Nov. 12, 1968 A. F. BARKER 3,410,461

SPHERICAL AEROSOL VALVE

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FIG. 1

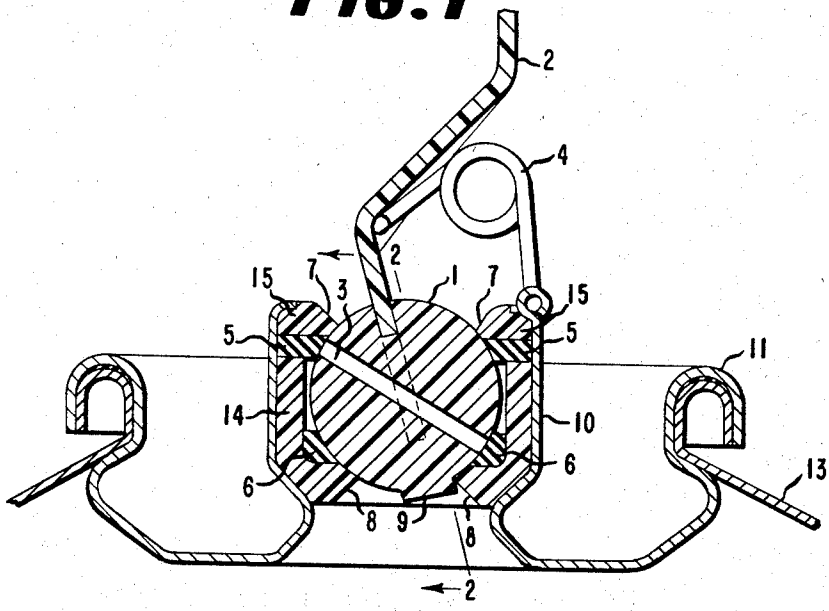

FIG. 2

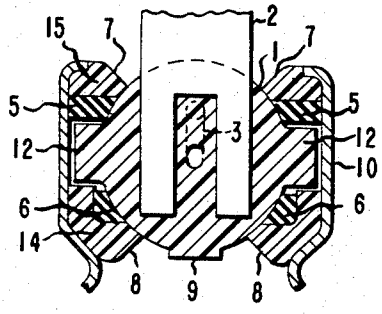

FIG. 3

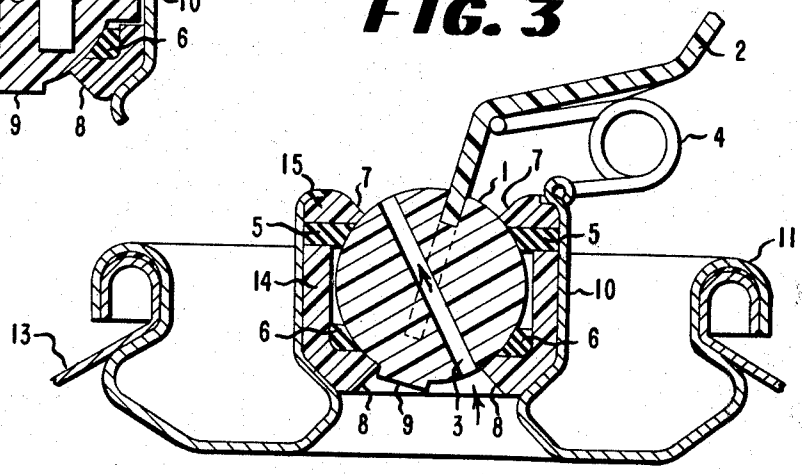

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FIG. 4

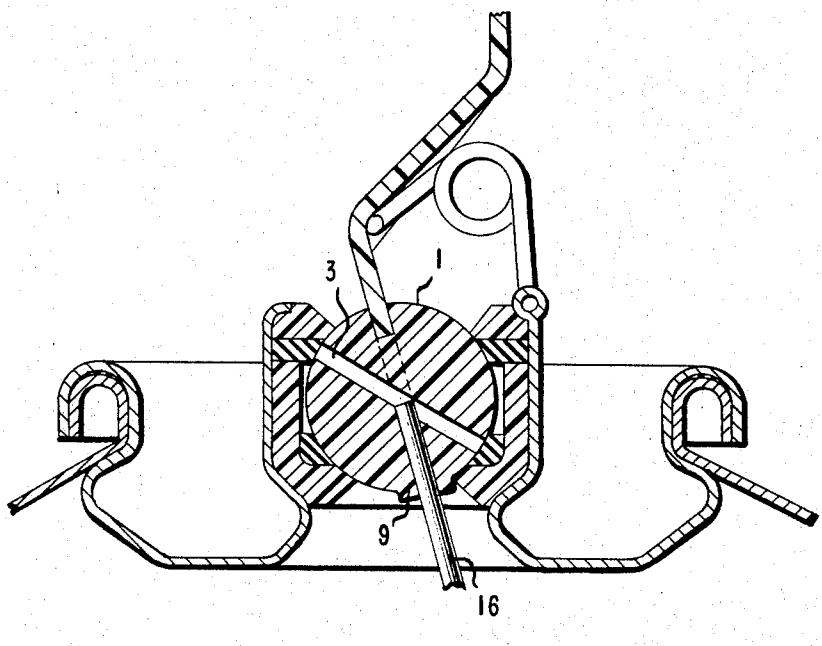
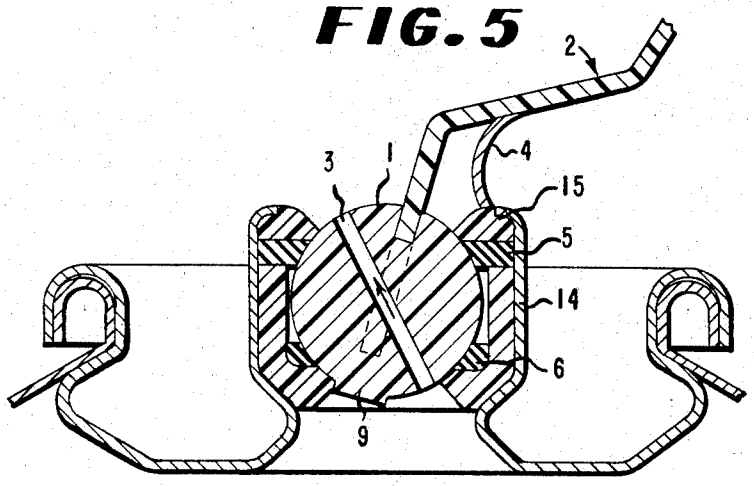


FIG. 5



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United States Patent Office 3,410,461 Patented Nov. 12, 1968

3,410,461

SPHERICAL AEROSOL VALVE

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Filed May 31, 1966, Ser. No. 553,778
4 Claims. (Cl. 222—516)

ABSTRACT OF THE DISCLOSURE

A self-sealing aerosol valve for automatically closing off the discharge opening from the atmosphere. The valve consists of a spherical member having a passageway through it, and is provided with means to alternately rotate the spherical member between an open position and a closed position. In rotating to the closed position, knife edges scrape discharge particles from the orifices of the passageway. In the closed position, the passageway orifices abut resilient members, forming an air-tight seal. The valve may be equipped with a dip tube by providing a second passageway in the spherical member from the interior of the aerosol can to the first passageway.

The present invention is directed to novel aerosol valve assemblies for pressurized aerosol containers. More specifically, the present invention is directed to an improved aerosol valve assembly adapted to be self-sealing, that is, having provision for automatically closing off from the atmosphere the discharge opening in the valve assembly except during those periods when the package is in use.

In relatively recent years, a great many commodities have come to be sold in pressurized aerosol containers in which a product is discharged from the container under pressure generated by an aerosol propellant within the container. Control of the discharge of the product is had by means of a valve assembly ordinarily mounted at the mouth of the container. The valve assembly usually includes an actuating device for opening the valve closure and a discharge orifice through which the product is dispensed.

