DEVICE FOR DISPENSING A PERSONAL CARE PRODUCT

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Abstract

A device for dispensing a personal care product onto skin comprising: a brush head comprising a base and a plurality of bristles, and a device body operatively connected to said brush head about said base, said device body comprising: an outer container; an at least partially expanded collapsible bag disposed in the outer container, an elastic member surrounding at least a portion of the collapsible bag such that the elastic member is stretched axially and radially, the elastic member being constructed of an elastically extensible material that permits the transfer of infrared radiation through at least a portion of the elastic member; at least one fluid dispensing conduit in fluid communication with said collapsible bag, extending through said base.
Fig. 2
DEVICE FOR DISPENSING A PERSONAL CARE PRODUCT

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/328,509 filed Apr. 27, 2010.

BACKGROUND OF THE INVENTION


[0003] Conventional brush dispensers devices, however, typically use conventional valves which can require multiple parts and be costly and complex to assemble. Nonlimiting examples of known valve systems used in aerosol include: U.S. Pat. Nos. 3,357,604; 3,477,613; 3,586,060; 3,817,429; 3,845,887; 4,122,982; 5,427,282, 6,006,745; and 6,474,513. Some of valve systems have even been disclosed as one piece grommets or seals made of rubber or other synthetic materials. See e.g., U.S. Pat. Nos. 4,008,834; 6,113,070; and 6,918,516. Many attempts to use rubber parts in the dispensing system, however, relate to tips and applicators.

[0004] Further, many dispensing systems rely on aerosol technologies which typically use blowing agents or other pressurized gases, or metered pump systems. An approach has been developed which appears to offer controlled dispensing similar to aerosols, but without many of the negatives associated with the pump. This approach includes a collapsible container surrounded by an elastomeric band. A normally closed valve and an actuator assembly are affixed to the container. When the container is initially filled with product, it expands along with the surrounding elastomeric band. Potential energy is generated as the elastomeric band stretches. And when the actuator is operated to open the valve, the potential energy is converted to kinetic energy to dispense product out of the container until the actuator is disengaged. Examples of such a dispensing system are disclosed in U.S. Pat. Nos. 4,964,540 and 5,232,126. The predominant expansion and contraction of the elastomeric band in these systems is in the radial direction. As a result, a significant amount of product can be trapped in the closed end of the container.

[0005] Despite these and other attempts, there remains a need for a new package for dispensing a personal care product which provides suitable product dispersal into and/or onto the brush head.

SUMMARY OF THE INVENTION

[0006] One aspect of the present invention provides for a device for dispensing a personal care product onto skin comprising: a brush head comprising a base and a plurality of bristles, and a device body operatively connected to said brush head about said base, said device body comprising: an outer container; an at least partially expanded collapsible bag disposed in the outer container, an elastic member surrounding at least a portion of the collapsible bag such that the elastic member is stretched axially and radially, the elastic member being constructed of an elastically extensible material that permits the transfer of infrared radiation through at least a portion of the elastic member; at least one fluid dispensing conduit in fluid communication with said collapsible bag, extending through said base.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIGS. 1A-1C are cross-section views of an embodiment of a skin care product.

[0008] FIG. 2 is a partial cross-section view of a valve member inserted into an opening of a container preform.

[0009] FIG. 3 is a side view of an exemplary container preform.

[0010] FIG. 4 is a cross-section view of the exemplary container preform shown in FIG. 3.

[0011] FIG. 5 is a perspective view of an exemplary polymeric preform.

[0012] FIG. 6 is a side view of the exemplary polymeric preform shown in FIG. 5.

[0013] FIG. 7 is a cross-sectional view of an exemplary embodiment of a container preform.

[0014] FIG. 8 is a side view of a skin care product.

[0015] FIG. 9 is a cross-section view of the skin care product of FIG. 8.

[0016] FIGS. 10A and 10B are side views of two exemplary tubes.

[0017] FIG. 11 is a perspective view of a container.

[0018] FIGS. 12 and 13 illustrate exemplary dimensional changes that may occur after transitioning a container preform into a collapsible bag.

[0019] FIG. 14 is an example of a personal care product which can include the elastically extensible, tube in sleeve type of dispenser described herein.

DETAILED DESCRIPTION OF THE INVENTION

[0020] The present personal care product utilizes an elastically extensible, tube-in-sleeve type of dispenser to provide a convenient and environmentally friendly way to apply a personal care composition to skin. The tube-in-sleeve type dispenser disclosed herein is capable of dispensing substantially all of the skin composition stored therein (e.g., more than 90%; 92%; 93%; 94%; 95%; or, ideally, 100%) and does not require undesirable chemical propellants. Additionally, the present tube-in-sleeve type dispenser is capable of desirable dispensing the stored personal care composition in a variety of container positions (e.g., upside-down, right-side-up, or sideways). Since the present personal care product does not need to be highly pressurized like an aerosol dispenser, the personal care composition may be dispensed at a temperature which is not substantially different from ambient temperature of the surrounding environment. Surprisingly, it has also been found that the present personal care product provides the unexpected benefit of being substantially cheaper to manufacture than commonly known aerosol and pump dispensers. Non-limiting examples of suitable dispensing brushes have been described in U.S. Patent Publs. 2009/0263175, 2009/0263174.

[0021] Certain properties described herein may include one or more ranges of values. It is to be understood that these ranges include every value within the range, even though the individual values in the range may not be expressly disclosed.

[0022] “Axial” means the direction generally corresponding to the lengthwise direction of an article.

[0023] “Collapsible” and variations thereof mean that the volume of an article or component (e.g., a collapsible bag or
other flexible container) can be reduced by at least 50% but less than 100% (e.g., 60%, 70%, 80%, 90%, 95%, 98%, or even 99%), relative to its volume in an expanded state, by an externally applied pressure of between 100 kPa and 600 kPa (e.g., 200-400 kPa, 260-340 kPa, or even 300 kPa) without substantial degradation of the performance of the article or component or damage to surrounding components that would impair the article's continued use.

[0024] "Compromised skin" means skin that is afflicted with a skin ailment such as one or more of the skin ailments disclosed herein.

[0025] "Elastic" and "elastically extensible" mean the ability of a material to stretch by at least 50% without rupture or breakage at a given load, and upon release of the load the elastic material or component exhibits at least 80% recovery (i.e., has less than 20% set). For example, an elastic material that has an initial length of 100 mm can stretch to at least 150 mm (50% stretch) and, upon removal of the force, retract to a length of 110 mm (i.e., have a set of 10 mm or 10%). Stretch, sometimes referred to as strain, percent strain, or elongation, along with recovery and set may each be determined according to a suitable hysteresis test commonly known in the art. It is to be understood; however, that this definition of elastic does not apply to materials that do not have the proper dimensions (e.g., not wide enough) to be properly subjected to a suitable hysteresis test. Instead, such material is considered to be elastic if it can stretch to at least 50% upon application of a biasing force, and return substantially to its original length (i.e., exhibit less than 20% set) upon release of the biasing force.

[0026] "Expandable" and variations thereof mean that the volume of an article or component (e.g., a polymeric preform or collapsible bag) can be increased by at least 50% up to 1000 times (e.g., 100%; 400%; 800%; 1200%; 2000%; 6000% or more) its volume in a relaxed or collapsed state, without rupture or breakage of the element. For example, a preform may have an initial volume of 10 ml, but when expanded (e.g., by filling with a gas and/or a personal care composition) the volume is increased to 1 liter.

[0027] "Extensible" means the ability to stretch or elongate, without rupture or breakage, by at least 50%.

