(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 125 865**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **84303081.8**

(51) Int. Cl.³: **B 65 D 83/14**

(22) Date of filing: **08.05.84**

(30) Priority: **06.05.83 GB 8312479**

(43) Date of publication of application:
21.11.84 Bulletin 84/47

(84) Designated Contracting States:
BE CH DE FR GB IT LI NL

(71) Applicant: **RIKER LABORATORIES, INC.**
19901 Nordhoff Street
Northridge California(US)

(72) Inventor: **Watson, Peter Gordon**
5 Sandalwood Road
Loughborough Leicestershire(GB)

(74) Representative: **Bowman, Paul Alan et al,**
LLOYD WISE, TREGEAR & CO. Norman House 105-109
Strand
London WC2R OAE(GB)

(54) Valve assembly for a pressurised aerosol-dispensing container.

(57) A valve assembly which allows pressure filling of an aerosol container and dispensing of metered volumes of material therefrom comprising:

a casing member adapted to form at least the top portion of an aerosol container,

a first hollow body secured inside of the casing member defining a metering tank, the metering tank having a pressure filling valve comprising an aperture in the metering tank communicating with the aerosol container which aperture is adjacent the casing member and covered by a sealing member which prevents passage of material from the aerosol container to the metering tank but allows passage of material from the metering tank to the aerosol container when there is sufficient pressure difference between the metering tank and aerosol container,

an elongate valve member sealingly extending through respective apertures in the casing member and metering tank capable of longitudinal movement between a closed and dispensing position, such that in the dispensing position there is an open channel through the elongate valve member connecting the metering tank with the outside environment and the metering tank is sealed to prevent passage of material from the aerosol container to the metering tank, and in the closed position the elongate valve member allows passage of material from the aerosol container to the metering tank and prevents passage of material from the metering tank to the outside environment,

and a second hollow body retained upon and forming a shroud around the metering tank, the shroud extending substantially to the casing member and covering said sealing member of the metering tank to allow only limited movement thereof, the shroud and metering tank defining at least one passage through which material from the aerosol container may pass into the metering tank when the elongate valve member is in the closed position.

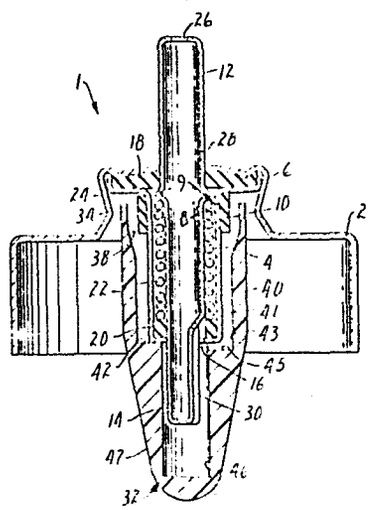

Fig. 1

EP 0 125 865 A2

VALVE ASSEMBLY FOR A PRESSURISED AEROSOL-DISPENSING CONTAINER

This invention relates to valve assemblies for pressurised aerosol-dispensing containers and in particular to a valve assembly which allows pressure filling of an aerosol container and dispensing of metered volumes therefrom.

Pressurised aerosol-dispensing containers, commonly referred to as "aerosol containers", are in widespread use for dispensing cosmetic, medical and other preparations. In some cases, particularly when dispensing medical preparations, it is important that the amount of the preparation which is dispensed is a predetermined accurate volume each time the aerosol container is activated. Additionally, many of the active ingredients in the preparations are expensive and accordingly it is important that there should be no wastage of the contents of the container.

There are several types of known valve assemblies for aerosol containers which are designed to dispense a metered quantity of the contents of an aerosol container. Examples of such valve assemblies are disclosed in British Patent Specification Nos. 864,694, 1 336 379 and 2 077 229. Two of the most common problems associated with known metering valve assemblies are that the dosage reproducibility is often bad and variations of up to 40% may be obtained, particularly when the aerosol container is nearly empty, and it is often not possible to dispense the entire contents of the aerosol container causing significant wastage.