Despite the continually increasing number of commodities being marketed in aerosol containers, there has been heretofore a large number of comestible products which could not be effectively marketed in this manner. There are several reasons why present-day aerosol valves fail as dispensing assemblies for food products. First of all, the particle size of many food products is of such a nature that the discharge metering orifice in the standard valve is easily clogged by such particles. Secondly, the food particles, when trapped in the standard valve closure, can prevent an effective seal from forming, thereby allowing the product to continuously seep through the closure. Finally, the standard valves are designed in such a manner that the residue product is left exposed to the air in the valve passageways after discharge. It is well known that food products are of such nature that prolonged exposure to air adversely affects their quality or other physical characteristics.

Any one of these problems is easily solved by itself, but the solution of one problem usually magnifies the other problems. It has been difficult to design a valve assembly especially adapted to food products and the like which solves all these problems in one design.

The main difficulty arises from the fact that in the usual arrangement of the valve assembly there is a substantial distance between the point where the valve closes and the discharge opening through which the aerosol contents are discharged to the atmosphere. As a result, the passageways connecting these points through which the product must

pass before discharge are essentially dead spaces which are constantly exposed to the atmosphere. Inasmuch as there is always some residue of product left within this dead space between the valve closure and valve discharge, any residue product which includes a nonvolatile substance, such as comestibles, will eventually dry out in these passageways. At the same time, any product which will be adversely affected by exposure to the action of aerobic bacteria will have the residue in these passages so affected. Thus, upon subsequent usage of the aerosol, the dried out and/or contaminated residue will be dispensed with fresh product, rendering the discharged product totally unacceptable.

Accordingly, this invention is directed to an improved aerosol valve assembly to be used in combination with the pressurized container for dispensing comestibles and the like which will have no dead spaces exposed to the atmosphere, thereby eliminating the problem inherent in said dead spaces such as the drying action of air or the attack of aerobic bacteria. A further advantage of the present valve assembly is that the valve closure is lined with a broad expanse of elastomeric material whereby any particles trapped within the valve closure will become temporarily embedded in the resilient lining, thus allowing a complete seal to form at the closure. Another advantage of the valve assembly of the present invention is that the valve closure mechanism involves the action of a hard knife edge surface which wipes the sealing valve member free of particles or fibers during closure, thereby enabling a more effective seal to form.

The present preferred form of the invention is shown in the accompanying drawing and will be described in detail hereinafter for the purpose of illustrating one way in which the invention may be made and used. From what has been said above, it will be apparent to those skilled in the art that the principles and advantages of the invention could be obtained in other forms of the invention not specifically shown herein. The accompanying drawing and description to follow are, accordingly, by way of example only and are not intended to define or restrict the scope of the invention.

A better understanding of the invention will be obtained by reference to the accompanying drawing which forms a part of this application and illustrates a preferred embodiment of this invention.

In the accompanying drawing:

FIGURE 1 is an elevational view in section of the valve assembly when in a closed position.

FIGURE 2 is a side sectional view taken on plane 2–2′ in FIGURE 1.

FIGURE 3 is an elevational view in section of the valve assembly when in an open or discharging position.

FIGURE 4 is an elevational view in section of a modification in one portion of the valve assembly.

FIGURE 5 is an elevational view in section of another modification in one portion of the valve assembly.

Referring first to FIGURE 1, there is shown a pressurized aerosol container valve assembly comprising a spherical member **1** having attached thereto a lever member **2**. The spherical member **1** has an internal passageway **3** essentially through its diameter. The spherical member **1** is hermetically secured in a cup-shaped, essentially rigid valve body **10** which is a part of the aerosol cap **11**. The aerosol cap **11** is in turn secured to the aerosol container **13** by obvious mechanical techniques such as crimping.

Within the cup-shaped valve body **10** is form fitted a rigid cup-like member **14** containing cradle-like holders adapted to receive the trunnions **12** of the spherical member **1** as more clearly shown in FIGURE 2. The trunnions **12** rotatably secure the spherical member in the valving assembly.