[0028] "Infrared" or "infrared light" ("IR") means electromagnetic radiation having a wavelength of between 700 nanometers ("nm") and 1 millimeter ("mm").

[0029] "Joined" means configurations whereby an element is directly secured to another element by affixing the element directly to the other element, and configurations whereby an element is indirectly secured to another element by affixing the element to intermediate member(s) that in turn are affixed to the other element.

[0030] "Latherable" as used herein refers to a personal care product that is able to form a foam or froth when agitated or spread onto the skin. The liquid personal care product may lather by entrapping air, by comprising a surfactant-type substance, or by another means known to those of ordinary skill in the art. Water addition may or may not be necessary to obtain a foam or froth, but it may enhance benefits or results depending on the type of product used. Agitation or spreading may be by hand, but is preferably by applicator. Agitation or spreading may be rapid or slow, and may comprise irregular and regular movements. The term "lathering" as used herein refers to the act of agitating or spreading onto the skin a personal care product to produce a foam or froth. For instance, a product may be dispensed as a gel and then lathered into a foam. If a product is already in the form of a foam or froth when dispensed from its package, lathering may comprise spreading product onto the skin to cover an area of skin.

[0031] "Plastic" and "plastically extensible" mean the ability of a material to stretch by at least 50% without rupture or breakage at a given load and upon release of the load the material or component exhibits at least 20% set (i.e., recovers less than 80%). For example, an extensible material that has an initial length of 100 mm can stretch to at least 150 mm (50% stretch) and, upon removal of the applied force, retract to a length of 35 mm (i.e., have a set of 35 mm (35%) set), when subjected to a suitable hysteresis test commonly known in the art.

[0032] "Operatively exhausted" means that a composition contained in a container is depleted such that the container is no longer able to dispense the composition as intended. By way of example, a container is initially filled to capacity with a personal care composition (i.e., is 100% full) and then the composition is dispensed until less than 5% of the initial amount, but greater than 0%, remains, at which time the container ceases to dispense any more of the composition. In this example, even though there is still some amount of residual composition remaining in the container, the container is operatively exhausted. It is to be appreciated that a container may be operatively exhausted and still dispense composition, if the composition is not dispensed as intended (e.g., exit pressure is too low, sputtering, dripping and the like). Ideally, the personal care product disclosed herein will dispense substantially all of the composition stored in it before being operatively exhausted.

[0033] "Preform" means a material, element, component, or article that has undergone preliminary shaping but is not yet in its final form.

[0034] "Radial" means the direction perpendicular to the axial direction, and generally corresponds to the widthwise direction of an article.

[0035] "Relaxed" means the state of an element, material or component at rest with substantially no external force acting on the element, other than gravity.

1) Dispensing Device

[0036] a) Brush Head

[0037] The device of the present invention comprise a brush head. The brush head comprises: a base, and a plurality of bristles, said plurality of bristles having a distal end and a proximal end, wherein said distal end is attached to the base and said proximal end forms a skin contacting region. The device comprise a flow path from the contents contained in the collapsible bag through the brush base into the fluid dispensing conduit and optionally into a region of lower bristle density formed in said brush head.

[0038] In one embodiment, the distal end has a greater bristle density than the proximal end; and wherein said plurality of bristles forms at least one flow path from said distal end towards said proximal end. Without wishing to be bound by theory, it is believed that the bristle density being greater at the distal end than at the proximal end facilitates the transport of composition from the distal end to the proximal end of the bristles. This feature results in a brush that is easier to use, with reduce messiness. The brush of the present invention is also easier to clean, as only small amounts of composition are able to enter the distal end of the bristles, thus removing the
need to remove these materials. As the proximal end is less dense, cleaning on this end is further facilitated by this end of the bristles.

Further, in one embodiment, at least a portion of the flow path is formed by a discrete region of low bristle population. A region of low bristle population means that within said discrete region, the number of bristles per area is measurably lower than the bristles per area surrounding at the region as the brush extends from the base towards the skin contacting region which is the proximal end of the bristles. In one embodiment, the number of bristles per area is at least about 20% less, alternatively at least about 40% less, alternatively at least about 50% less, alternatively at least about 75% less than the number of bristles per area surrounding the region. Bristle population can be calculated on by square mm or square cm of area. In one embodiment, the region of low bristle density is free or essentially free of bristles. By “essentially free of bristles” it is meant that no bristles for formed in the region. It will be understood by those in the art that bristles are flexible and can bend into the region intended as the flow path. Allowing bristles to bend into the flow path is within the scope of the invention. In one embodiment, the flow path maintains a substantially consistent shape from the base to the skin contacting region.

In one embodiment, the flow path from the collapsible bag through the brush also comprises one or more fluid dispensing conduits which can extend for a portion of said flow path. In one embodiment the fluid dispensing conduit forms the portion of the flow path as it immediately exits the dispensing container and extends for some distance above the base but below the contacting region. Those of skill in the art will understand that the flow path can continue beyond the fluid dispensing conduit as the brush extends away from the base. Without intending to be bound by theory, it is believed by providing a flow path which is made of both a fluid dispensing conduit and a region of low bristle population, the brush head facilitates the transport of composition from the base to the skin contacting region. In one embodiment, the region of low bristle population is in fluid communication with said fluid dispensing conduit such that composition dispensed through said fluid dispensing conduit continues to travel the same general path away from the base. In one embodiment, the fluid dispensing conduit is made from an elastomeric material which is flexible, such as rubber.

In one embodiment, at least a portion of the fluid dispensing conduit can have an interior structure run for at least a portion of the length of the fluid dispensing conduit. Non-limiting examples of suitable interior structures includes one or more dividing wall, thereby creating two half circles within the tube, or three, or four passages within the fluid dispensing conduit. Without intending to be bound by theory, it is believed that providing said one or more dividing walls can help direct flow of the composition away from the base towards the exit orifice, ultimately towards the skin contact region of the brush head. In one embodiment, said one or more dividing walls can create a tube within a tube. This may be particularly useful if multiple types of compositions are used in the container.


b) Brush Base

The base of the current invention can be made of any material capable of functionally attaching bristles. In one embodiment, the base is made from a material selected from plastic, metal, composites, porcelain, glass, or combinations thereof. One of ordinary skill would be readily able to select a material suitable for making a base.

The base of the current invention is functionally attached to the distal end of the plurality of bristles. One of ordinary skill recognizes that there are many attachment mechanisms that may be employed to fix the plurality of bristles to the base. It is contemplated that the bristles are attached to the base by mechanical, chemical, and/or heat based mechanisms. One of ordinary skill would readily know how to attach the bristles of the present invention to the base.

In one embodiment, the base is functionally attached to a container. The container of the present invention relates to any vessel that can hold a composition for an indefinite period of time. The container of the present invention may be made by any number of materials, including plastics, metals, and the like. The container contains any composition that is to be applied with the brush. In one embodiment, the brush is removably attached to the container. In such an embodiment, the composition is directly applied to the skin and/or the brushed is placed in the composition within the container and applied to the surface.

