Feb. 22, 1966 L. T. WARD 3,236,424

METERING BUTTON DISPENSING CAP FOR USE WITH PRESSURIZED CONTAINERS

Original Filed Sept. 27, 1961

FIG. 2

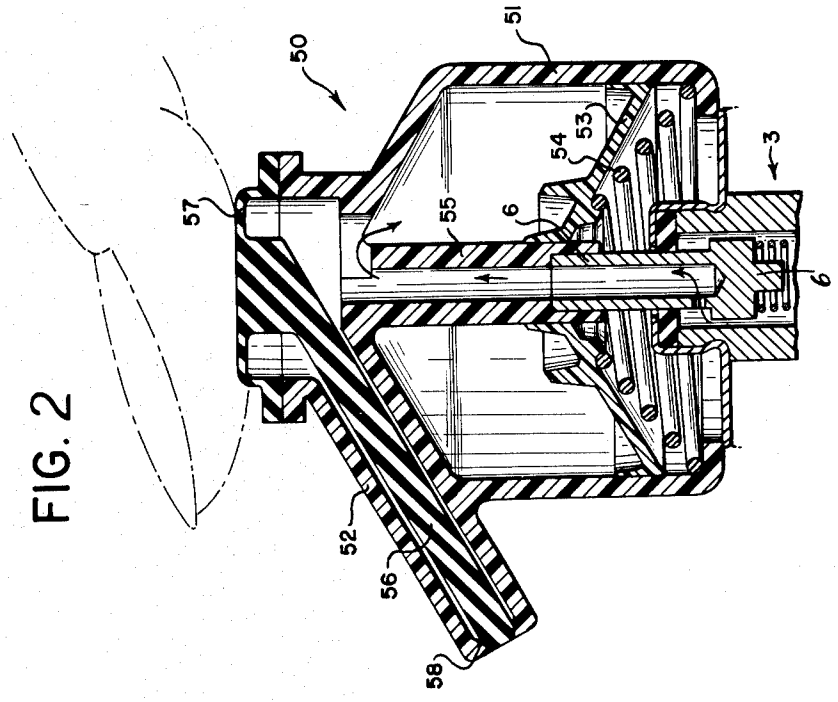
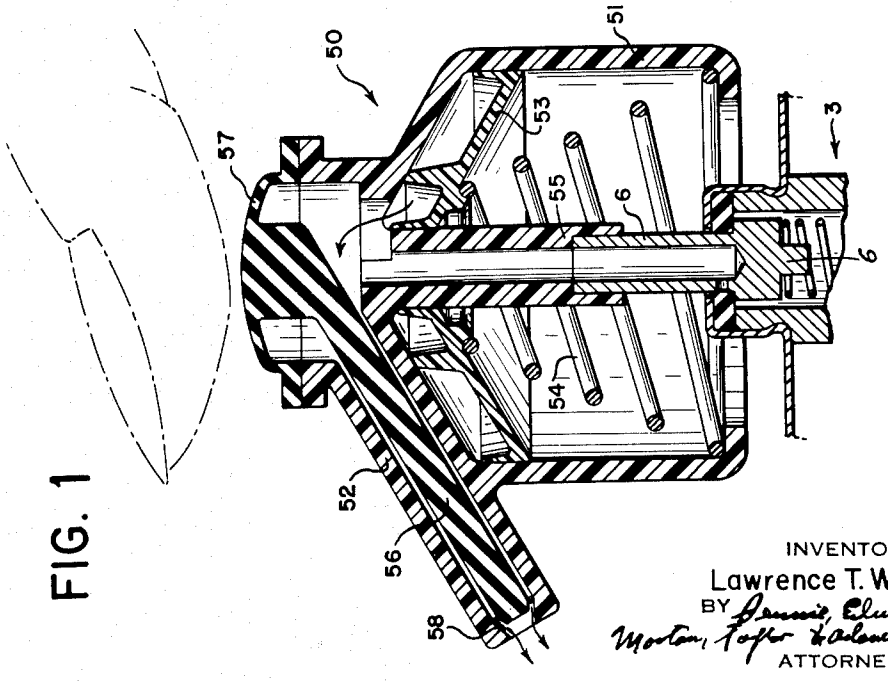


FIG. 1



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3,236,424

METERING BUTTON DISPENSING CAP FOR USE WITH PRESSURIZED CONTAINERS

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Original application Sept. 27, 1961, Ser. No. 141,077, now Patent No. 3,138,301, dated June 23, 1964. Divided and this application Apr. 21, 1964, Ser. No. 361,412
3 Claims. (Cl. 222—335)

This application is a division of my co-pending application Serial No. 141,077, filed September 27, 1961, now Patent No. 3,138,301, dated June 23, 1964, which, in turn, is a continuation-in-part of application Serial No. 115,776, filed June 8, 1961, now abandoned.