These problems are said to be overcome in the valve assemblies of British Patent Specification No. 2 077 229 which relates to a valve assembly comprising a casing member adapted to form at least the top portion of an aerosol container, the first hollow body secured to the inside of the casing member, and an elongate valve member sealingly extending through respective apertures in the casing member and hollow body for longitudinal inward movement during a dispensing operation, outlet and inlet passages formed in the valve member at the outer and inner ends thereof respectively and operative to connect the chamber formed by the

space inside the hollow body around the valve member with the outside and inside respectively of the container, and a second hollow body encircling and retained on the first hollow body in such manner as to define a plurality of capilliary channels between the two bodies which retain liquid therein. However, such a valve assembly has no provision for filling the aerosol container.

There are two conventional methods for filling aerosol containers. The first method, commonly referred to as "cold filling", comprises cooling the formulation of aerosol propellant and active ingredients to maintain them in the liquid state, introducing the cooled liquid formulation into an aerosol container and thereafter closing the container by securing the valve assembly. In the second method, known as "pressure filling", the valve assembly is secured to the aerosol container before filling and the formulation, which is maintained in liquid form under pressure, is introduced under pressure into the aerosol container through a special filling valve which is included in the valve assembly. In some cases, a concentrate of the active ingredient is introduced in the open container, the valve assembly is attached and the aerosol unit is pressure filled with the remainder of the propellant.

There are several known valves which are adapted for both pressure filling and dispensing metered volumes of contents. However, these known valves generally suffer from one or more of the disadvantages of poor dosage reproducibility, inefficient emptying of the container, a tendancy for the filling valve to fail by displacement thereof during filling and possession of a complex construction.

The present invention has been made with these points in mind.

According to the present invention there is provided a valve assembly which allows pressure filling of an aerosol container and dispensing metered volumes of material therefrom comprising:

a casing member adapted to form at least the top portion of an aerosol container,

a first hollow body secured inside of the casing member defining a metering tank, the metering tank having a pressure filling valve comprising an aperture in the metering tank communicating with the aerosol

container which aperture is adjacent the casing member and covered by a sealing member which prevents passage of material from the aerosol container to the metering tank but allows passage of material from the metering tank to the aerosol container when there is sufficient pressure difference between the metering tank and aerosol container,

an elongate valve member sealingly extending through respective apertures in the casing member and metering tank capable of longitudinal movement between a closed and dispensing position, such that in the dispensing position there is an open channel through the elongate valve member connecting the metering tank with the outside environment and the metering tank is sealed to prevent passage of material from the aerosol container to the metering tank, and in the closed position the elongate valve member allows passage of material from the aerosol container to the metering tank and prevents passage of material from the metering tank to the outside environment,

and a second hollow body retained upon and forming a shroud around the metering tank, the shroud extending substantially to the casing member and covering said sealing member of the metering tank

to a allow only limited movement thereof, the shroud and metering tank defining at least one passage through which material from the aerosol container may pass into the metering tank when the elongate valve member is in the closed position.

The valve assembly of the present invention allows pressure filling of aerosol containers with the complete formulation in a single step at speeds in excess of 15 g/sec. The valve gives excellent dosage reproducibility even when the container is almost empty and dispenses substantially all of the formulation within the container.

The invention will now be described with reference to the accompanying drawings wherein like reference numerals refer to like parts throughout the drawings, in which:

Figure 1 represents a cross-section through a valve assembly in accordance with the invention with the valve in the closed position,

Figure 2 represents a cross-section of the valve assembly of Figure 1 with the valve in the firing position for pressure filling, and

Figure 3 represents a partial section through the plastics shroud present in the valve assembly shown in Figures 1 and 2.