An alternate embodiment of the base comprises a dispensing device. The dispensing device is fluidly attached to the base and capable of transmitting a composition outside of the container through the base between the plurality of bristles whereby the composition is capable of being applied to a surface. In one embodiment, the dispensing device is capable of dispensing the composition in a direction that is substantially parallel to the plurality of bristles. In an alternate embodiment, dispensing device is capable of dispensing the composition in a direction that is substantially non-parallel to the plurality of bristles. Moreover, the dispensing device is capable of dispensing the composition in a direction that is substantially perpendicular to the plurality of bristles. It is believed that when the composition is dispensed in a manner substantially perpendicular to the plurality of bristles, the delivery of the composition within the bristles of the brush becomes more uniform in addition to providing the composition additional air entrainment opportunities. Further, the transport of the composition through the plurality of bristles is aided by the bristle density driving the composition to the proximal end of the plurality of bristles as well as the hydrophobic nature of the bristles.

c) Brush Shape

The brush of the present invention has a shape that facilitates usage, particularly on the face. In one embodiment, the outer shape of the cross-section of the brush, as defined by determining the cross-section of the bristles parallel to the base of the brush, is oblong in shape. By being oblong in shape, the cross-section has a first dimension that is longer than a second dimension, e.g., an overall length longer than the width. Oblong shapes include oval, oblong circles, rectangles, ellipses, and the like. In another embodiment, the outer shape of the cross-section of the brush is a circle, square, or regular polygon. It is contemplated that the corners of any polygon could be rounded. Other shapes, such as a "D" shape are also contemplated.

In one embodiment the proximal end of the brush is substantially parallel to the base. In an alternate embodiment, the proximal end of the brush comprises its highest bristles substantially in the center. The bristles then decrease in height from the center toward the edges in a curvilinear, stepped,
angled, and/or arched manner. In one embodiment, the difference between the average height of the bristles in the center of the brush and the average height of the bristles on the edge of the brush is from about 0.1 inches to about 0.5 inches, in an alternate embodiment from about 0.1 inches to about 0.3 inches. It is believed that having bristles of decreasing height allows the user to vary the amount of bristles that contact the surface by varying the application force. Such a mechanism results in an increase in mechanical action, leading to increased friction generated by the brush.

[0051] It is also contemplated to have a substantially angled edge, such as a squared edge, on at least one portion of the brush. Such an edge is capable of providing increased control of the brush action by being shaped to enter into tighter portions of a surface.

[0052] d) Bristles

[0053] The current invention includes a plurality of bristles. These the distal end of the plurality of bristles is functionally attached to the base. In one embodiment, at least one of said plurality of bristles comprises a hydrophobic material. In another embodiment, at least one of said plurality of bristles comprises hydrophilic material. In yet another embodiment, the plurality of bristles comprises a material selected from the group consisting of a hydrophobic material, a hydrophilic material, and a mixture thereof. Particularly preferred materials would be those which are hydrophobic, especially when the composition is water based. Without wishing to be bound by theory, it is believed that the hydrophobic nature of the plurality of bristles, in combination with the plurality of bristles having a greater bristle density at the distal end than at the proximal end, work synergistically to transport composition toward the proximal end of the plurality of bristles and onto a surface. This composition transport results in an improved brush usage experience as well as a more efficient and clean brush operation.

[0054] In one embodiment, any hydrophilic material is selected to make the plurality of bristles. Hydrophilic plastics are well suited for the current invention. In one embodiment, nylon is a hydrophilic plastic utilized for the plurality of bristles. In one embodiment, the hydrophobic material used to make at least a portion of said at least one bristle is selected from the group consisting of nylon, a natural hair (including but not limited to badger hair), and polybutylene terephthalate. Other known brush bristle materials may also be used.

[0055] Regarding the use of bristles, material and physical properties of bristles can impact brush performance, including skin feel and latherability, for example. In one embodiment, the bristle diameters are from about 0.001 to about 0.01 inches, in an alternate embodiment from about 0.002 to about 0.006 inches, in alternate embodiment from about 0.003 to about 0.004 inches. The bristles of the present invention have an average length of from about 0.1 to about 1.3 inches, in an alternate embodiment from about 0.3 to about 1.0 inches, in an alternate embodiment from about 0.5 to about 0.9 inches. The sizing of the bristles should be such that the bristles should not fold over or collapse during use; while allowing the bristles to return to substantially their original shape.

[0056] In one embodiment, the brush comprises a recess at the skin contacting region of the brush similar to the cavity described in U.S. Patent No. 2005/0045200 to Zemunik. In one embodiment, the composition flow path extends from said base and discharges into said recess. The recess is a discrete region of the brush where the height of the underlying bristles is lower than the average length of the rest of the bristles forming the rest of the brush. As such, a recess in the brush is formed. Without intending to be bound by theory, it is believed that allowing composition to travel from the container through the base and ultimately into the recess allows the user to dispense a desired amount of composition without fear that the composition will spill over or fall off the tip of the brush. In one embodiment, the recess is formed by crimping a plurality of said bristles such that they do not extend as far from the base as the bristles surrounding the recess. In another embodiment, the recess is formed by a combination of crimped bristles or relatively shorter bristles.

[0057] In one embodiment, the fluid dispensing conduit comprises a dispensing orifice which opens into the portion of said recess facing said base. The dispensing orifice can be formed by part of the fluid dispensing conduit or formed from the region of low bristle population. In one embodiment, the recess has a depth of from about 0.010 inch to about 1 inch, alternatively from about 0.05 inches to about 0.5 inches, alternatively from about 0.2 inches to about 0.4 inches. Those of skill in the art will understand that the dimensions of the recess can be varied as long as the recess can act to receive a volume of composition prior to contact with skin. In one embodiment, the recess has a shape which is selected from the group consisting of a circle, ellipse, oval, triangle, square, rectangle, star, moon, a letter or number, and so forth. In one embodiment, the shape of the recess is generally the same as the shape of the brush.

[0058] In one embodiment, the brush head had a central axis, and a cross sectional plane which is perpendicular to said central axis, wherein the cross sectional plane defines a recess cross section area and a brush cross section area, wherein the recess cross section area is from about 10% to about 75% of said brush cross section area, alternatively from about 25% to about 50%, alternatively from about 30% to about 40%.

[0059] In one embodiment, the plurality of bristles forms said fluid flow path. In one embodiment the fluid flow path comprises a fluid dispensing conduit, a region which is free or essentially free of bristles, or a combination thereof.

[0060] Various treatments of the proximal end of the plurality of bristles are contemplated for use with this brush. In one embodiment, end rounding, tipping, tapering, and the like are used to provide a user acceptable feel to the plurality of bristles.

[0061] It is contemplated that bristles of various hues and/or colors can be utilized within brush. For example, colors may serve the function of showing where bristles of increasing and/or decreasing hardness are. Colors may also be used to indicate brand, brand name, style, and/or other aesthetic measures. Color may also be used to indicate the benefit of the associated composition, e.g., green bristles for indicating aloe, and the like.

[0062] e) Bristle Density

[0063] The brush of the present invention comprises a plurality of bristles, wherein the bristle density of the distal end is greater than the bristle density of the proximal end. The bristle density is determined by determining the sum of the cross-sectional area of the individual bristles and dividing it by the cross-section defined by the outermost bristles, which inherently includes void space between the bristles; then determining the percentage.

[0064] As an exemplary calculation, for a circular patch having a 0.2 inch radius containing 10,000 bristles, each
bristle having a diameter of 0.002 inches, the bristle density would be calculated as follows:

\[
\frac{0.002 \text{ inch diameter}^2}{0.001 \text{ inch radius}} = \pi \left(\frac{0.001}{2}\right)^2 = \pi \times 0.00000314 \text{ inches}^2
\]

(cross-sectional area of one bristle) \( \pi \times 0.00000314 \text{ inches}^2 \)

\[
\frac{10,000 \text{ bristles} \times (\text{total area of bristles})}{100} = 0.065 \text{ inches}^2
\]

In one embodiment, the bristle density is greater at the distal end than it is at the proximal end. In one embodiment, the bristle density at the distal end of the plurality of bristles is from greater than 30 to about 70%, in an alternate embodiment from about 40 to about 50%, in an alternate embodiment from about 40 to about 60%, in an alternate embodiment from about 45 to about 55%. In one embodiment, the bristle density at the proximal end of the plurality of bristles is from about 10% to about 30%, in an alternate embodiment from about 15% to about 25%, in an alternate embodiment from about 19% to about 26%.