This invention relates to a metering button dispensing cap and more particularly to a metering button cap for use with pressurized containers utilizing an insoluble gaseous propellant for use with goods which may become contaminated by contact with air and for use with conventional hollow stem depressible continuous type discharge valves.

Metering valve assemblies have heretofore been used with aerosol type containers wherein the propellant is soluble in the goods to be propelled or ejected from the container. Containers filled with goods, such as deodorant, perfume, etc., have used Freon as a propellant or other derivatives of fluorine which are readily soluble in the goods to be ejected and which are ejected along with the goods in order to aerate them. Freon or other fluorine derivative propellants, however, are often unsuitable for use with many goods, such as food products, medicinal products, or in instances where fluorine may be toxic to the user. Another propellant used has been carbon dioxide which, while not toxic, often reacts with food products to vary their taste. It is desirable, therefore, that a relatively inert propellant be used which is not toxic and which will not react with the goods to be ejected from the container. Such an inert propellant, which is adaptable for use in pressurized containers is nitrogen. This propellant is for the most part relatively insoluble in the goods to be ejected from the container and is used essentially as a pressure source to push the goods from the container up through the syphon tube into a discharge valve.

It is often desirable that a predetermined amount of goods be ejected from a pressurized container upon each application of the discharge valve. This is particularly true wherein the goods are to be mixed with a liquid in order to make a flavored beverage of constant strength or, where medicinal products are used and uniform dosage is desired. It is therefore an object of this invention to provide for a metered button valve assembly which may be used to accurately meter goods ejected from a pressurized container having a relatively non-soluble gaseous propellant.

A desirable feature of metered valve assemblies is that the assembly itself be made of a minimum number of parts and wherein the parts will require a minimum of machining in order to reduce expense of manufacture. I proposed to provide for a metering button cap which has a minimum of parts most of which may be easily molded on an injection molding machine. I further propose to provide for a button cap which may be applied to conventional continuous flow valves to convert them into metered valve assemblies. By making a metering button cap according to my novel design, the cap itself may be used over and over again merely by taking the cap off the discharge valve of an empty container and applying it to the discharge valve of a filled container.

Still another feature which is important in the manufacture of metered valve assemblies is that the assembly itself not interfere with filling of the container. A metering button cap constructed according to my invention is applied to a conventional continuous flow valve to convert it to a metered valve assembly after the container has been filled through the discharge valve and thus the metering button cap itself does not interfere with filling.

A metering button cap constructed according to one form of my invention is adapted to be used with a conventional continuous flow valve having a hollow depressible operable valve stem which is resiliently biased outwardly from a valve housing. The valve housing is carried in a neck portion of a pressurized container having an aperture through which the depressible stem may be moved. The depressible stem sealingly engages the sides of the aperture and has therein an opening which is normally sealed off by the sides of the aperture and which will be open when the valve stem is depressed to connect the interior of the container with the interior of the hollow valve stem.

The novel button cap assembly, which is applied to the end of the valve stem, comprises generally a cup-shaped body portion having a recess therein of predetermined size to form a metering chamber. The button cap has a discharge passage extending therethrough which is adapted to connect the chamber with atmosphere. The button cap contains valve means whereby the discharge passage is normally held closed and held closed when the body portion is depressed in order to depress the hollow valve stem. A plunger is movably mounted in the recess so as to form a side wall of the chamber and is biased by resilient means so that under normal conditions, when the opening in the hollow stem is sealed by the side walls of the aperture, the plunger will be urged outwardly of the chamber. As the button cap is depressed and the opening of the valve stem brought into communication with the interior of the container, the nonsoluble gaseous propellant in the container will force the goods up through the valve housing, the valve stem, into the metering chamber contained in the button cap where the pressure of the goods will move the plunger into the button cap against the force of the resilient means. As the operating force is removed from the valve assembly so that the valve stem is moved outwardly of the container by its resilient means to close the opening in the valve stem, the discharge passage in the button cap will be caused to open so that the goods in the metering chamber may be ejected through the discharge passage by the force of the resilient means urging the plunger outwardly of the chamber.

