

A MULTI-LAYER GASKET FOR AN AEROSOL CONTAINER CLOSURE

This invention relates to aerosol containers, and more particularly to a novel gasket for sealing the valve mounting cup to the rim of the container.

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Aerosol dispensing containers have found widespread use in the packaging of fluid materials including a variety of both liquid and powdered particulate products. Such containers are provided with a valve-controlled discharge orifice and operate by the action of a
10 volatile propellant which is confined within the container together with the product to be dispensed. Because the propellant has an appreciable vapor pressure at room temperature, the product in the closed container is maintained under superatmospheric pressure.

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A typical aerosol unit comprises a hollow cylindrical container which is tightly closed at one end and is provided with an opening at its opposite end for receiving a dispensing valve assembly. A closure, commonly referred to as a mounting cup, serves as the closure for the container and as a support for the valve assembly. Typically, the
20 mounting cup comprises a pedestal portion for mounting the valve unit, a panel portion extending from the pedestal portion, a skirt portion depending from the periphery of the panel, and an annular channel portion extending outwardly from the skirt. When the mounting cup is placed in sealing position on the container, the channel is positioned
25 over the bead surrounding the container opening and the lower portion of the skirt adjacent to the channel is flared or clinched outwardly against the container wall adjacent the bead. To ensure adequate sealing between the closure and the container, the cup is provided with a gasket in the channel, or predominantly in the channel, of the cup.

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Heretofore, mounting cup seals have been formed by disposing a so-called "cup" gasket in the channel. This type of gasket has the disadvantage of not being stationary relative to the mounting cup during propellant filling or other valve unit assembly operations with
35 the undesirable consequence that when the mounting cup and container are clinched to effect the seal, the gasket is often disposed at an angled position, and thus, the seal may be less effective.

Another commercial method for disposing the gasket onto the mounting cup consists in forming the gaskets in situ from liquid gasket-forming compositions comprising an elastomer dispersed or dissolved in volatile liquid vehicles, so called "flowed-in" gaskets.

5 In the manufacture of such a gasket, the liquid composition is deposited in the desired configuration in the channel of the cup while the cup is rotated beneath a metering nozzle through which the gasket composition flows. The deposit is then converted into a dry solid sealing mass by expelling the liquid vehicle at elevated temperatures.

10 Though this technique of flowing gaskets into place has received wide commercial acceptance, it suffers from the disadvantages of requiring an elaborate drying operation, wherein the mounting cup must be handled carefully so as to avoid undue upset from the horizontal. Costly recovery apparatus for the expelled liquid also must be provided. In

15 sum, the flowed-in gasket is an expensive step in the formation of the mounting cup. See United States Patent No. 3,342,381 as an example of the "flowed-in" gasket.

Other techniques for disposing a gasket onto the mounting cup are

20 described in United States Patent No. 3,417,177, wherein the gasket seal is made of heat shrinkable material. After placing a band of gasket material having a diameter greater than the outside diameter of the skirt of mounting cup, the cup is heated at a temperature and for a time sufficient to shrink the band into tight frictional engagement

25 with the skirt.

Another similar technique is disclosed in United States Patent No. 3,443,006 ("006"), wherein a band of gasket material is swelled through the use of a suitable swelling agent so as to increase its

30 diameter to fit over the skirt of the mounting cup.

Subsequently, the swelling agent is removed from the gasket material so that the band will come into tight frictional engagement with the skirt.

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Both the heat shrink and swelling techniques for applying a gasket material to the mounting cup have the disadvantage of being costly and relatively time consuming procedures. Note in U.S. Patent No. 3,417,177, column 4, lines 27-31, that the positioned bands must be heated to 115°C (240°F) for about 2 - 3 minutes in order to obtain a tight friction fit. In the procedure of the '006 patent, the bands must stand in the swelling liquid for a period of 1/2 to 1-1/2 minutes according to example 2, and then allowed to stand for the drying period. Also, in any mass production utilizing the '006 system, an organic liquid recovery system must be employed.