One mechanism to create additional voids within the bristles is to splay or flair out the bristles. In one embodiment, splay is created by utilizing wavy or crimped bristles at least part of the plurality of bristles. Crimped bristles are bristles having a substantially periodic waveform with a crimp depth (peak to peak amplitude, from peak to trough) and crimp frequency. The crimped bristle comprises a crimp depth from about 0.005 inch to about 0.03 inches, alternatively from about 0.010 inch to about 0.020 inch. The crimped bristles comprise a crimp frequency of from about 2 to about 10 crimps per inch, alternatively from about 3 to about 7 crimps per inch.

Without wishing to be bound by theory it is believed that the larger space between crimped bristles allows each bristle to fluctuate further when the brush is being rubbed against the intended surface. This space allows the bristles to provide increased mechanical action and enhances the action of the composition. When used with a shaving composition, this mechanical action creates additional lather, lifts the hair on the surface for easier cutting, and aids exfoliation of the skin.

\[ f) \text{ Fluid Dispensing Conduit} \]

The device of the present invention comprises at least one fluid dispensing conduit. The dispensing nozzle is in fluid communication with said collapsible bag, extending through said base, allowing the composition to be dispensed out of the device. In one embodiment, a portion of the fluid dispensing conduit forms a tube which can be used to actuate and facilitate fluid pass through from the valve system into the fluid dispensing conduit.

In one embodiment, the fluid dispensing conduit is the dispensing conduits as generally described in U.S. Ser. No. 61/247,388, Applicant Docket No. 11461P, filed Sep. 30, 2009. In one embodiment, the fluid dispensing conduit is a dispensing conduit comprising a central longitudinal axis, a proximal end and a distal end, wherein the proximal end comprises an inlet that is in fluid communication with the body, wherein the distal end extends from the applicator base, wherein said distal end comprising at least one orifice, wherein said central longitudinal axis does not intersect said at least one orifice.

\[ g) \text{ Device Body} \]

Device body comprising: an outer container; an at least partially expanded collapsible bag disposed in the outer container, an elastic member surrounding at least a portion of the collapsible bag such that the elastic member is stretched axially and radially, the elastic member being constructed of an elastically extensible material that permits the transfer of infrared radiation through at least a portion of the elastic member; a fluid dispensing conduit in fluid communication with said collapsible bag, extending through said base. Additional suitable devices for dispensing a product having a brush are described in detail in U.S. Patent Pubs. 2009/0263175, 2009/0263174.

The device body may generally include a collapsible bag and a band surrounding at least a portion of the bag. In one exemplary embodiment, the bag has a length that is at least about 50% longer than the length of the band. In another exemplary embodiment, the band is constructed of material that permits the transfer of invisible light waves through a wall of the band—which enables invisible light to pass through the band when situated around a bag preform to heat the preform prior to blowing the same into a final bag configuration. In yet another exemplary embodiment, the bag comprises at least one section (such as a side wall) having a wall thickness less than about 4 mils, or less than about 2 mils, and even as low as about 1 mil. In a further embodiment, the bag is made from an injection molding grade polyester having an intrinsic viscosity value of from about 0.5 to about 1.0, or about 0.58. In one preferred embodiment, the band is adhered to the bag, e.g., by chemical means, or via mechanical means beyond mere friction. Nonlimiting examples of suitable ways to affix the band to the bag include using shrink sleeves or over-molding a retaining ring/band made out of composite materials to secure the elastically deformable band to the preform. The device may be adapted to dispense multiple products by way of a multi-chambered bag.

Unfilled and filled devices are also provided by the present invention. The package can include an outer container and a device in accordance with the present invention disposed therein. The outer container can employ various features. In one embodiment the outer container is selected from the group consisting of: a blow molded plastic container, an injection molded container, a glass container, a flexible packaging, a paper or cellulosic packaging; a rubber container, or a combination or mixture thereof. For example, the outer container may take on a variety of shapes and geometries that are not traditionally employed with aerosol products. The containers may have reduced diameter sections, have tapered sections, or be oval or square, for example. The outer containers may be transparent, translucent, or employ windows.
that permit a user to see how much product remains in the package (through changes to the appearance of the device) to understand when replacement products should be purchased. For embodiments where one can see at least a portion of the device, the device may employ colors and/or indicia to communicate aspects of the product contained therein. In some embodiments, the outer container may not completely enclose the device. That is, the outer container may form only parts of an outer covering for aesthetic and/or functional features, such as, for example, a base or legs for the device, or a handle for the device. The outer container may be rigid or may be flexible, or have portions having varying physical properties. The packages can be filled with numerous different flowable compositions; for example, personal care compositions, including, but not limited to shaving compositions, hair care compositions, antiperspirant/deodorant compositions, skin care formulations, and oral care compositions (including dentifrice and denture adhesives (see, e.g., U.S. Pat. Nos. 5,073,604 and 6,025,411). Other flowable products may also be dispensed from the inventions herein. By way of example only, fabric/air care compositions, pet care compositions, and food products may be dispensed from the systems of the present invention.

Additional details regarding the device body will be provided in the description of the figures.

2) Personal Care Composition

Personal care compositions for use herein are not particularly limited and include, for example, skin care compositions, antifungal compositions, and enzyme inhibiting compositions. Suitable personal care compositions may be in the form of, for example, lotions, creams, pastes, balms, ointments, pomades, gels, liquids, combinations of these and the like, and may also contain solids to further enhance the benefits for the consumer. The personal care compositions disclosed herein include at least one active ingredient. Examples of suitable active ingredients include cosmetic actives.

Exemplary product forms for the personal care composition include gels, post foaming gels, creams, foaming and non-foaming liquids, mechanically pumpable liquids, non-aerosol gels, aerosol gels, aerosol foams, pastes, serums, and sprays. Examples of suitable products to be contained in device include body wash, body lotion, facial cleanser, facial lotion, shampoo, conditioner, deodorant, shave gel or cream, self tanner, nail polish, nail polish remover, and other personal care products. In a preferred embodiment, the liquid personal care product is a shave prep composition, which can be an emulsions (creams/lotions) or gels, which most commonly consist of polymer thickened surfactant systems. Most non-aerosol shave aids fall within a pH range of 5-9, which allows for the use of any number of thickeners and by extension the development of clear, translucent or opaque products. See e.g. U.S. Patent Publ. No. 2007/0207106; U.S. Pat. Nos. 5,902,574 and 5,262,154.

Amine-based soaps are combined with volatile hydrocarbons to form a clear, stable emulsion when kept under pressure. Once dispensed and mechanically agitation, these gels transform into thick foams.

