DEVICES AND METHODS FOR PACKAGING AND DISPENSING UNIT DOSES OF PERSONAL CARE PRODUCTS

Fig - 1
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DEVICES AND METHODS FOR PACKAGING AND DISPENSING UNIT DOSES OF PERSONAL CARE PRODUCTS

Cross-Reference to Related Applications

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Background of the Invention

[0003] In the personal care product industries, and especially the cosmetics, cosmeceuticals and fragrance industries, there is a recognized need for "unit of use" product packaging and dispensing suitable for mass distribution and/or in-store testing. Unit of use or unit dose packaging provides numerous benefits for manufacturers and marketers of such products including: improved shelf life, product quality, convenience, ease of use and product sampling. Companies attempt to grow their customer bases by distributing free samples of small quantities of their products, often via direct mail or as inserts in magazines, with the hope that the recipient consumer will use and enjoy the products, and eventually become a customer. The types of products distributed through these samples typically include cosmetic products, fragrances, essential oils, lotions, serums, creams, gels, powders, and other products that may be used, in many cases, on the skin or hair. Unit dose containers can also be used to simplify packaging and mixing of two or more dissimilar products such as a liquid and a powder by the consumer just prior to use. Unit dose packaging can further be used to distribute hygienic or cleaning products, such as toothpaste or liquid soaps. The unit dose container is designed to contain enough product for a single use or, in some cases, multiple uses of the product to preserve the quality of a commercial product until ready to use or so that the consumer can test the product a limited number of times before deciding whether to buy the product if he or she wishes to continue using it.

[0004] Current methods of packaging liquids and powders for samplers to be mailed or otherwise distributed to consumers often involve sealing the product in between two ply layers. The sealed, compressed package can then be inserted into mailings or magazines, or distributed by hand or from a display in public locations. There are notable disadvantages to this method, however. When a consumer expels the contents of the sealed sample, there is
often a substantial amount of product left on the internal walls of the two ply layers. This results in a waste of product and money for the company, and even more so if the company compensates for the inaccessible product by packaging more than the amount of product necessary for a single use. Another important disadvantage is that these sealed samplers often cannot be applied in the same way that the commercial products are applied, especially in the case of fragrances or other products that are delivered through sprays, mists, or drops. For example, the distribution of perfume through a sealed liquid sample does not allow the consumer to test the product in the mist or spray form in which the product would be used if purchased. The use of the product in unintended forms, such as dabbing a concentrated amount of a fragrance on the skin, prevents the potential customer from experiencing the product in the manner that he or she would if they were to buy a full-sized container.

The alternative to sealed samplers is to provide consumers with larger quantities of perfume or other products in small sample bottles or pouches, requiring the company to provide substantially more product than is necessary for a single use. Indeed, another current method for packaging and distributing samples of fragrances is to distribute small glass vials containing a small quantity of the fragrance. The applicators that are included and used with these samples are typically one of three types: a dipstick, a rollerball, or a sprayer. This type of sample has many of the same disadvantages as the sealed samplers, however. Companies must provide much more product than is necessary for a single spray or use. Moreover, with the exception of sprayed samples, the vial applicators do not provide the same experience and application as would the commercial products. Another disadvantage which is unique to the vials is that they have the potential to break or leak, causing waste of product, negative experiences for the consumers, and even potential liability for the company.

In addition to the problems with distributed samples, problems of wastefulness occur when samples and testers are used in stores or other public locations. Stores that sell cosmetics and other personal care type products typically use in-store testers so that consumers can sample products in order to decide whether to buy them. These testers are often commercial sized bottles of the products, labeled as "testers," that are left on display for the customers to try. This method of providing samples to customers creates a great deal of waste. Customers will often use a substantially greater amount of the product than is necessary for a single use, and unsupervised children are likely to expel large volumes of
product. The financial consequences of this waste are especially damaging when the product is a more expensive commodity, such as a fragrance.

Unit dose containers offer additional advantages for use in commercial product applications. They are typically small and compact making them easy and convenient to carry for the consumer. Unit of use packaging for commercial products ensures that the remaining supply of product is not exposed to environmental conditions such as oxygen, light, or water vapor for example, that would contaminate or degrade the quality of the product over time after the consumer begins use of the product.

There is a need, therefore, for more effective and less wasteful means for storing and dispensing measured amounts of product samples in a liquid, powder, gel, crème, foam, stream, spray, mist, or droplet form, to be provided as samples or convenient single use commercial products.