The valve assembly 1 comprises a casing 2 which forms the closure cap of an aerosol container (not shown). The assembly 1 may be crimped over the neck of an aerosol container with the provision of a sealing gasket (not shown) to ensure a tight seal.

A hollow body defines the metering tank 4 and is secured at one end 6 to the casing 2. The metering tank 4 is provided with an aperture 8 covered by a rubber sleeve 10 which extends around the metering tank 4. The aperture 8 and rubber sleeve 10 constitute the pressure filling means of the valve 9.

An elongate valve member 12 extends centrally through the casing 2 and at its inner end 14 projects through an aperture 16 in the metering tank 4. Sealing gaskets 18 and 20 are provided at each end of the metering tank 4. A helical coil spring 22 is seated at one end upon the gasket 20 and at the other end on an annular protuberance 24 of the valve member 12 to urge the valve member 12 towards the exterior of the aerosol container (not shown). The valve member 12 includes at its outer end a discharge orifice 26 and a further orifice 28 which is exterior of the casing 2 when the valve member 12 is in the closed position (Figure 1)

and within the metering tank 4 when the valve member 12 is in its firing position (Figure 2). The valve member 12 includes at its inner end on the outer surface thereof a groove 30 which is arranged to provide access to the metering tank 4 via aperture 16 only when the valve member 12 is in the closed position (Figure 1). This arrangement is known, see for example, British Patent Specification No. 2 077 229A.

The metering tank 4 is enveloped by a shroud 32 made of plastics material. The open end 34 of the shroud 32 extends substantially to the flared end 6 of the metering tank 4, enveloping the rubber sleeve 10 of the pressure filling valve 9. The interior of the shroud 32 at the open end 34 is dimensioned to allow only limited movement of the rubber sleeve 10 in the radial direction, sufficient to allow passage of liquid material from the metering tank 4 to the interior of the aerosol container during the filling operation, but insufficient to allow permanent displacement of the rubber sleeve 10. Movement of the rubber sleeve 10 in the longitudinal direction is prevented in one direction by the flared end 6 of the metering tank 4 and in the other direction by abutments 38 on the interior surface of the shroud 32.

The interior of the intermediate portion 40 of the shroud 32 comprises a series of substantially longitudinal ribs 41 defining passages 43 there between. The ribs 41 are dimensioned such that the shroud 32 may be force fitted over the metering tank 4 with the ribs 41 providing pressure contact with the outside of the metering tank 4 thereby holding the shroud 32 firmly in place. Preferably, the interior surface is provided with a projecting surface 42 which is designed to abut the end of the metering tank 4. This arrangement blocks the passages 43 between the ribs 41 with the exception of one or more passages which are extended at their inner end 44 to define with the metering tank 4 an aperture 45 so that there are one or more open passages between the interior inner portion 46 of the shroud 32, the intermediate portion 40 and the open end 34 leading to the aerosol container. The inner end 42 of the shroud 32 is dimensioned to accommodate the valve member 12 in both the closed and firing positions. The exterior surface 47 of the shroud 32 is free from major discontinuities, e.g. ledges, to reduce the propensity of the formulations within the aerosol container to deposit powder or crystals thereon.

The valve assembly 1 of the invention readily allows the entire contents of the aerosol container to be pressure filled. The valve member 12 is depressed to the firing position and the formulation introduced under pressure through the aperture 26. The liquid emerges from the elongate valve member 12 into the metering tank 4 via the orifice 28. When sufficient pressure has built up in the metering tank 4, there is a slight radial displacement of the rubber sleeve 10 covering the aperture 8 of the pressure filling valve 9 thus allowing passage of liquid from the metering tank 4 into the aerosol container. The route of the formulation under pressure filling is shown by the arrowed line in Figure 2.