In United States Patent Nos. 4,546,525 and 4,547,948, a novel gasketed mounting cup system is described, including novel method and apparatus, wherein the gasket material is disposed on the mounting cup in the preferred position for effecting a seal between the mounting cup and the bead of the container; and further wherein the disadvantages associated with the aforementioned techniques of applying the gasket material to the cup are obviated. Also, an apparatus and method is provided wherein gaskets are applied to aerosol mounting cups in an exceptionally rapid and efficient manner to form gasketed-mounting cups having excellent sealing characteristics. In general, the method of invention of the aforesaid United States Patent Nos. 4,546,525 and 4,547,948 comprises passing a tubular sleeve of gasket material onto a compressible mandrel; initially positioning and aligning the skirt of the mounting cup and the contiguous end of the mandrel such that the sleeve of gasket material may pass onto the skirt, said mandrel having fixed and moveable portions with respect to each other and to their movement toward and away from the mounting cup; urging the moveable portion of the gasket material bearing mandrel toward the mounting cup such that the gasket material passes onto the skirt of the cup; causing the moveable portion of the mandrel to retract to its initial position, cutting the sleeve at a point between the mounting cup and the mandrel to leave a band of gasket material; and subsequently, advancing the mounting cup to a station whereat the band of the gasket material is urged further onto the skirt of the mounting cup, whereby, the band of gasket material does not extend beyond the skirt of the mounting cup. Subsequently, the gasket is advanced to the ultimately desired position

on the mounting cup.

United States Patent No. 4,559,198 concerns a further refinement of a "sleeve" type gasket system which employs annular (or radial) compressive deformations or "ribs" in the band of the gasket material. This ribbing imparts to the gasket a resistance to being dislodged during "under the cup" propellant filling operations. This ribbing also imparts to the gasket a resistance to being repositioned on the mounting cup by the gasket returning to its initial position.

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In addition to the type of mounting cup gasket systems described heretobefore, namely, "cut", "flowed-in" and "sleeve" gasket, a recent commercial system involves laminating a plastic material to a sheet of the metal and subsequently forming the laminated plastic sheet into a mounting cup. The thickness of the plastic laminate is usually on the order of 0.008 - 0.010" (0.2 to 0.25mm), thinner than the sleeve gasket and substantially thinner than the cut or flowed-in gasket.

This variation in gasket thickness among the several gasket systems, further complicated by the fact that the channel portion of the mounting cups manufactured by the valve assembly plants and the annular beads of the aerosol container manufactured by container plants have nominal variations which are within quality control limits, often produce a defective seal in a completed aerosol product which may remain undetected until ultimately discovered by the consumer.

Recently, attention has been focused on modifications of the shape and configuration of the mounting cup used over the past twenty-five years in the aerosol industry. Such a modification is described in U.S. Patent No. 4,792,067. This modification of the mounting cup comprises a channel portion for sealing with the bead of the container, the channel portion having an inner region contour being substantially different in shape from the inner surface contour of the annular bead of the container. The difference in the shape of the inner region contour of the channel portion from the shape of the inner surface contour of the annular bead allows only a portion of the inner region contour of the peripheral rim to contact the inner surface contour of

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the annular bead when the mounting cup is disposed on the container. The shape of the inner region contour of the peripheral rim is deformed when the mounting cup is crimped to the annular bead of the container. The deformation of the inner region contour reforms the shape of the inner region contour to be substantially the same shape as the inner surface contour of the annular bead to provide a sealing engagement between the mounting cup and the container.

In the manufacture of valve mounting cups for aerosol containers, it is also known to provide a non-deformable, annular indent or depression in the curved portion of the channel portion of the cup which retains its shape through the clinching process, thereby to provide localised compression of the gasket in an annulus around the valve mounting cup and an annular band of enhanced sealing between the mounting cup and the bead of the container.

Despite the attempts to modify the gasket and the mounting cup to improve the reliability of the seal between the channel portion of the mounting cup and the annular bead of the aerosol container, gaskets still become twisted and deformed, particularly during the filling of the container with propellant. The gasket can then be blown into the container or joined to the bead of the container, forming an imperfect seal. Such distortions of the gasket are caused in part by the inherent flexibility of the linear low density polyethylene ("LLDPE") commonly used to form such gaskets. Replacement of LLDPE with high density polyethylene ("HDPE") does not improve the seal. Since the HDPE is rigid, it conforms poorly to the metal of the mounting cup and has insufficient resilience to form a good seal.