Brief Summary of Invention

The present disclosure is directed to dispensing devices and methods for dispensing precise, unit amounts of personal care products, including cosmetics, cosmeceuticals, nutriceuticals, nutricosmetics, hygienic products, powders, liquids, fragrances, lotions, creams, gels, and serums. As used herein, a "personal care product" is any liquid, powder, high viscosity liquid or combinations thereof that is used for cosmetic purposes, personal care, general health or well-being or for personal hygiene, including but not limited to fragrances, essential oils, dermal treatments, skin coloring or masking, liquid soaps, makeup, toothpaste, breath freshener, hair serum, shaving cream, lotion, or hair gel, herbal preparations, electrolytes, vitamins, minerals, stimulants and other products generally applied to the body, in the mouth, to the skin, hair nails or taken orally. The personal care product is packaged in a unit dose container comprised of one or two or more interconnected chambers. One such chamber also contains an nozzle/piercer device comprised of a molded polymer material and having internal channels capable of dispensing the personal care product in a controlled manner. One or more unit dose containers are loaded into a dispenser device or cartridge at the time of manufacture or by the consumer.

The disclosed delivery devices and containers will find particular use in the fields of personal care products, including but not limited to perfumes, fragrances or essential oils, which can be distributed in single use, single dose dispensers or containers. Such products
offer advantages over conventional samplers and testers as described elsewhere herein, and also provide convenient methods of delivery of personal care products that can be easily carried in a purse or pocketbook for "freshening" one's fragrance or environment when needed. The devices are also useful as "travel size" containers for both men and women, both of whom can easily carry a number of single doses in their luggage or shaving kit, and can be configured to resemble conventional bottle top spray devices. The devices also offer the advantage of allowing a user to mix fragrances or have a larger variety available at any one time, rather than having to buy or carry multiple conventional sized bottles of expensive fragrance, hair or skin care or coloring products and the like.

Dispenser devices may hold one or more such blisters or cartridges containing one or more blisters. In certain embodiments the dispenser device utilizes a mechanical mechanism such as a lever, hinge, cam or inclined plane mechanism actuated by the user to forcefully crush the blister in a controlled manner to expel the personal care product in a stream, drops, spray or mist in a desired volume and dispense characteristics through the internal nozzle/piercer. As used herein an internally pierced blister refers to a crushable container in which a formed piercer/nozzle object is wholly contained in the crushable container so that when the container is crushed, the piercer/nozzle penetrates one surface of the container and provides a channel for delivery of the contents of the container through the internal channels and nozzle of the piercing device. As used herein, blister unit dose container or internally pierced blister, unit dose container, or dosage form refers to an internally pierced blister containing a precise amount, generally an amount equal to a single use, of a personal care product. Several embodiments of internally pierced blisters and blister unit doses are described in pending application U.S. Serial No. 13/233,661, which is incorporated by reference herein. The disclosed dispensing devices may be used with any of the unit dose containers described in the aforementioned application.

In certain embodiments, the disclosure can be described as directed to a unit dose containing blister containing two or more separate chambers that are interconnected by a sealed channel. Each chamber can contain a personal care product in the form of powders, liquids, fragrances, lotions, creams, gels or serums or combinations of any thereof. Applying external pressure to one of chambers opens the sealed channel connecting the chambers enabling the user to mix the contents for the purpose of combining two or more personal care
products into a single use application inside the unit dose blister. The mixed product is then dispensed through the piercer/nozzle by crushing the remaining chamber.

[00013] The present disclosure can therefore be described in certain embodiments as a delivery system for dispensing a measured amount of any cosmetic, cosmeceutical, nutriceutical, nutricosmetic, fragrance, essential oil, serum, paste, gel, lotion, cream, liquid, powder, or other personal care product. The system includes the use of any of the disclosed unit doses with a delivery device, or "dispensing device," that is used to expel the product from the unit dose. The unit doses can be manufactured as either single dosages or multiple dosages on a single strip, in a cartridge or a disk to be dispensed sequentially. When a force is exerted on the dispensing device, the dispensing device crushes the unit dose container and expels the contents of the blister through the internal channels and out the discharge nozzle of the nozzle/piercing device in the same manner that the delivery devices deliver personal care product compositions in the embodiments of U.S. Serial No. 13/233,661, incorporated herein by reference. In certain embodiments, the dispensers may be configured to administer only single use units or multiple units. In certain embodiments, the dispensers may be manufactured to be disposable after a single use or a certain number of uses. In other embodiments, the dispensers may be designed to be reloadable with unused dosages. In certain embodiments the dispensers are manufactured from recyclable or recycled material. In certain embodiments, the dispensers are comprised of plastics, polymers, or cellulose materials, and are produced via injection molding, thermoforming, casting, printing or stamping.