In use, the aerosol is fired with the valve assembly 1 inverted, i.e. valve member 12 pointing downwardly. The liquid formulation therein passes up the open passage 44 between the shroud 32 and metering tank 4 to the inner end 46. When the valve member 12 is in the closed position (Figure 1), the liquid contents pass from the inner end 46 of the shroud 32 into the metering tank 4 via the groove 30 in the valve member 12 to fill the metering tank 4. When the valve member 12

is in the firing position (Figure 2) access from the shroud 32 to the metering tank 4 is prevented since aperture 16 is blocked by the exterior surface of the valve member 12 and the liquid contents under pressure in the metering tank 4 pass into the elongate valve member 12 via orifice 28 and thence are expelled via the aperture 26.

The valve assembly 1 gives very good dose reproducibility even when the container is almost empty. This is achieved by the shroud 32 extending substantially to the flared end 6 of the metering tank 4 and thus will dip into the liquid contents of the aerosol container (when the container is inverted) until the contents are substantially exhausted. The provision of only one open channel which is preferred, reduces the "dead volume" of the valve assembly since the blocked passages contain only small volumes of liquid and ensures that the filling of the metering tank 4 is substantially unaffected when the aerosol container is almost empty and tilted.

The arrangement also ensures that the rubber sleeve 10 of the pressure filling valve 9 will not be permanently displaced even under high pressure filling operations. This allows the size of the sleeve to be

reduced in comparison to many prior art devices thus reducing the risk of contamination of the contents upon contact with rubber.

CLAIMS:

1. A valve assembly which allows pressure filling of an aerosol container and dispensing of metered volumes of material therefrom comprising:

a casing member adapted to form at least the top portion of an aerosol container,

a first hollow body secured inside of the casing member defining a metering tank, the metering tank having a pressure filling valve comprising an aperture in the metering tank communicating with the aerosol container which aperture is adjacent the casing member and covered by a sealing member which prevents passage of material from the aerosol container to the metering tank but allows passage of material from the metering tank to the aerosol container when there is sufficient pressure difference between the metering tank and aerosol container,

an elongate valve member sealingly extending through respective apertures in the casing member and metering tank capable of longitudinal movement between a closed and dispensing position, such that in the dispensing position there is an open channel through the elongate valve member connecting the metering tank with the outside environment and the metering tank is sealed to prevent passage of material from the aerosol

container to the metering tank, and in the closed position the elongate valve member allows passage of material from the aerosol container to the metering tank and prevents passage of material from the metering tank to the outside environment,

and a second hollow body retained upon and forming a shroud around the metering tank, the shroud extending substantially to the casing member and covering said sealing member of the metering tank to allow only limited movement thereof, the shroud and metering tank defining at least one passage through which material from the aerosol container may pass into the metering tank when the elongate valve member is in the closed position.

2. A valve assembly as claimed in Claim 1, in which said sealing member of the pressure filling valve comprises a rubber sleeve extending circumferentially around the metering tank.

3. A valve assembly as claimed in Claim 2, in which longitudinal movement of the rubber sleeve is prevented by the shroud.

4. A valve assembly as claimed in any preceding claim, in which there is a single passage defined between the shroud and metering tank through which material from the aerosol container may pass into the metering tank.

5. A valve assembly as claimed in any preceding claim, in which the interior portions of the shroud are in pressure contact with the exterior surface of the metering tank thereby holding the shroud securely in place.

6. A valve assembly as claimed in Claim 5,. in which the interior of the shroud comprises a plurality of ribs which are in pressure contact with the metering tank, the ribs defining passages therebetween.

7. A valve assembly as claimed in Claim 6, in which the interior surface of the shroud includes a ledge which abuts the end of the metering tank thereby blocking the channels between the ribs with the exception of one or more channels which are open.