The valve means in the button cap is positioned adjacent the exit of the discharge passage or outlet nozzle which extends through the button cap so that goods remaining inside the button cap will not become contaminated or dried out after first use of the metering valve assembly. In particular, the discharge passage has a valve seat at its outer end and a valve plunger movable in the passage to engage the seat to seal off the interior of the body portion from the atmosphere. The other end of the valve plunger is connected to a resilient flexible diaphragm which forms a part of the top of the body portion. A piston is included in the body portion and is spring biased so that it is urged into the body portion. When the button cap is depressed by finger pressure, the valve stem will move to allow goods to flow into the hollow body portion where they will force the piston outwardly against the force of the spring. Release of finger pressure will allow the diaphragm to move which in turn will cause the plunger to unseat from the valve seat so that the goods may be expelled out of the discharge passage by the force of the spring urging the piston inwardly of the body portion. After the goods are ejected, the resilient diaphragm

will return to its normal shape and move the plunger into sealing engagement with the valve seat.

Referring to the drawings in which a preferred embodiment of my invention is illustrated,

FIG. 1 is a cross-sectional view of a button cap constructed according to the invention having the valve means at the outer end of the discharge passage; and

FIG. 2 is a view similar to FIG. 1 illustrating the button cap depressed and goods entering into the cap.

Referring to FIGS. 1 and 2, there is illustrated a button cap 50 which is particularly adaptable for use with goods which may become spoiled or contaminated upon contact with the atmosphere or which may dry and clog up the button cap when exposed to the atmosphere. The cap 50 there shown comprises a body portion 51, a discharge nozzle 52, a piston 53, and a spring 54 which urges the piston upward into the body portion.

The body portion has a tubular element 55 which is adapted to engage the valve stem 6 of a conventional hollow stem discharge valve 3 in turn mounted in an aperture of a pressurized container. The nozzle 52 has a valve plunger 56 which is movable in the nozzle and which is integral with a resilient, flexible diaphragm 57 mounted on the top of the body portion. The outer end of the plunger normally seats on a valve seat 58 mounted at the end of nozzle 52 when the diaphragm is in a neutral or relaxed position to close off the discharge passage contained in the nozzle from atmosphere.

As the button cap is depressed as shown in FIG. 2, the goods will flow up the stem 6 into the body portion under the force of an insoluble propellant contained in the container in which the valve 3 is mounted. The pressure of the goods entering into the body portion will then force the piston 53 downwardly against spring 54.

As finger pressure is released as shown in FIG. 1, diaphragm 57 will expand outwardly under the pressure of the spring 54 pushing on piston 53 through the goods. This outward movement of the diaphragm in turn will move plunger 56 to cause it to unseal with seat 58 so opening the discharge passage. After the goods have been ejected from the cap, the resilient diaphragm will return to normal wherein the plunger will again seat on the valve seat 58 to close off the interior of the cap and discharge passage from atmosphere and so reduce possibility of contamination or drying of any goods left in the button cap after discharge.

I claim:

1. A metering button cap for use with a hollow depressible valve stem of a discharge valve mounted on a pressurized container, said button cap comprising: a body portion having therein a chamber of predetermined size, a discharge passage extending through said body portion into said chamber, valve means for sealing off said discharge passage and a resilient flexible diaphragm comprising a side wall of said chamber and being operatively connected to said valve means; said valve means normally being closed to seal off said discharge passage and said valve means being open when pressure in said chamber moves said flexible diaphragm outwardly of said chamber.

2. A metering button cap according to claim 1 wherein said valve means is positioned adjacent the end of said discharge passage remote from said chamber.

3. A metering button cap for use with a hollow depressible valve stem of a discharge valve mounted on a pressurized container, said button cap comprising: a body portion adapted to sealingly engage the side walls of a depressible valve stem, a chamber of predetermined size in said body portion, a discharge passage extending through said body portion and connecting with said chamber, a piston movable in said body portion and forming a side wall of said chamber, resilient means for urging said piston to move in one direction, a discharge valve seat at the end of said discharge passage, a movable plunger extending through said discharge passage with one end of said plunger adapted to seat with said valve seat to close off said discharge passage, and a flexible resilient diaphragm forming a side wall of said chamber connected to the other end of said plunger; said plunger normally seating on said valve seat to seal off said discharge passage except when there is pressure in said chamber to move said diaphragm outwardly to unseat said plunger.

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