[00014] In exemplary embodiments, the dispensing device of the delivery system comprises two elongated arms which are connected at one end by a hinge. The hinge can be a separate piece connected to the two arms, or it can be a "living hinge" in which the arms and hinge are formed of a single piece of material. In such embodiments, a blister is held between the arms disposed such that the nozzle is adjacent to a dispensing opening in one of the arms. In certain embodiments, an elastic or paper band can be wrapped lengthwise around the two arms to hold the arms together against the blister during storage. In use, a user can simply hold the ends of the device between a thumb and finger and press the ends together to dispense the product. In certain embodiments, the elastic band can be removed after use and the device loaded with another blister, or the device can be a single use device. In other
embodiments, the pressure may be exerted on the blister by some mechanical device, such as a ram or a plunger driven by a cam, inclined plane or lever mechanism, which creates a mechanical advantage for the device. For example, the lever arm may be configured with a living hinge in the midpoint with one end stationary and the other end adjacent the blister. Pressure on the midpoint or hinge forces the movable end of the lever against the blister to crush it and dispense the product. Alternatively, the blister may be disposed at one end of the device with the nozzle adjacent an outlet opening in the device. Upon activation by pressing the ends of the levers together, an arm or ram can be forced against the blister to expel the contents.

These devices offer many advantages for precise delivery of small amounts of flowable ingredients. Because the blister containing product is completely crushed and the contents forced out the internal piercing device, there is little wasted material. The amount of waste is dependent on the viscosity of the product, but the disclosed devices delivery a small amount of product with at least 70% of product delivered for more viscous products such as lotions, for example, and deliver at least 80%, at least 90%, at least 95%, or at least 99% of the contents through the delivery channel. The devices additional provide the advantage of creating a spray or mist, when desired by forcing the product through the delivery channel under sufficient pressure. The devices thus delivery the product in a very short time frame, from about 10 milliseconds to about 500 milliseconds depending on the viscosity and the volume to be delivered.

In other exemplary embodiments, the dispensing device of the delivery system may consist of two rectangular members which are interlocked and house the blister unit dose. One of the members - the "crushing" member - wraps around the outer edges of second "dispensing" member such that the crushing member can slide up and down along the outside of the dispensing member in a telescoping interaction. In some embodiments, the dispensing member has protrusions that fit into linear slits in the edges of the crushing member such that the dispensing and crushing members cannot be pulled apart, but the crushing member can slide along the dispensing member within the length of the slits. The dispensing member houses the blister, which is sandwiched between the two members and is adjacent to the dispensing member at the blister's pierceable seal. As with other embodiments, there is an outlet through the dispensing member which is aligned with the pierceable seal of the blister.
so that the contents of the blister will be expelled through the internal channels and out the nozzle through the outlet when the blister is crushed. The crushing member of the dispensing device has an elevated, sloping surface or inclined ramp on the internal face that faces the dispensing member. As the pieces are pushed together the ramp squeezes and crushes the blister. In certain embodiments a flat member or plate is disposed between the blister and the ramp and in other embodiments, the ramp impinges directly on the blister.

[00017] The described embodiments can be used to deliver the contents of any unit amount of personal care product, including liquids, powders, gels, creams, lotions, high viscosity liquids or combinations thereof. The blisters for use in the described delivery systems can be of various sizes to accommodate different products, and can deliver precise volumes in the range from 5 microliters to 5 milliliters, for example. While not limiting the volumes that can be delivered with the disclosed devices, it is understood that a unit dose of a liquid such as a fragrance can be as small as between 50 and 200 microliters of the liquid. For powders, again without imposing limits on the volume, it is understood that for some embodiments the unit dose blisters can contain between 10 and 50 milligrams of powder, for example. For higher viscosity liquids, such as lotions or creams, a unit blister can be manufactured to deliver between 1 and 3 milliliters of product, for example.

[00018] As used herein, the term "unit dose," "unit amount," "dosage form," or "unit dose container" are used interchangeably and can refer to a container for a single or even multiple applications of a personal care product, or a single use amount of a plurality of products. Unit doses as described herein can also deliver flowable substances for uses not related to personal care in a controlled spray geometry in a convenient manner. Such uses include but are not limited to lighter fluids, lubricants, paints, dyes, solvents, and the like. All such uses are contemplated by the disclosure.

[00019] Throughout this disclosure, unless the context dictates otherwise, the word "comprise" or variations such as "comprises" or "comprising," is understood to mean "includes, but is not limited to" such that other elements that are not explicitly mentioned may also be included. Further, unless the context dictates otherwise, use of the term "a" or "the" may mean a singular object or element, or it may mean a plurality, or one or more of such objects or elements.