8. A valve assembly as claimed in Claim 1 substantially as herein described with reference to the accompanying drawings.

9. An aerosol container having a valve assembly as claimed in any preceding claim.

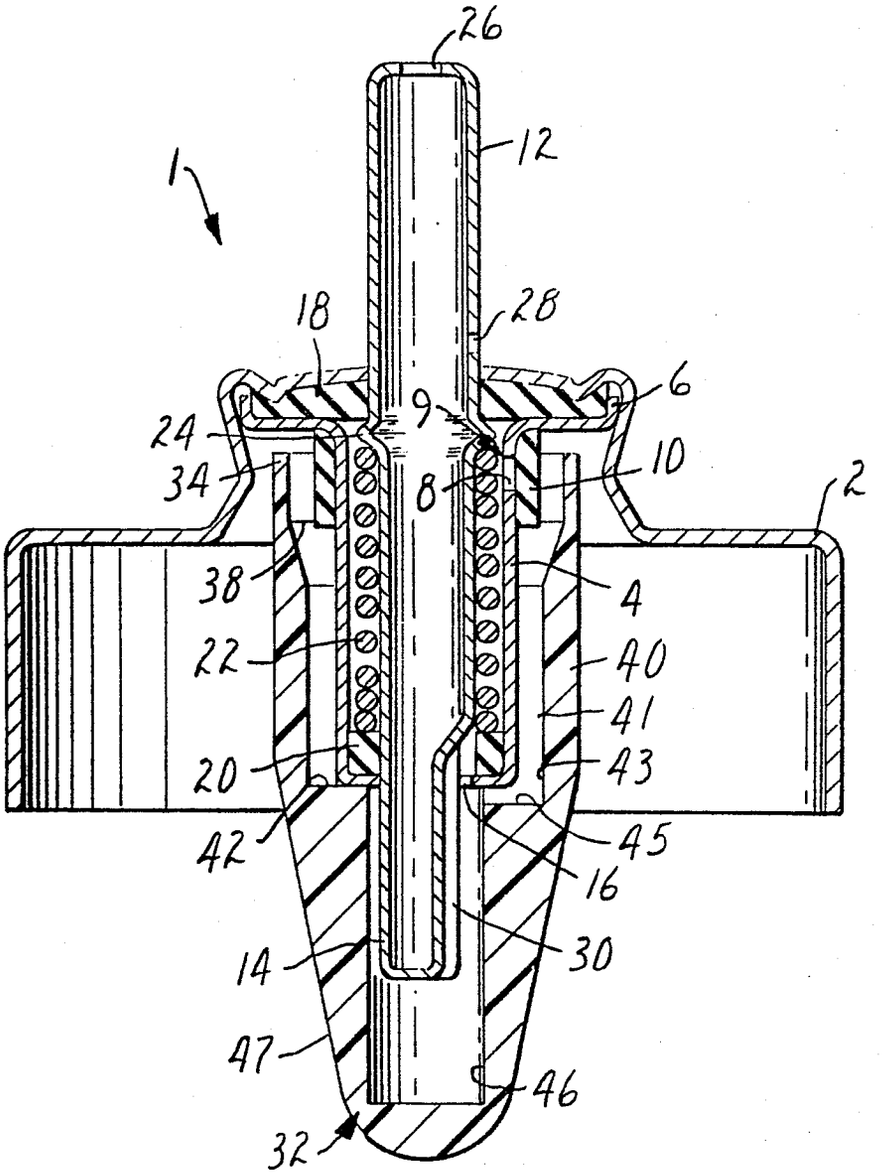