In another embodiment, the personal care composition is a post-foaming shave gel. See, e.g., U.S. Pat. Nos. 5,526,556 and 5,500,211. In one embodiment, the post-foaming shave gel includes one or more polymers added to increase lubrication, such as a glyceryl acrylate/ acrylic acid copolymer. See e.g., U.S. Patent Publ. No. 2007/0207106; U.S. Pat. Nos. 5,902,574 and 5,262,154. Further, in some cases a lubricious water soluble polymer such as polyethylene oxide or polyvinylpyrrolidone has been added. See, e.g., U.S. Pat. Nos. 5,560,859 and 5,858,343. In other cases, water insoluble particles have been added, including water insoluble polymer particles, such as polytetrafluoroethylene, polyethylene, or polyamide (nylon) particles, and water insoluble inorganic particles such as titanium dioxide or glass beads. See, e.g., U.S. Pat. Nos. 5,587,156 and 4,155,870. Various other shave gels have been disclosed. See, e.g., U.S. Patent Publ. No. 2006/0257349, 2006/0257350 and 2005/0175525 and U.S. Pat. Nos. 5,500,211 and 6,352,689. These and other known shaving preparations can be used with the device of the present invention.

Moving to the Figures,

FIG. 1A shows an exemplary embodiment of a container preform 10. The container preform 10 is shown as being inserted into a top portion of a mold 30 such as, for example, the type of mold used in a blow molding or injection molding process. The container preform 10 may include a polymeric preform 12 and an elastically deformable band 14, which at least partially surrounds a portion or even all of the polymeric preform 12. The elastic band 14 may be joined to the polymeric preform 12 by any means commonly known in the art, as long as it does not undesirably interfere with the ability of the polymeric preform and/or the elastic band 14 to expand and/or collapse. The polymeric preform 12 may be elastically or plasticly extensible and is configured to receive a flowable composition such as, for example, one or more of the personal care compositions disclosed herein. In certain embodiments, the polymeric preform 12 may be expanded to form a collapsible bag (e.g., by filling or partially filling the polymeric preform 12 with a gas and/or a personal care composition). The polymeric preform 12 and/or the band 14 may be expanded such that sufficient potential energy is stored in the stretched elastic band 14 and/or collapsible bag to expel at least some or substantially all of the skin composition stored in the collapsible bag in the manner intended. For example, the potential energy stored in the elastic band 14 may be sufficient to expel a liquid composition stored in the expanded polymeric preform a distance of between 30 centimeters ("cm") and 125 cm, for example, between 40 and 100 cm, between 50 and 80 cm, or even between 60 and 70 cm, when the composition has a viscosity of between 50 and 5000 cP when measured at 22°C with a DV-III+ Rheometer (available from Brookfield Inc.) using a RV/3a spindle rotating at 30 RPM.

The polymeric preform 12 may be made of a flexible, extensible, and, optionally, elastic material. Examples of materials suitable for forming the polymeric preform 12 include, without limitation, nylon; polypropylene; polyethylene; low density polyethylene; polybutylene; polyester (e.g., polyethylene terephthalate); high density polyethylene (HDPE); polyamide-based materials; acrylonitrile materials; and combinations of these. Particularly suitable examples are SARANEX brand plastic resin available from DOW Chemical Company, Midland Mich. and BAREX 218 brand thermoplastic acrylic resin available from BP Chemicals Corporation, Ohio. The polymeric preform 12 may be formed of two or more materials, for example, during a co-extrusion blow molding process. In certain embodiments, the material used to form the polymeric preform 12 is relatively inert, such
that there are substantially no undesirable tastes or smells imparted to the contents of the collapsible bag. Further, an inert polymeric preform 12 may inhibit or even prevent certain ingredients from undesirably migrating into the collapsible bag from the skin care composition and vice versa. For example, certain skin care compositions use preservatives to increase the effective life of the skin composition. If these preservatives were to migrate out of the skin care composition and into the material of the collapsible bag, the skin care composition might be undesirably affected (e.g., become rancid), such that it does not deliver its expected benefit to a user or exhibits undesirable characteristics (e.g., foul odor or change in appearance). The polymeric preform 12 may be flexible over substantially its entire surface in both the radial and axial dimensions, except that it may be decoratively provide some amount of stiffness in the neck region 13. In certain embodiments, it may even be desirable to provide a polymeric preform 12 that is stiff enough over its entire length to be self-supporting. The walls of the polymeric preform 12 may be of any suitable thickness, as desired. For example, the polymeric preform 12 may have an average wall thickness of from 1.5 mm to 9.5 mm; or even 3.2 mm before it is stretched and an average sidewall thickness of from 25.4 micrometers ("μm") to 50.8 μm when fully expanded (e.g., from 30.5 μm to 46 μm) over substantially its entire length except, optionally, at the neck region 13. The portion of the polymeric preform 12 that forms the neck region 13, which can be within 2.5 cm of the valve member 16 when the polymeric preform 12 is expanded, may be thicker. It is to be appreciated that minor variations in thickness at any given cross-section of the polymeric preform are contemplated herein, and are within the scope and spirit of the present disclosure.

When making the container preform 10, it may be desirable to heat the polymeric preform 12 prior to stretching and/or receiving the skin care composition. It is believed, without being limited by theory, that heating the polymeric preform 12 and/or elastomeric band 14 softens and/or increases the pliability of the preform 12 and/or band 14. In certain embodiments, all or at least a portion of the polymeric preform 12 may be heated to a temperature ranging from 0.5 to 15°C, or from 5 to 10°C above the glass transition temperature ("Tg"). In another embodiment, the elastomeric band 14 may also be heated to the same temperature. Heating may be done by transmitting IR or other electromagnetic radiation through the elastomeric band 14 to the polymeric preform 12. Pressure is applied to the interior of polymeric preform 12 to plastically or elastically expand the polymeric preform 12 into a collapsible bag and elastically expand the elastomeric band 14. This pressure can be provided by a pressurized gas (e.g., air or nitrogen), a driven rod or other physical member, insertion of a skin care composition, or a combination of these. In one embodiment, the applied pressure is from 150 kPa to 1000 kPa, or even 584 kPa. Without intending to be limited by theory, it is believed that an applied pressure of within ±200 kPa; ±180 kPa; or even ±160 kPa of 584 kPa may be particularly suitable for expanding the polymeric preform 12 quickly and uniformly, without undesirably damaging the polymeric preform 12 or elastomeric band 14. The volume of the polymeric preform 12, when expanded is not particularly limited and may be, for example, between 100 ml and 1 liter (e.g., 200 ml, 500 ml, 750 ml). The elastic band is capable of stretching axially and/or radially at least 50% up to more than 750% of its initial unstretched length and/or width. FIGS. 12 and 13 illustrate, by way of example, the difference in size of the elastic band 614 and the polymeric preform 612/collapsible bag 610 in an unstrained state (i.e., FIG. 12) as compared to a stretched state (i.e., FIG. 13). Similarly, during use, the elastic band 614 may shrink or contract in an axial and/or radial direction from 50 to 95% from an initial dispensing at first use to a final, complete dispensing when the product is operatively exhausted. Because of the potential for significant axial expansion and contraction of the elastic band 614, the length of the polymeric preform 612 can be significantly greater than the length of the elastic band 614 in its unstrained/unstretched state. For example, the polymeric preform 612 can be at least about 100%, 150%, 200%, or 300% of the length of the associated and unstretched elastic band 614.

Exemplary methods for providing substantial axial expansion of the elastic band 614 are disclosed in co-pending U.S. Patent Publ. No. 2010/0133295.