Brief Description of the Drawings
The following drawings form part of the present specification and are included to further demonstrate certain aspects of the present invention. The invention may be better understood by reference to one or more of these drawings in combination with the detailed description of specific embodiments presented herein.

Fig. 1 is an embodiment of a unit dose container with an internal piercing mechanism.

Fig. 2 is an embodiment of a piercing/nozzle mechanism.

Fig. 3 demonstrates an embodiment of a unit dose container with an internal piercing/nozzle mechanism during dispensing of the contents.

Fig. 4 is an embodiment of a unit dose container with an internal piercing/nozzle mechanism.

Fig. 5 is a view of the embodiment of Fig. 4 in the housing of a device for administering the dosage.

Fig. 6 is a view of the unit dose container of Fig. 5 during an intermediate step of administration.

Fig. 7 is a view of the unit dose container of Fig. 5 during discharge.

Fig. 8 is a cross section view of a unit dose container with two dosage chambers and an internal piercing/nozzle mechanism interacting with plungers of a delivery device.

Fig. 9 is a cross section view of the unit dose container of Fig. 8 in the first step of administration.

Fig. 10 is a cross section view of the unit dose container of Fig. 8 in an intermediate step of administration.

Fig. 11 is a cross section view of the unit dose container of Fig. 8 during discharge.

Fig. 12 is a perspective view of a trimmed unit dose.

Fig. 13 is a side view of the unit dose container shown in Fig. 35.

Fig. 14 is a view of the unit dose container after swaging the rim to reduce the outside diameter of the unit dose.

Fig. 15 is a side view of the swaged unit dose.

Fig. 16 is a view of a unit dose container with a sealing depression around the sealing area.
[00037] Figs. 17-19 are side views of embodiments of the unit dose containers shown in Fig. 39.

[00038] Fig. 20 is a perspective view of a piercing nozzle.

[00039] Fig. 21 is a plan view of the bottom of a piercing nozzle with a filled center.

[00040] Fig. 22 is a section view of an embodiment of a piercing nozzle with a filled center and showing the fluid path through the piercing novel in use.

[00041] Fig. 23 is a plan view of the bottom of a piercing nozzle with an open center.

[00042] Fig. 24 is an embodiment of a dispensing device that uses a lever system to dispense personal care products housed in internally pierced blisters.

[00043] Fig. 25 is a cross section view of the dispensing device of Fig. 24.

[00044] Fig. 26 is a view of the dispensing device of Fig. 24 in the ready position prior to discharge.

[00045] Fig. 27 is a cross section view of the dispensing device of Fig. 24 in the ready position prior to discharge.

[00046] Fig. 28 is an offset sectional view of the dispensing device of Fig. 24 after discharge.

[00047] Fig. 29 is a cross section view of the dispensing device of Fig. 24 after discharge.

[00048] Fig. 30 is an embodiment of a dispensing device that uses a rail system to dispense personal care products housed in internally pierced blisters.

[00049] Fig. 31 is a cross section view of the dispensing device of Fig. 30 in the ready position prior to discharge.

[00050] Fig. 32 is an exploded view of the individual parts that make up the dispensing device of Fig. 30.

[00051] Fig. 33 is a view of the dispensing device of Fig. 30 after discharge.

[00052] Fig. 34 is a cross section view of the dispensing device of Fig. 30 after discharge.

[00053] Fig. 35 is an embodiment of a dispensing device that uses an internal ramp system to dispense personal care products housed in internally pierced blisters.

[00054] Fig. 36 is a cross section view of the dispensing device of Fig. 35 in the ready position prior to discharge.

[00055] Fig. 37 is a view of the dispensing device of Fig. 35 after discharge.

[00056] Fig. 38 is a cross section view of the dispensing device of Fig. 35 after discharge.
Fig. 39 is an embodiment of a dispensing device for dispensing single doses of personal care products through the use of two flat plates.

Fig. 40 is a cross section view of the dispensing device of Fig. 39 in the ready position prior to discharge.

Fig. 41 is an exploded view of the individual parts that make up the dispensing device of Fig. 39.

Fig. 42 is a cross section view of the dispensing device of Fig. 39 after discharge.

Fig. 43 is an embodiment of a dispensing device for dispensing multiple doses of a personal care product sequentially in the ready position.

Fig. 44 is view of the bottom face of the dispensing device of Fig. 43.

Fig. 45 is a cross section view of the dispensing device of Fig. 43 in the ready position.