FIG. 1

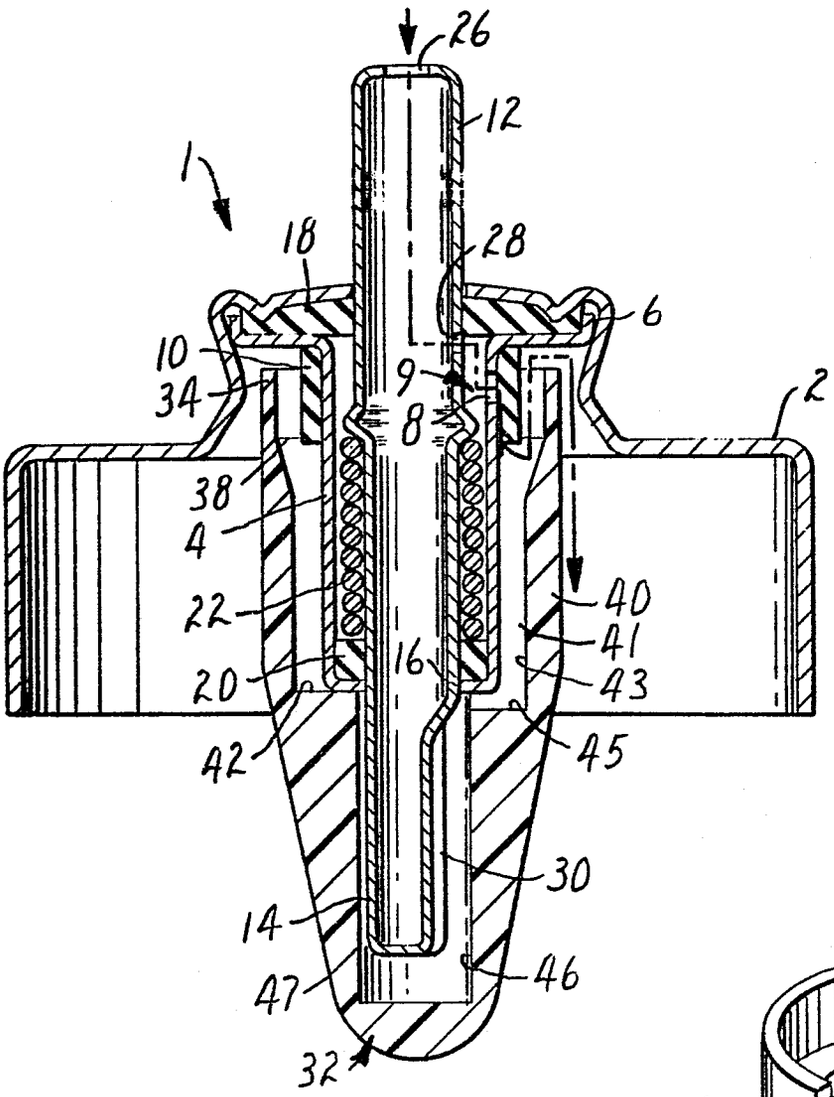
26
12
1
18
28
6
10
34
9
8
2
38
4
22
40
41
20
16
43
42
45
30
14
47
46
32

FIG. 2

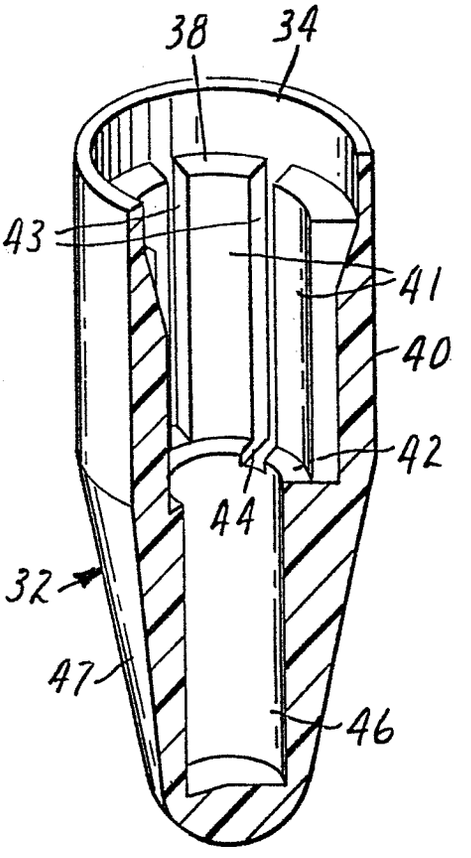
38
34
43
41
40
42
44
32
47
46

FIG. 3