The seal between the mounting cup and the aerosol container remains of great concern to both the valve assembly plants and the filling plants since it must be capable of being gas tight for a period of years. In addition, the seal between the mounting cup and the aerosol container must be low in cost to enable aerosol products to be competitive with non-aerosol products in the consumer market.

In accordance with the present invention the above problems are alleviated by means of a multi-layer gasket comprising a middle layer of rigid plastics material, preferably of high density polyethylene or polypropylene, sandwiched between opposing inner and outer layers of a softer thermoplastics material, preferably a linear low density polyethylene. If desired, the gasket can also include a layer of adhesive, preferably thermally activated adhesive, coated on the surface of the inside layer.

In one aspect, the present invention relates to the construction of the gasket per se.

In other aspects, the invention relates to the combination of that gasket and a mounting cup for an aerosol container, and to aerosol containers fitted with that combination.

The invention is further described with reference to the accompanying drawings in which:

Figure 1 is an elevated sectional view of a gasketed mounting cup according to the present invention;

Figure 2 is an enlarged, partial elevated sectional view of that portion of the mounting cup within the circular dotted line of Figure 1, showing a multi-layer gasket according to the present invention;

Figure 3 is a sectional view of the multi-layer gasket of the present invention, including an adhesive layer;

Figure 4 is a partial sectional view of the apparatus used to advance the multi-layer gasket from an initial position on a mounting cup to its final position partially in the channel of the mounting cup;

Figure 5 is an enlarged partial sectional view of the circled portion of Figure 3; and

Figure 6 is an enlarged partial sectional view of a two piece sleeve used in placing the multi-layer gasket of the present invention into the channel of a mounting cup.

Referring in more detail to the drawings, Figure 1 shows an aerosol valve mounting cup according to the present invention generally designated as 10 and including the multi-layer sleeve gasket 17. The mounting cup has a pedestal portion 11 which rises from the interior edge of a panel portion 12. A skirt 14 rises from the exterior edge of the panel portion 12 opposite the pedestal portion--and concentric thereto. The top portion of the skirt 14 curves into a channel portion 15 which terminates in edge portion 16. The channel portion 15; the edge portion 16 and the top of the skirt 14 form an annular convex receptor for the standard bead of an aerosol container. A multilayer gasket 17 in accordance with the present invention is shown positioned partially along the skirt 14 and partially within the channel 15 of the mounting cup 10. Figure 2 is an enlarged detail view of the circled portion of Figure 1 showing the multi-layer gasket 17 of the present invention, the upper portion of skirt 14, the channel portion 15 and the edge portion 16 in a sectional view.

The multi-layer sleeve gasket 17 of the present invention comprises a middle layer 20 of the rigid plastic material, an inner layer 22 of soft plastic material adjacent one surface of the middle layer 20 and an outer layer 24, also of soft plastic material, adjacent the opposite surface of the middle layer 22. The middle layer needs to be rigid enough to provide support for the gasket 17, preventing deformation of the gasket which could interfere with sealing. The inner and outer layers needs to be soft enough to provide effective seals with the mounting cup and container bead. The middle layer 20 is preferably thicker than the outer layers.

The middle layer could be any rigid thermoplastics material such as high density polyethylene ("HDPE"), other rigid polyethylenes, such as low density polyethylene ("LDPE") of suitable molecular weight, acrylonitrilebutadienestyrene (ABS), acetal, polyamide, polycarbonate, polypropylene or polyesters. HDPE and polypropylene are preferred. The particular plastic chosen needs be chemically resistant to the product to be dispensed and could therefore vary depending on the application. Altaven - 6200B HDPE, available from Plastics Del Logo, C.A. Venezuela, is one preferred middle layer material.