The potential energy created due to the expansion of the elastic band 14 is generally sufficient to collapse the collapsible bag 18 once the internal pressure of the blow molding process is removed. After the polymeric preform 12 is expanded into a collapsible bag 18 and subsequently collapsed, it may be charged with a flowable personal care composition. During this filling process, the collapsed bag expands both radially and axially, which causes the elastic band 14 to expand, and potential energy is once again created due to the expansion of the elastic band 14. A normally-closed valve member 16 may be joined with the filled bag to provide an openable/closable pathway for the skin care composition to flow through, but to prevent the potential energy stored in the elastic band 14 from undesirably acting on the filled collapsible bag 18 and urging the skin care composition out of the collapsible bag 18.

The elastically deformable band 14 may be formed from an elastically extensible material (e.g., natural rubber, synthetic rubber, and/or a thermoplastic elastomer). Suitable natural rubbers include those which have a tensile strength of at least 24.1 megapascals ("MPa"). Additionally, the natural rubber may have a hardness (Shore A) of between 30 and 40, and a 100% Modulus of up to 862 kilopascals ("kPa"). Suitable methods for determining the properties of a rubber material such as those disclosed herein are disclosed in ASTM No. D 412-06a, titled "Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers." The elastically deformable band 14 may be formed, for example, from a natural rubber made from a rubber plant (e.g., Guayule shrub or Hevea tree) or a natural rubber modified with latex additives. The elastic band 14 may be formed as a unitary sleeve (e.g., as shown in FIGS. 1A-1C) or formed as one or more discrete bands of elastic material joined to the polymeric preform 12. The elastic band 14 may be configured to provide a uniform or non-uniform pressure to different portions of the collapsible bag 18. For example, several discrete elastic bands of varying thickness may be positioned at different locations on the collapsible bag 18. The thicker band(s) may provide more pressure to the portion of the collapsible bag 18 to which (they) are joined relative to the thinner band(s). The pressure generated by the elastic bands may depend upon, among other things, their thickness, the modulus of the material from which they are formed or a combination thereof.

The elastically deformable band 14 may be free or substantially free of carbon black or any other ingredients which would unduly obstruct or interfere with the transmittance of a particular wavelength or wavelengths of electromagnetic radiation. For example, it may be desirable to con-
figure the elastic band 14 such that IR radiation is able to pass through all or at least a portion of the elastic band 14. IR transparency provides the unique benefit of allowing the simultaneous heating of the elastic member 14 and the polymeric preform 12, which may reduce manufacturing complexity and/or cost relative to known containers and methods of making such containers. In certain embodiments, the elastic band 14 may be configured to pass different wavelengths, intensities, and/or combinations of electromagnetic radiation (e.g., UV, visible light, microwave, radio frequency, and x-ray radiation).

[0086] FIG. 1B shows an exemplary embodiment of a partially expanded container preform 10. The polymeric preform 12 and elastic band 14 are shown expanding both axially and radially. In certain embodiments, the polymeric preform 12 is expanded plastically and the elastic band 14 is expanded or stretched elastically. The potential energy generated as a result of stretching the elastic band may be sufficient to generate 1000 kPa or less of hydrostatic pressure, for example, less than 340 kPa, 310 kPa, or even less than 240 kPa, but more than 100 kPa on the collapsible bag 18 and/or contents thereof. The pressure generated by the elastic band may depend upon, among other things, the thickness of the elastic band, the modulus of the material from which the elastic band is formed, or a combination thereof. That is, the thicker the elastic band, the more potential energy it is capable of generating when stretched. A substantially uniform elastic band 14 suitable for use herein, when relaxed, may have an average wall thickness of between 1 and 10 mm. The same elastic band 14, when stretched to accommodate an expanded collapsible bag 18 as intended (e.g., as shown in FIG. 1C), may have an average wall thickness of from 100 μm to 400 μm, or from 180 μm to 240 μm, or even from 200 μm to 220 μm.

[0087] FIG. 1C shows an example of a fully expanded polymeric preform 12. The polymeric preform 12 and elastic band 14 extend all the way to the walls of the mold 30 to define a collapsible bag 18 and/or a container. If the internal pressure is released from the collapsible bag 18, the potential energy associated with the elastic band 14 will act on the collapsible bag 18 to at least partially collapse it in both the axial direction and radial directions.

[0088] Prior art containers may utilize a variety of different valve assemblies to provide an openable and/or closable flow path to dispense flowable contents stored in the container. Some of these valves utilize a complex arrangement of parts (e.g., ferrules, coil springs, valve seating members, snap rings) that can add difficulty and expense to a manufacturing process. In contrast, the container disclosed herein may include a relatively simple valve member 16. FIG. 2 shows an exemplary valve member 16 suitable for use herein. The valve member 16 may include an elastically deformable body 40 in cooperation with a rigid insert 19. The elastically deformable body 40 may be made from any suitable elastomeric material commonly known in the art. In certain embodiments, an inner wall of the polymeric preform 14 or the neck region 13 may be used to functionally replace the insert 19. The insert 19 (or alternatively a neck region 13 of the polymeric preform 12) may be configured to function as a sleeve to seal the valve in its normally closed position. The valve body 40 may include an open end 42, an opposing closed end 43, and a flange 44 disposed proximate to the open end 42. In certain embodiments, a blind hole 45 (i.e., a hole that does not extend completely through the valve member 16) extends from the open end 42 and terminates at a blind hole bottom 46. As shown in FIG. 2, the blind hole 45 defines the inner surface of the valve body side wall 47. A through-hole 48 may extend from the inner surface to the outer surface of the side wall 47 (i.e., extends completely through the side wall 47) and is positioned between the open end 42 and the bottom 46 of the blind hole 45. In certain embodiments, the valve 16 may include no blind holes 45 and two or more through-holes 48 arranged to provide a flow path. The body 40 and/or through-hole(s) 48 may be arranged to form a seal with the wall of the insert 19. The insert 19 may be made from a rigid material such as, for example, plastic, metal, hard elastomers, glass, and cardboards or other cellulosic based materials to provide a desirable sealing surface. The valve member 16 may be actuated by a user, for example, by applying a sufficient amount of axial stress to elastic body 40 so that the body 40 becomes elongated and its diameter is reduced. A fluid flow channel may then be formed between the exterior surface of body 40 and the insert 19 as the body 40 is elongated and reduced in diameter. The fluid flow channel, once created, permits the passage of fluid from the interior of the collapsible bag to the external environment by way of through-hole 48, blind hole 45, and open end 42. Other examples of suitable valve members for use herein are disclosed in co-pending U.S. Patent No. 2010/0133211.