Fig. 46 is an internal view of the dispensing device of Fig. 43 when the device is opened.

Fig. 47 is a view of the dispensing device of Fig. 43 after discharge.

Fig. 48 is a cross section view of the dispensing device of Fig. 43 after discharge.

Detailed Description

Certain embodiments of the present disclosure are directed to delivery systems for unit doses that contain a measured dose of a personal care product, wherein the unit doses contain a pierceable section such that the unit dose container can be pierced to release the contents under pressure. When using the term "under pressure" in the disclosure, it is understood that the pressure is typically an externally applied pressure that creates an internal pressure within the unit dose container itself. In typical operation, a plunger, lever, ram, cam, wheel, or some other mechanical device contacts the unit dose container with sufficient force to crush the unit dose container against a piercing member and force the contents out of the nozzle. The piercing member is contained within the unit dose container. The unit dose container may be generated using methods well known to those of skill in the art, including, for example, form fill seal technology or blow fill seal technology. The form-fill-seal process can be used to create a blister, for example a blister pack, from rolls of flat sheet or film, filled with the personal care product, and closed or sealed on the same equipment. This process involves a formed base which has the cavity in which the personal care product, or
an agent that may be mixed or combined with a personal care product, is placed, and a lidding, for example of foil, through which the agent is dispensed out of the blister. Blow fill seal technology involves forming, filling, and sealing a unit dose container in a continuous process in a sterile enclosed area inside a machine.

[00068] An example of a unit dose container with an internal piercing member is shown in Fig. 1. The unit dose container in Fig. 1 is a blister unit dose container 1 that includes a diaphragm 2 formed into a modified hemispherical shape and a membrane 3 sealed to the diaphragm 2 along the seal area 4. Sealed within the blister unit dose container 1 are a piercing nozzle 5 and a flowable composition 9. It is understood that the flowable composition as used herein can be a liquid, a powder, a solution, a suspension, a dispersion, or a cream, lotion or gel, for example.

[00069] The piercing nozzle of Fig. 1 is also shown in Fig. 2. This example of a piercing nozzle 5 has tapered sides 10 and an inner chamber 8 that connects inlet ports 7 to a discharge port 12. The inner chamber 8 can contain internal contours 11 and other structures on the interior walls of the inner chamber 8. The contours and other structures are designed to influence the flow of the fluid or solid agent 9. Different nozzle configurations are created for specific applications to cause the fluid or solid agent to exit the discharge port 12 in a spray, mist or stream, depending on the needs of a specific personal care product or application.

[00070] A blister unit dose container is shown during use in Fig. 3. When the dose is to be administered, the unit dose container is placed in a device designed to administer the personal care product to a particular location. Many such devices include a trigger mechanism that forces a surface against the unit dose container with an explosive force to expel the contents out of the blister under pressure. Examples of such devices are described in U. S. Patent No. Application No. 8,377,009, incorporated herein in its entirety by reference. The results of this action are demonstrated in Fig. 3, in which a force in the direction 15 is applied with a plunger 13 to the back of the diaphragm 2. The piercing tip 6 has penetrated the membrane 3 and the liquid personal care product 9 has flowed into the inner chamber 8 through the inlet ports 7, out the discharge port 12 and been dispensed in a discharge pattern 14. The piercing tip 6 and tapered sides 10 of the piercing nozzle 5 cause
the membrane 3 to seal tightly around the piercing nozzle 5 forcing the personal care product 9 to flow out the discharge port 12.

[00071] Another embodiment of a blister unit dose container 100 is shown in Fig. 4. This version has the inlet ports 107 on the same side of the piercing nozzle 105 as the discharge port 112. This configuration forces the personal care products 109 to flow through two 90° bends during dispensing. It is understood that the fluid path is not limited to 90° bends but that other configurations can be used to create more or less resistance in the fluid flow path. Forcing the liquid or solid agent to flow through this series of bends in conjunction with the contours 111 in the inner chamber 108 control the discharge pattern 114. In blister unit dose container 100 a portion 116 of diaphragm 102 is formed to conform to the shape of the base 120 of the piercing nozzle. The diaphragm provides support for and holds the piercing nozzle 105 in place during assembly and during dispensing. Thus, the diaphragm functions to capture the piercing nozzle and hold it in place through manufacture and actual use.