A similar preferred HDPE is Alathon L5840 from Occidental Chemical Corporation. Exxon PD 7292, a polypropylene copolymer, is also preferred. These materials have been found to have sufficient rigidity for this application and to extrude smoothly, easing manufacture of the gasket. Typical property data for these materials appear below:

Althaven- 6200B

	<u>Properties</u>	<u>Covenin Method</u>	<u>ASTM Method</u>	<u>Typical Value</u>
10	Melt index	1552	D 1238	0.40 g/10 min
	Density	-	D 1505	0.0958 g/cm ³
	Yield strength	1357	D 638	280 Kg/cm ²
	Tensile strength at break	1357	D 638	320 Kg/cm ²
	Elongation at break	1357	D 638	>500%
15	Izod Impact strength	822	D 256	12 Kg. cm/cm
	Environmental cracking resistance	-	D 693	>400 hours

Alathon L5840

20	<u>Properties</u>	<u>ASTM Method</u>	<u>Typical Values</u>
	Density	D 792	).958 g/cm ³
	Melt Index	D 1238, 190/2.16	0.40 g/10 min
	High Load Melt Index, I-20	D 1238, 190/21.6	34 g/10 min
25	Environmental Stress Crack	D 1693, A	80°F (27°C)
	Flexural Modulus	D 790, I/B	180,000 lbs/in ² 12600 kg/cm ²

5	Tensile Yield Strength	D 638	4,300 lbs/in ² (301kg/cm ²)
	Elongation at Yield	D 638	16%
	Tensile Impact Strength	D 1822,S	92 ft-lbs/in ² 19.3Nm/cm ²
	Heat Deflection Temperature	D 648(66)	168°F; 76°C

Exxon PD7292

10	<u>Properties</u>	<u>ASTM Method</u>	<u>Typical Value</u>
	Melt Flow Rate	D 1238 (230/2.16)	4.0g/10 min
	Density	D 792	0.90 g/cc; 900kg/m ³
	Tensile Strength & Yield (50 mm/min)	D 638	4200 psi; 29 Mpa
15	Elongation & Yield (50 mm/min)	D 638	12%
	Flexural Modulus 1% Secant (1.2 mm/min)	D 790A	155,000 psi; 1070 MPa
20	Izod Impact Strength Notched @ 23°C	D 256	2.0 ft-lb/in; 35 J/m
	Gardner Impact Strength - 30°C 3.2 mm specimen	D 3029 Method G	180 in-lb; 20J
25	Heat Deflection Temperature @ 455 kPa	D 648	185°F; 85°C

The inner and outer layers, 22 and 24, need to be soft enough to provide seals against the inner surface of the gasket 14 and the bead of the container (not shown). The type of plastic chosen for a particular application needs to be chemically resistant to the product to be dispensed. These layers also need to be resistant to cold-flow, which could deform the gasket and cause a slow leak. Suitable materials include soft polyethylene, particularly low density and more particularly, linear low density polyethylene, elastomers, polyurethane, ethylvinylacetate (EVA) copolymer, ethylene-ethyl acrylate copolymer, polyethylene-butyl compounds, polyester elastomers and polyisobutylene modified by the addition of other polymers, such as polyethylene, for firming and toughening. Preferred inner layer materials include linear low density polyethylene, such as LL-2102 from Exxon and G-Resin 7340 from Union Carbide. It is preferred that the inner and outer layers be the same for simplicity in manufacture, but it is possible to use different materials for each layer as well.

Typical property data for Exxon 2102 and G-Resin 7340 appear below:

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EXXON LL-2102

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Property	Test Method	Typical Values
Melt Index	D 1238	0.8 dg/min
Density	D 1505	0.531 oz/in ³ ; 920 kg/m
Melting Point	Exxon Method	245.3°F; 118.5°C
Tensile Strength	D 638	2200 psi; 15.2 MPa
Ultimate Elongation	D 638	600%
Dart Drop Impact Strength F ₅₀ @ 40°C	D 3029	45 Ft-lb; 61J
Brittleness Temperature	D746	< -148°F; < -100°C
Environmental Stress Crack	D 1693	

