that the spaced-apart sides of said cut-out portion are held in fixed relationship at the outer circumference of said outer rim portion, and
a plurality of longitudinally disposed rib members external to said hollow body member to strengthen said hollow body member against the pressure exerted by said pressurized products,
whereby said hollow body member can be constructed of moldable plastic.

2. The combination according to claim 1 wherein said bottom closure member is of concave configuration and includes and external rib member extending transversely of said closure member to provide reinforcement.

3. The combination according to claim 1 wherein said longitudinal rib members are tapered in thickness.

4. A container assembly for dispensing pressurized contents comprising
a hollow body member,
a bottom closure member,
a top closure member with a substantially flat undersurface,
an opening in said top closure member for the passage of the container contents, and
a valve member for closing said opening,
said valve member comprising a resilient annular disc member having a ball-like central portion and an outer discontinuous rim portion,
said outer rim portion having at least one cut-out portion with spaced-apart sides therein,
a retainer member of a shape complementary to said valve member to secure said valve member to the undersurface of said top closure member,
said retainer member including a flat annular flange portion abutting said undersurface and holding the spaced-apart sides of said cut-out portion in fixed relationship at the outer circumference of said outer rim portion,
whereby the area of said cut-out portion will increase when said ball-like central portion is depressed to provide a variable flow through said valve.

References Cited

UNITED STATES PATENTS

2,483,993	10/1949	Becker	222—394 X
2,512,105	6/1950	Kooij	222—394 X
2,799,435	7/1957	Abplanalp	222—394

FOREIGN PATENTS

205,116	4/1955	Australia.

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