[0089] In one embodiment, the plug has one or more the radial and/or diametric orifices as disclosed in U.S. Pat. No. 13,085,677 (Applicant Docket No. Z-8456), to Chan et al., filed Apr. 13, 2011. In such an embodiment, the device comprises a valve system comprising a plug selectively blocking and admitting fluid flow from a high pressure side of said plug to a low pressure side of said plug when inserted into a plug receiving member, said plug comprising: a generally elongate elastically deformable plug body having a longitudinal axis, a first end, a second end longitudinally opposed thereto, and a peripheral outer sidewall, said outer sidewall sealingly engaging an inner wall of a plug receiving member when said plug is inserted therein; a blind hole disposed in said first end and extending in the longitudinal direction to a blind end, said hole defining an inner sidewall in said elongate body; and a flange juxtaposed with said first end and extending radially outward of said outer wall, said flange having an inner flange wall and an outer flange wall; wherein said plug forms at least one orifice extending from at least a portion of said inner sidewall to at least one of said outer sidewall, said outer flange wall, or a combination thereof, preferably at least partially formed in said plug body, whereby said plug is longitudinally elongateable in response to longitudinal force applied to said blind end of said blind hole; said plug radially contracting in response to said longitudinal elongation, said radial contraction creating a fluid flowpath from said second end to said first end. In one embodiment, said at least one orifice is formed by said generally elongate elastically deformable plug body such that said orifice extends between said inner sidewall and said outer sidewall. In another embodiment, said at least one orifice is at least one radial orifice. For purposes of clarification, a radial orifice can be similar to the through hole 48, shown in FIG. 2. In another embodiment, said at least one orifice comprises more than one orifice, which can be two diametrically opposed radial orifices. In one embodiment, said two diametrically opposed radial orifices are longitudinally coincident forming a diametric orifice. In another embodiment, said plurality of orifices are equally circumferentially spaced apart. In yet another embodiment, said more than one orifice are not in the same
longitudinal position. These and other similar plugs are described in U.S. Pat. No. 13,085,677 (Applicant Docket No. Z-8455P), to Chan et al. filed Apr. 26, 2010. In such an embodiment, the device comprises a valve system comprising a plug selectively blocking and admitting fluid flow from a high pressure side of said plug to a low pressure side of said plug when inserted into a plug receiving member, said plug comprising: a generally elongate elastically deformable plug body having a longitudinal axis, a first end, a second end longitudinally opposed thereto, and a peripheral outer sidewall, said outer sidewall sealingly engaging an inner wall of a plug receiving member when said plug is inserted therein; a blind hole disposed in said first end and extending in the longitudinal direction to a blind end, said hole defining an inner sidewall in said elongate body; and a flange juxtaposed with said first end and extending radially outward of said outer wall, said flange having an inner flange wall and an outer flange wall; wherein said plug forms at least one orifice extending from at least one of said outer sidewall, said inner flange wall, or a combination thereof, to at least one of said inner sidewall, said outer flange wall, or a combination thereof, preferably at least partially formed in said flange, whereby said plug is longitudinally elastically elongatable in response to longitudinal force applied to said blind end of said blind hole; said plug radially contracting in response to said longitudinal elongation, said radial contraction creating a fluid flowpath from said second end to said first end. For purposes of clarification the flange is shown in FIG. 2 as element 44 and in FIG. 6 as element 224. From FIG. 2, the outer side wall would be the portion of the sidewall 47 which is in contact with insert 19. The inner side wall would be the portion of the plug forming the blind hole 45. The portion of the flange 44 which is in contact with the insert 19 would be the inner flange wall. The outer flange wall would be the portion of the flange facing the open end, away from the body of the plug. In one embodiment, said at least one orifice is a flange orifice extending from said inner flange wall. In another embodiment, said flange orifice extends to the outer flange wall. These and other forms of flange orifices are described in greater detail in U.S. Ser. No. 61/327,981 (Applicant docket no. Z-8455P) to Chan et al., filed Apr. 26, 2010.

In yet another embodiment, the plug can include one or more radial and/or diametric orifices AND one or more flange orifices. In one preferred embodiment, the plug comprises at least one diametric orifice.

FIG. 3 shows another exemplary embodiment of a container preform 100. The container preform 100 includes a polymeric preform 112, an elastically deformable band 114, a valve member 116, and an optional adapter/insert 119 disposed between valve member 116 and a neck region 113 of polymeric preform 112. FIG. 4 shows an axial cross-section view of the container preform 10 of FIG. 3.

FIGS. 5 and 6 show an exemplary embodiment of a polymeric preform 212. The polymeric preform 212 includes an open end 220 (although the actual opening is not shown) and an opposing closed end 222. The polymeric preform 212 may include a flange 224 proximate to the open end 220 to help hold the polymeric preform 212 in a particular position in a blow mold. The flange 224 may also be used for joining the expanded polymeric preform 212 to an outer container and/or a portion of a valve or actuator assembly. Additional flanges 225 and 226 and grooves 227 and 228 may be included to help position and retain the elastic band 214 in a variety of configurations, as desired. For example, the elastic band 214 may be joined to the polymeric preform 212 at one or more points proximate to the open end 220 and/or closed end 222. In certain embodiments, an adhesive may be placed in the grooves 227 and/or 228 to affix the elastic band 214 to the polymeric preform 212. The grooves 227 and 228 may be configured for receiving adhesive, but it should be appreciated that the adhesive could also be deposited on the exterior of the polymeric preform 212 in the absence of any specific receiving feature such as the optional grooves 227 and 228. Nonlimiting examples of adhesives suitable for use herein include epoxies, urethanes, acrylates, and/or other adhesives capable of suitably bonding an elastically deformable material with a plastic material. The adhesive may be air-cured, light-cured, and/or cured via chemical cross-linking. Particularly suitable examples of adhesives for use herein are LOC-TITE 4306 and 4307 brand light-cured adhesives and LOC-TITE 406, 4501, and 495 brand adhesives, all available from Henkel, located in Germany. In certain embodiments, the elastic band 214 is not affixed to the polymeric preform 212 at points which are positioned away from the ends 220 and 222 of the polymeric preform 212 (i.e., points that are spaced significantly from the open end 220 and the closed end 222) so that the polymeric preform 212 walls may expand to the blow mold boundary as effectively and efficiently possible without being constrained by the elastic band 214. Mechanical means may also be employed to join the elastic band 214 to the polymeric preform 212. Alternatively or additionally, the elastic band 214 may be configured such that it is unnecessary to affix the distal portion of the band to the polymeric preform 212.

FIG. 7 shows an exemplary embodiment wherein the elastic band 314 has a distal end 315 that is closed over the closed end 322 of the polymeric preform 312. When the polymeric preform 312 expands axially, for example, during blow molding, the elastic band 314 can correspondingly stretch in the axial direction. The closed distal end 315 may be formed by adhesively adhering inner wall portions of the elastic band 314 to one another. Alternatively or additionally, a restraining member (e.g., a clamp) may be placed around the exterior of the distal end 315 to hold it closed. Although the distal end 315 is shown completely closed, it may also be partially closed or be manufactured to have a smaller opening than its opposing side so that the polymeric preform 312, and any collapsible bag that may be blow molded from the polymeric preform 312, do not push through the distal end 315 of the elastic band 314.

An exemplary personal care product 400 comprising a brush head 900 is shown in FIG. 8. FIG. 9 shows an axial cross-section view of the personal care product 400 of FIG. 8. The personal care product 400 includes a shaped container 412 and an overcap 414. The overcap 414 shown in FIG. 8 is transparent, but it is to be appreciated that the overcap 414 may be translucent or even opaque. A device 416 is disposed within container 412, which includes a collapsible bag 418 formed from a polymeric preform such as one of the polymeric preforms disclosed herein. The collapsible bag 418 is filled with a flowable personal care composition 419. The actuator 422 in this example can be the brush head 900 that can be depressed during application onto skin, or depressed prior to contact with skin. In another embodiment, it may be
desirable for the brush head 900 to be stationary (not be depressible). In such an embodiment, a button can be used as the actuator so actuation can occur separately from any movement of the brush head. In one embodiment, the actuator can be the tube 426 and/or fluid dispensing conduit 926, wherein a downward pressure on the brush triggers the fluid dispensing conduit to press into the valve. As shown here, the tube 426 and the fluid dispensing conduit 926 can be formed from the same tube structure, where the tube resides below the brush head and the fluid dispensing conduit extends into the brush head. Those of skill in the art will understand that movement of the tube 426 would result in movement of the fluid dispensing conduit in such an embodiment. In an embodiment where the brush is not depressible, a button or other lever can be used to cause the tube 426 to be depressed. Fig. 14 is an example of a personal care product which can include the elastically extensible, tube in sleeve type of dispenser described herein. As shown in Fig. 14, a button can be placed on the dispenser head so the entire structure including the brush head, fluid dispensing conduit, and tube can be depressed during actuation.