Resistant, F ₀		
10% "Igepal"		> 1000 hr
100% "Igepal"		> 1000 hr

G - RESIN 7340

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<u>Property</u>	<u>Test Method</u>	<u>Typical Values</u>
Melt Index	D 1238	0.8
Density	D 1505	0.920 g/cm ³
Secant Modules of Elasticity, 1% Elongation	D 638	34.000 psi; 234 MPa
10 Tensile Strength	D 638	2.250 psi; 15.5 MPa
Ultimate Elongation	D 638	600%
Bent Strip	D 1693	
Crack Resistance, hrs, F		
100% "Igepal"		>500
15 10% "Igepal"		>500
Brittleness Temperature	D 746	Below -100°C
Flex.Life, Cycles to Fail	UCC Method	140,000
Minimum Shear Rate to Melt Fracture, sec ⁻¹	UCC Method	4,000

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The thickness of the middle layer 20 is preferably between about 0.004 - 0.012 inches (0.1 to 0.3mm) for the nominal 1 inch (2.54cm) diameter mounting cup. The thickness of the inner and outer layers 22 and 24 is preferably between about 0.0005 - 0.005 inches (0.013 to 0.13mm). If

25 the inner and outer layers are thicker, it could allow cold-flow. The total thickness of the gasket is preferably about 0.014 inches (0.36mm).

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The inner layer 22 and the outer layer 24 are preferably of two different colors. The middle layer 20 is preferably not colored. The juxtaposition of two different colors results in a third color, which allows for simple, visual quality control. The appearance of the color of either of the colored layers instead of the expected resultant color indicates that a portion of a layer is missing or too thin. For example, the inner layer has been colored red and the outer layer blue. A purple sleeve of gasket material indicates that the inner and outer layers present. Variations in the shade or coloring of the sleeve indicates that the multi-layer gasket is defective.

The multi-layer gasket 17 of the present invention provides sealing and reliability superior to prior art gaskets. If it is desired to even more securely adhere the gasket to the mounting cup, an adhesive layer 26 can be added to the exterior of the inner layer 22 of the multi-layer gasket adjacent the mounting cup 10, as shown in Figure 3. The adhesive layer is preferably between about 0.0005 - 0.0015 inches (0.013 to 0.038 mm) thick. 0.0007 inches (0.018 mm) is presently preferred.

Preferably, the adhesive is a thermally activated adhesive which is not activated until the gasket is advanced to its final position in the channel as described below. The bonding material may be applied to the entire surface of the gasket material that is contiguous to the mounting cup, disposed in stripe form on the gasket, or formed as stripes having an apex in that portion of the bonding material distal to the gasket material.

The temperature-activable material forming the bond between the gasket and mounting cup may result in the formation of an adhesive bond, a stronger interference fit between gasket and mounting cup, or a combination of both adhesion and interference fit.

While the temperature-activable bonding material may be any adhesive resin compatible with the gasket material chosen, the product and other components of the aerosol container, it has been found that with conventional LLDPE gaskets that BYNEL- 3101, an ethylene based

polymer containing a combination of ester and acidic comonomer functionality, available from the DuPont Company, modified with LLDPE to improve chemical resistance and ease of processing, is preferred. 64.87% Bynel CXA 101 is mixed with 34.67% Exxon LL 2101 and blue colorant, such as PB-3963 available from H. Kohnstann Company.

Typical property data for BYNEL- CXA 3101 follows. Exxon LL 2101 is described above.

Property	Test Method	Typical Values
Melt Index	ASTM D-7139	3.5 dg/min.
Density	ASTM D-1505	943 kg/m ³ ; 0.943 gr/cc
Melting Point	DSC	87°C; 199°F
Freezing Point	DSC	69°C; 156°F
Vicate Softening Point	ASTM D-1525	65°C; 149°F
Tensile Strength	ASTM D-170	813.26 MPa; 1.920 psi
Tensile Modus	ASTM D-170	832.999 MPa; 478 psi
Elongation at Break	ASTM D-1708	64%

It is important that the temperature-activable bonding material have the capability of being converted to the bonding state at a temperature below the distortion temperature of the gasket material. Preferably, the temperature that converts the bonding material to the bonding state is at or near that generated by the heated mounting cup when the gasket is as its ultimate position on the mounting cup, so as not to deposit said substance onto the skirt portion of the mounting cup as the gasket is advanced to its ultimate position during the secondary plunger action, as is described below.