[00072] Blister unit dose container 100 is shown in Fig. 5 positioned in a housing 18 with plunger 13 in the ready mode. Housing 18 has a discharge opening 19 to allow the piercing nozzle 105 to penetrate the membrane 103 during dispensing. As shown in Fig. 6, a force in direction 15 is applied to plunger 13 during the dispensing action, compressing the diaphragm 102 and driving the piercing nozzle 105 into the membrane 103 at piercing point 20. The next stage of dispensing is shown in Fig. 7. As the force continues to drive the plunger 13 against the diaphragm 102, the diaphragm collapses, driving piercing membrane 103 through the membrane and forcing the agent 109 through the piercing nozzle 105 and out the discharge port 112 in the discharge pattern 114. In this embodiment, the shape of the blister unit dose container 100 is designed to conform to the plunger 13 and housing 18 of the dosing mechanism to insure that the diaphragm 102 seals to the piercing nozzle 105 in the contact area 116 and that the membrane 103 seals to the piercing nozzle 105 around the sealing area 21 in order to achieve the desired spray pattern 114.

[00073] In certain embodiments, the disclosure is directed to unit doses that contain more than one personal care product in separate chambers, or more than one component of a personal care product that is to be mixed or combined just prior to or during dispensing. The chambers may also have one personal care product and a second personal care product that is to be mixed or combined with the agent prior to dispensing. The personal care products and
mixing agents in separate chambers may be liquid compositions, solid compositions, or one or more liquid compositions and one or more solid compositions. The solid compositions may be, for example, powdered personal care product compositions or lyophilized compositions. The personal care product or mixing agents in the chambers are typically different, but the same personal care product or mixing agent may be present in more than one chamber of the same unit dose. An example of a dual chambered blister unit dose container 22 is shown in Fig. 8. This blister includes an outer ring shaped, or arcuate shaped chamber 23 filled with a first volume of agent 46 and an inner chamber 24 filled with a second volume of agent 47. Either agent 46 or 47 can be in powder form, but one of the two is preferably a liquid. The seal between the two chambers is a delamination zone 25. This area releases its seal between diaphragm 142 and membrane 143 at a lower pressure than the bursting strength of the diaphragm material and at lower pressure than the seal area 144. This concept also utilizes an outer plunger 26, which is also essentially a round member and can move independently of the plunger 13.

The unit dose container 22 is shown during the dispensing steps in Figs. 9, 10 and 11. In the first stage, the outer plunger 26 is forced against the outer chamber 23. As the critical pressure is reached, the delamination zone 25 releases its seal and the first agent 46 is driven into the inner chamber 24 and mixes with the second agent 47. As the outer plunger 26 is completely depressed as shown in Fig. 10, and the outer chamber 23 is completely collapsed, all the first agent 46 is forced into the inner chamber 24, causing the diaphragm of the inner chamber 24 to expand to a domed shape containing the contents of both chambers. A comparison of Figs. 9 and 10 illustrates this expansion, as the sides of the inner chamber are concave (in the two dimensional drawing) in Fig. 9 and expand to a convex shape in Fig. 10. The final stage is demonstrated in Fig. 11, where the force is applied to the inner plunger 13 so that it presses the piercing nozzle 145 through the membrane 143 and collapses the inner chamber 24, expelling the mixture of first agent 46 and second agent 47 through the inner chamber 148 and out the discharge port 212 in the desired discharge pattern 214. The seal between contact area 116 and the sealing area 221 again force all the agents to pass through the piercing nozzle 145, resulting in the desired spray configuration.

In certain embodiments it is desirable to control the spray pattern of the dispensing products. The surface features and configuration of the internal channel or channels of the
piercing/nozzle mechanism can be designed for different types of spiral, vertical and other flow and the design can be adjusted for different viscosities of the fluid or solid to be dispensed. For example, surface features such as one or more chambers, bends, angled surfaces, spirals, ribs, flutes or constrictions may be added to create a vortex, to further mix the contents of the blister, to change the fluid property type from laminar to turbulent or vice versa or to change fluid properties such as pressure, velocity, surface tension or viscosity.

To successfully dispense the personal care product, the product must flow through the piercing nozzle with enough velocity to create the desired spray geometry. As described herein, this is accomplished by pressing on the blister form with sufficient force to push the piercing nozzle through the lid material, completely crushing the unit dose container and forcing the contents through the nozzle with the required velocity. During this dispensing operation, the seal of the lid material to the blister material must be strong enough that no leakage occurs prior to the nozzle piercing the lid.

A trimmed unit dose container is shown in Fig. 12 in which a trim edge 805 is shown outside the sealing area 804, providing a smaller diameter unit dose container for certain uses. A side view of the unit dose container is shown in Fig. 13. The unit dose container can also be swaged or pressure formed in a way to further reduce the overall diameter without negatively impacting the strength of the seal of the lid material to the blister material. A swaged unit dose container is shown in Fig. 14. In the swaged unit dose container the rim 806 is formed to further reduce the outside diameter 807.