The valve, being elastically deformable in the longitudinal position would then stretch and contract radially. The tube can form part of the fluid dispensing conduit, or the tube can be a separate structure which is in fluid communication with the fluid dispensing conduit. The tube 426 may be connected to an elastically deformable valve member 428. Downward displacement of tube 426 positions valve member 428 such that a volume of the personal care composition 419 is capable of passing into the through-hole 429, which may be aligned with a second through-hole and/or an open-ended slot (e.g., Fig. 10A shows a second through-hole 66 on tube 426 and Fig. 10B shows an open-ended slot 466 on tube 426) on tube 426, such that the personal care composition 419 is capable of flowing through the length of the tube 426 and exiting the package 410. In certain embodiments, the tube 426 may rotate within the valve member 428 such that in one position a first through-hole 66 is aligned with a second through-hole 429 and in another position it is not. This feature may provide a desirable locking aspect to prevent or limit the discharge of composition 419 if the actuator is inadvertently hit or pressed.

In certain embodiments, it may be desirable to dispense the personal care composition in a particular pattern (e.g., cone-shaped, planar, single-stream, multi-stream, or amorphous); droplet size; at a particular pressure; and/or range (i.e., effective distance that the dispensed composition can travel). For example, the container may include a fluid dispensing conduit with an opening configured to dispense a personal care composition in a cone-shaped pattern that has an effective area of coverage of between 2.54 cm² and 15.24 cm²; between 5.08 cm² and 10.16 cm²; or even between 7 cm² and 9 cm² when the nozzle is held at a distance of between 15.24 cm and 30.48 cm away from the skin. In certain embodiments, the person care composition may be dispensed in a spray pattern that has an effective area of coverage of between 1 cm² and 225 cm². Further, in certain embodiments, it may be important to size the dispenser opening such that the particles in the particular containing personal care compositions do not agglomerate at the opening and clog the dispenser. The personal care product disclosed herein, when used as intended, enables a user to apply a substantially uniform film of personal care composition to the skin of a recipient without the need for further manipulation of the composition by the user or recipient (e.g., no need to further spread or rub the composition). In addition to configuring the personal care composition to have a suitable viscosity and surface tension, it is important to provide a nozzle that has an opening(s) that is/are configured to apply the composition to a surface in the form of a suitable film. For example, the nozzle opening may be configured to provide a particular pressure drop (i.e., the difference between the pressure exerted on the composition in the container and the pressure at which it is applied to a surface) and/or shear rate. By selectively configuring the opening, the shear rate, for example, can be controlled to minimize the undesirable effect(s) of shear thickening or shear thinning on the composition.

Fig. 11 shows an exemplary embodiment of an outer container 500 suitable for use herein. The outer container 500 may include an opening 500 at the top of the container for inserting a polymeric preform, collapsible bag, and/or valve member. The outer container 500 may be made of any suitable material known in the art. In certain embodiments, the outer container 500 may be formed from the same material as the polymeric preform. Examples of methods for making personal care products are disclosed in the copending U.S. application titled "METHOD FOR MAKING A PERSONAL CARE PRODUCT," identified as U.S. Ser. No. 12/767,283, (Applicant Docket No. 11694) and filed on Apr. 26, 2010 by Klofn, et al.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm."

All documents cited in the Detailed Description of the Invention are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention. To the extent that any meaning or definition of a term in this document conflicts with any meaning or definition of the same term in a document incorporated by reference, the meaning or definition assigned to that term in this document shall govern.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed is:

1. A device for dispensing a personal care product onto skin comprising:
   (a) a brush head comprising a base, and
   (b) a device body operatively connected to said brush head about said base, said device body comprising:
      (i) an outer container;
      (ii) an at least partially expanded collapsible bag disposed in the outer container, an elastic member surrounding at least a portion of the collapsible bag such that the elastic member is stretched axially and radially, the elastic member being constructed of an elastically extensible material that permits the transfer of infrared radiation through at least a portion of the elastic member,
(c) at least one fluid dispensing conduit in fluid communication with said collapsible bag, extending through said base.

2. The device of claim 1, wherein said brush head further comprises: a plurality of bristles, said plurality of bristles having a distal end and a proximal end, wherein said distal end is attached to the base and said proximal end forms a skin contacting region.

3. The device of claim 2, wherein said plurality of bristles forms at least one flow path from said distal end towards said proximal end.

4. The device of claim 3, wherein said fluid dispensing conduit extends at least partway into said at least one flow path formed in said plurality of bristles.

5. The device of claim 1, further comprising a personal care composition contained within said collapsible bag.

6. The device of claim 5, wherein said personal care composition comprises at least one of a shaving preparation, a skin care composition, an antifungal composition, an antimicrobial composition, a wound healing composition, and an enzyme inhibiting composition.

7. The device of claim 6, wherein the personal care composition has a product form selected from the group consisting of gels, post foaming gels, creams, foaming and non-foaming liquids, mechanically pumpable liquids, non-aerosol gels, aerosol gels, aerosol foams, pastes, serums, and sprays.

8. The device of claim 6, wherein said shaving preparation comprises a post foaming gel.

9. The device of claim 1, wherein the collapsible bag comprises at least one section having a wall thickness of less than about 100 micrometers.

10. The device of claim 1, wherein the collapsible bag has an open end and a closed end opposite said open end, and the elastically extensible band comprises a first end proximate the bag open end and a second end that is joined to the bag proximate the bag closed end.

11. The device of claim 1, wherein the elastic member is joined to the collapsible bag by at least one of an adhesive, a mechanical fastener, or a combination thereof.

12. The device of claim 1, wherein the elastic member exerts a hydrostatic pressure of between 135 and 480 kilopascals on the collapsible bag.

13. The device of claim 1, wherein at least 95% of the personal care composition disposed in the collapsible bag is dispensed when the product is operatively exhausted.

14. The device of claim 1, wherein the elastic member has a stretched length and an unstretched length, and the stretched length is at least 50% greater than the unstretched length.

15. The device of claim 1, wherein the collapsible bag includes a bag open end and a bag closed end, the article further comprising a valve member disposed in the bag open end, the valve member including a flow path for the flowable composition to flow out of the collapsible bag.

16. The device of claim 15, wherein the valve member includes a rigid insert and a flexible body member operatively configured to provide an openable/closable flowpath through the valve member.

17. The device of claim 16, wherein the valve member includes a blind hole and at least one through hole passing through the side wall.

18. The device of claim 17, wherein the valve member forms two through holes diametrically opposed to one another forming a diametric orifice.

19. The device of claim 1, further comprising a depressible button.

20. A device for dispensing a personal care product onto skin comprising:
   (a) a brush head comprising a base, and
   (b) a device body operatively connected to said brush head about said base, said device body comprising:
      (i) an outer container;
      (ii) an at least partially expanded collapsible bag disposed in the outer container; an elastic member surrounding at least a portion of the collapsible bag such that the elastic member is stretched axially and radially, the elastic member being constructed of rubber;
      (c) at least one fluid dispensing conduit in fluid communication with said collapsible bag, extending through said base,
      (d) wherein the collapsible bag has an open end and a closed end opposite said open end, and the elastically extensible band comprises a first end proximate the bag open end and a second end that is joined to the bag proximate the bag closed end
      (e) wherein the personal care composition is a shave preparation in the form of a non-aerosol gel.

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