The multi-layer gasket 17 can be made in a conventional manner through extrusion under ordinary processing conditions for the chosen plastics. If the inner and outer layers are the same, two extruders

may be used to form a sleeve of gasket material. If the inner and outer layers are of different materials or are colored differently, 3 extruders are used. If an adhesive layer is added, a fourth extruder is required. The adhesive layer would be the innermost layer of the sleeve. To form a friction fit between gasket material and the skirt of the mounting cup, the inside diameter of the gasket material is slightly less than the outside diameter of the skirt portion of the mounting cup. A preferred outer diameter for the sleeve is approximately 0.975 inches (25mm).

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The sleeve is preferably placed on the mounting cup 10, cut and inserted in the channel 15 of a mounting cup through an apparatus and method disclosed, for example in U.S. Patents Nos. 4,559,198 and 5024592.

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Subsequent to the initial advance of the gasket material onto the skirt of the mounting cup, the mounting cup is passed on conventional tracking through a zone wherein the band of gasket and bonding material is heated by conventional heating means through heat exchange with the mounting cup. For example, the heating zone is a conventional mounting cup tracking in indirect heat exchange with an insulated heat water system, said water system being capable of close control through heated water control systems. The mounting cup is heated to a temperature of 200-225°F (93 to 107°C). A temperature of 218-225°F (103 to 107°C) has been found satisfactory. Alternatively, and preferably, the mounting cup is heated by a conventional radio frequency system (RF.).

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From the heating zone the mounting cups are passed to a secondary plunger station for final positioning of the gasket. The plunger for advancing the gasket at the secondary plunger station is shown in Figure 3. The plunger of Figure 3, generally designated as 120, comprises an outside sleeve portion 122, a head portion 124, and a chuck portion 126. The chuck portion is attached to a plunger advancing mechanism (not shown). The head portion 124 and sleeve portion 122 define a recess 128. Within the recess 128 is a mounting cup stripping member, generally designated as 130, which comprises slidable mating portions 132 and 134, and a mounting cup centering member, 136, which centering member 136 is biased away from the head

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portion 124 by a spring 140. Mating portion 134 of the mounting cup stripping member 130 is biased away from mating portion 132 by spring 142.

5 The sleeve 122 has a lower portion 144 having an annular shoulder 146. The shoulder portion 146 engages the gasket material 116 while advancing the gasket to its ultimate position on the mounting cup 118. Unlike the edge of the sleeve in U.S. Patent No. 4,559,198, the bottom edge 148 of the sleeve 122 may be smooth, as shown in Figures 3 - 4.

10 The multi-layer gasket of the present invention can securely seal the mounting cup and container bead without the use of the ribbing taught in U.S. Patent No. 4,559,198. If desired for additional securing, such ribbing can be added. Figure 6 shows a modified two piece sleeve presently preferred for use with the multi-layer gasket. The radiused

15 intersection 200 between the two pieces 144a and 144b allows for more precise positioning of the multi-layer gasket 17.

 In operation, the mounting cups 188 are suitably placed at the secondary plunger station. When in place, the plunger 130 is advanced

20 toward the mounting cup 119. The mounting cup is centered relative to the plunger 120 by the mounting cup centering member 136. Also, the mounting cup stripping member 130 is brought into contact with the cup, as shown in Figures 3. Upon advancing the plunger 120, the sleeve 122 moves to engage the shoulder 146 against the gasket material 116,

25 urging the gasket material 116 further onto the skirt of the mounting cup 118, and ultimately advancing the gasket material to the final position shown in Figure 3 - 4. As shown in Figure 4, the edge 148 of the sleeve 122 terminates its advance by bottoming against the walls 152 of the channel of the mounting cup.