In certain embodiments, as shown in Fig. 16, the strength of the seal area 804 can be increased by forming a concentric depression 808 around the seal area 804. As shown in side view in Figs. 17-19, a depression can be formed in the lid material (Fig. 17), in the blister material (Fig. 18) or in both (Fig. 19).

An embodiment of a piercing nozzle 900 for use in an internally pierced blister is shown in Fig. 20. The nozzle includes a base 902 with an upper surface 904 and a bottom 906. Attached to and extending from the base is an elongated member 908 that terminates in a discharge nozzle 910. Inlet openings 912 are shown in the top surface 904 of the base 902. The bottom surface 906 of the piercing nozzle is shown in Fig. 21. The fluid path through the base can be seen in this view. The inlet openings 912 pass through the base from the top
surface to the bottom and connect to the respective inlet channels 916, which are connected to the internal channels 914.

[00080] The fluid path through the piercing nozzle is shown in more detail in Fig. 23. This nozzle is designed to be embedded in a formed blister as described herein, with the base of the piercing nozzle held in place at the bottom or formed portion of the blister and the piercing end and discharge nozzle at or near the piercable surface as shown in Fig. 1, for example. The blisters are used in devices that hold the blister in place and force a ram, piston or other solid member against the bottom of the blister, crushing it and forcing the fluid contents through the piercing nozzle and out the discharge opening in a precisely dosed, controlled spray or mist. As shown in the Figure, as the blister is crushed, fluid in the blister is forced into the inlet openings 912, through the inlet channels 916, up through the internal channels 914, into the swirl chamber 920 and out the discharge nozzle 922. In the cross-section view, the solid central column 918 is shown to block the fluid from the central channel of the elongated member, creating a higher pressure fluid path for the production of finer mists.

[00081] As described herein, the piercing nozzles can also be used with or without a solid central column depending on the intended use. Fig. 23 is a bottom view of an example of a piercing nozzle without the central column. In certain embodiments, a two piece piercer includes the device shown in Fig. 23 and a second cylindrical column is placed in the opening 922 to produce the configuration shown in the device in Fig. 22.

[00082] Certain embodiments of this disclosure are directed to devices that dispense a measured dose of a personal care product contained in a blister unit dose. An embodiment of such a dispensing device used for dispensing single sample doses of a personal care product is shown in Fig. 24. The dispensing device 1100 comprises a stable arm 1102 and a lever arm 1104 which are hingedly connected at point 1106 on either side of the device, forming a cylindrically shaped unit. At the hinged end of the device is a circular outlet 1108 through which the personal care product is dispensed from the device. As shown in the cross section view of 1100 in Fig. 25, an internally pierced blister 1120 containing a single-use quantity of a desired personal care product is housed in the enclosed end of the device adjacent to outlet 1108. The blister is aligned with the outlet 1108 such that the pierceable seal is directly adjacent to the outlet, and the outlet is aligned with the internal piercing nozzle 1124 such
that when the blister is pierced, the piercing nozzle extends outward through outlet 1108. Between the stable and lever arms is a plunger mechanism 1130, which exerts the force on the blister which crushes the blister, causing the piercing nozzle to pierce the blister and dispense its contents.

Figs. 26 and 27 display the dispensing device 1100 in its ready position. The plunger mechanism 1130 has two sections: a plunger 1150, which is adjacent to the blister, and a ram 1160 which is connected to the plunger. Located on the outside surface at the end furthest from the plunger on either side of the ram are two sloped rails: an inner rail 1140 and an outer rail 1142. Connected to either side of the lever arm 1104 is a post 1136 which extends directly downward, perpendicular to the bottom surface of the device. The post 1136 is aligned with the rails such that, at rest, a latching mechanism 1138 connected to the post 1136 fits into the groove 1146 created between the two sloped rails. When a user lifts the lever arm of the device, the lever arm rotates around the hingedly connected points 1106. As the lever arm is lifted, the latching mechanism attached to the post rides up along the inner groove 1146 of the two rails until it slides out from the groove and catches on the outside of the outer rail, as the position in Fig. 27 displays.