Two resilient annular sealing members **5** and **6** made from resilient materials are placed within and supported by rigid cup-like member **14**. These annular members are so placed within rigid member **14** so as to form an air-tight seal at both ends of passageway **3** when the valve is in a closed position as shown in FIGURE 1. A rigid annular member **15** is superimposed over resilient sealing member **5** and secured by the rigid valve body **10** so as to form knife edges **7**.

A spring means **4** is attached under compression to the rigid valve body **10** and lever member **2** such that the rotatable spherical member **1** is normally held in the closed position. Said spring means **4** could alternatively be provided as an integral resilient part of annular member **15**, as shown in FIGURE 5. Protuberant **9** acts as a stop against full rotation by abutting against knife edges **8** of rigid cup-like member **14** in both the open and closed positions.

The present invention may be used with a dip tube **16** by boring through protuberant **9** to passageway **3** and inserting the dip tube onto the bored protuberant **9**, as shown in FIGURE 4. The dip tube comprises a conduit of sufficient length to extend into the internal portion of the aerosol container which is farthest from the valve assembly. The dip tube is used to insure the discharge of the entire contents within the aerosol container.

The valve assembly is operated by applying force to lever member **2** against the action of the spring means **4** as more clearly shown in FIGURE 3. As the spring means is compressed, the spherical member rotates until the protuberant **9** abuts the rigid, cup-like member **14** at knife edge **8**. At this point, the passageway **3** is aligned in a manner whereby the active ingredients under pressure within the container are easily discharged. When the applied force is released from the lever member **2**, the spring means **4** returns spherical member **1** rotatably to the closed position while knife edge **8** scrapes all large particles and fibers from the internal end of the passageway **3** upon closing, thereby preventing plugging of the internal passageway by such large particles of product. The knife edges **7** and **8** also wipe clean the sealing surfaces of spherical member **1** before they engage resilient sealing members **5** and **6**.

The resilient sealing members **5** and **6** are normally made of elastomeric materials such as rubber, polyethylene, or polyvinyl chloride. Rubber is the preferred material. The rigid parts, **1**, **2**, **10**, **14**, and **15**, may be made of hard plastics such as nylon, polystyrene, polypropylene, or an acetal or metal.

It will be readily appreciated by those skilled in the art that passageway **3** may be modified by the inclusion of metering orifices, expansion chambers, and the like to provide various discharge characteristics of the product being dispensed.

It will be seen that in the novel valve assembly of this invention there is no dead space between the valve closure and the discharge opening. It will also be seen that any particles or fibrous materials trapped at the ends of the passageway will become temporarily embedded into resilient sealing members **5** and **6**, thereby effecting a complete air-exclusion seal. It will also be seen that the rigid members **14** and **15** form hard knife edge surfaces **7** and **8** which wipe the sealing valve member essentially free of any particles or fibers before effecting the closing seal.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that this invention is not limited to the embodiments thereof except as defined in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A valve assembly for a pressurized aerosol container comprising

(A) a discharge means consisting of a spherical member having a passageway essentially through its diameter, said spherical member being rotatably contained between upper and lower resilient annular sealing members, said sealing members and said spherical member being hermetically secured between a cup-shaped, essentially rigid valve body and rigid annular members, said annular members forming knife edge contact with said spherical member at a location adjacent the surface openings of said passageway in said spherical member, and

(B) a lever means for rotatably positioning said spherical member passageway in relation to said seals.

2. A valve assembly according to claim **1** wherein a dip tube, of sufficient length to extend into the internal portion of the aerosol container which is farthest from the valve assembly, connects with and interrupts the passageway of said spherical member, and emerges from said spherical member at a point on the surface thereof that is open to the interior of the aerosol container throughout the operation of the valve assembly.

3. A valve assembly according to claim **1** wherein the resilient annular sealing members are made of rubber.

4. A valve assembly according to claim **1** wherein the lever means is operated by a spring means which is an integral part of said rigid annular member.

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