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 During retraction of the plunger 120, the mating portion 134 of the mounting cup stripping member 130 is biased against the mounting cup 118 by the spring 142 until the sleeve 122 moves clear of the advanced gasket, thus precluding the retracting sleeve 122 from lifting

35 the mounting cup 118. Obviously, the springs 140 and 142 must be designed to permit mating portion 132 to advance toward mating portion 134 during the advance of the plunger 120.

Preferably, following the advance of the gasket material to its ultimate position on the mounting cup, the gasketed mounting cup is cooled to room temperature.

5 The multi-layer gasket of the present invention combines advantageous sealing and adhesion characteristics of a soft thermoplastics material with the support provided by more rigid thermoplastics material to form a gasket superior to those of the prior art. The gasketed mounting cup of the present invention can therefore
10 be more securely and reliably sealed to the bead of an aerosol container than prior art mounting cups.

The following trade names used herein are hereby acknowledged as Registered Trade Marks:

15 Alathon;
Exxon;
Bynel.

CLAIMS:

1. A multi-layered gasket for sealing an aerosol valve mounting cup to the rim of an aerosol container, and shaped to fit between the valve mounting cup and the rim of the container, said gasket comprising a middle layer of rigid thermoplastics material sandwiched between inner and outer layers of softer thermoplastics material, said inner layer, when the gasket is so fitted between the valve mounting cup and the rim of the container, lying on that side of the middle layer that is directed towards the valve mounting cup, and the outer layer lying on that side of the mounting cup that lies on that side of the middle layer that is directed towards the rim of the container.
2. A gasket according to claim 1, wherein said middle layer is constructed from rigid polyethylene, rigid acrylonitrilebutadienestyrene copolymer, polyacetal, polyamide, polycarbonate, polypropylene or polyester.
3. A gasket according to claim 2, wherein said middle layer is constructed from high density polyethylene.
4. A gasket according to claims 1, 2 or 3, wherein said inner and outer layers of softer thermoplastics material are constructed from polyethylene, polyurethane, ethylvinylacetate (EVA) copolymer, ethylene-ethyl acrylate copolymer, polyethylene-butyl compounds, or a polyisobutylene, polyester or other elastomer.
5. A gasket according to claim 4, wherein said inner and outer layers of softer thermoplastics material are constructed from a linear low density polyethylene.
6. A gasket according to any one of claims 1 to 5, wherein said inner and outer layers are both constructed of the same material.
7. A gasket according to any one of claims 1 to 6, wherein the middle layer has a thickness greater than either of the inner or outer layers.



8. A gasket according to claim 7, wherein the middle layer has a thickness of from 0.1 to 0.3mm (0.004 - 0.012 inches) and the inner and outer layers each have a thickness of from 0.013 to 0.13 mm (0.0005 - 0.005 inches).

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9. A gasket according to any one of claims 1 to 8 comprising a layer of adhesive on the inner face of said inner layer.

10. A gasket according to claim 10, wherein said adhesive is a thermally activated adhesive.

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11. A gasket according to any one of claims 1 to 10, wherein the inner and outer layers are different colors.

12. A gasket according to any one of claims 1-11, which is in the form of a sleeve consisting of a middle layer of said rigid thermoplastics material being sandwiched between concentric inner and outer layers of said softer thermoplastics material, the adhesive, if present, being on the inner face of the inner layer.

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13. An aerosol valve mounting cup of the type comprising an apertured pedestal providing an aperture for the mounting of an aerosol valve member therein, an integral panel surrounding the pedestal with an integral skirt depending from the periphery of said panel, said skirt being outwardly flared to form an annular channel for receiving and clinching onto the rim of an aerosol container, and a gasket positioned in the channel portion of the mounting cup and surrounding said skirt for sealing the valve mounting cup to the rim of the container, wherein the gasket is a multi-layered gasket as claimed in any one of claims 1 to 12.

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14. An aerosol valve mounting cup according to claim 12, substantially as hereinbefore described with reference to the accompanying drawings.

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15. An aerosol container when fitted with a valve mounting cup as claimed in claim 13 or 14.

16. A multi-layered gasket according to claim 12, substantially as
5 hereinbefore described with reference to Figures 2 and 3 of the accompanying drawings.



* C L H S *