When the latching mechanisms 1138 catches on the outside of the outer rail 1142, the lever arm is locked in its upward position by the posts and the dispensing device is in the ready position. To dispense the product contained in the blister, the user exerts a force downward on the lever arm, causing the posts 1136 on either side of the device to push the latching mechanisms along the outer rail of the plunging mechanism. As the latching mechanism rides along the outer rail, it exerts a force on the ram, pushing it and the entire plunging mechanism 1130 into the blister. Figs. 28 and 29 show the final dispensed position of the dispensing device 1100. The curve of the outer rail 1142 creates a mechanical advantage in transferring the force exerted by the user on the lever arm to the force of the ram on the plunger. The force of the plunger crushes the blister and causes piercing nozzle 1124 to pierce the blister and extend outward through outlet 1108, expelling the personal care product that was contained in the blister from the device in the general direction of the arrow.

In certain embodiments, a dispensing device for personal care products is configured such that two rectangular pieces are pushed together, and an internal ramping mechanism produces a mechanical advantage by forcing a plunger into an internally pierced blister,
crushing it and causing the contents to be expelled. An embodiment of such a dispensing device 1200 is shown in Fig. 30. The body of this version of the device is formed from two rectangular pieces - a dispensing piece 1202 and a crushing piece 1204. The dispensing piece 1202 has a protruding rail 1214 on each of its long sides. The long sides of the crushing piece 1204 wrap around the rails of the dispensing piece such that the dispensing piece fits inside of the crushing piece, and the crushing piece can ride along the rails of the dispensing piece. In other words, the dispensing piece and the crushing piece are interlocked to form a single unit, as shown in Fig. 30, such that the crushing piece 1204 can move up and down along the rails of the dispensing piece 1202. To prevent the two pieces from becoming detached, the crushing piece has a linear slit 1220 along a portion of each of its sides. The dispensing piece 1202 has corresponding protrusions 1228 at the top of each of its rails, which fit inside of the slits of the crushing piece and prevent the crushing piece from sliding off of the dispensing piece. The protrusions 1228 on the dispensing piece's rails 1214 are more visible in the exploded view of 1200 in Fig. 32. When the device is in the ready position, the protrusions are at the bottom of the slit, preventing the crushing piece from sliding off of the rails on the dispensing piece. When the device is in the final dispensed position (i.e., the crushing and dispensing pieces are completely pushed together), the protrusions are at the uppermost point of the slits. On the outer face of the dispensing piece is a circular outlet 1208 through which the personal care product is sprayed or otherwise dispensed.

The device in Fig. 30 is an example of an embodiment in which the spray direction is perpendicular to the direction of force when the device is activated by a user. As can be seen in Figs. 30, 33 and 34, for example, the single unit dispensing device can appear to dispense the product similarly to a convention pump spray as used in many fragrance bottles. This embodiment finds particular use in providing fragrance samples, since the dispenser can be designed to mimic the pump spray top of a commercial size bottle.

Figs. 30 and 31 display the device in the ready or resting position. As shown in the cross section view in Fig. 31, an internally pierced blister 1210 containing a single-use quantity of a desired personal care product is located between the crushing piece 1204 and the dispensing piece 1202. The blister 1210 is directly adjacent to the dispensing device and aligned with the outlet 1208 such that the pierceable seal of the blister is immediately

17
adjacent to the outlet. The outlet is aligned with the piercing nozzle and has a greater
diameter than the piercing nozzle. This alignment of the blister with the outlet allows the
piecing nozzle to project outward through outlet 1208 when the blister is pierced. Located
immediately above the blister is a flat plunger 1206 which is sandwiched between the blister
and the internal wall of the crushing device. Fig. 32 is an exploded view of embodiment
1200, displaying the plunger 1206 apart from the rest of the device.

As the exploded view in Fig. 32 shows in more detail, the crushing piece 1204 has
three ramps located on its inner face: a shorter center ramp 1234 and two identical, longer
outer ramps 1230 on either side of the center ramp. These ramps produce the mechanical
advantage of the device, causing the plunger 1206 to drive into and crush the internal blister
when the crushing piece and dispensing piece are pushed together by the user. As shown in
Fig. 32, the plunger 1206 has a square end and a curved end as well as two wings 1236 on
either side. At rest, the plunger is oriented such that it is flat against the crushing piece with
the squared end facing the center ramp and sandwiched between the two outer ramps, and the
wings 1236 directly in front of the longer outer ramps. When the dispensing and crushing
pieces are pushed toward each other, the plunger is forced downward toward the internal
blister by the ramps of the crushing piece. As the crushing piece rides along the outer rails
1214 of the dispensing device, the wings 1236 of the plunger are forced up the slope of the
outer ramps and the center of the plunger (starting at the square end) is forced up the slope of
the center ramp. This movement causes the plunger to be forced against the blister toward the
dispensing piece and its outlet. As the plunger crushes the blister, the internal piercing nozzle
is pushed toward the pierceable seal, eventually piercing the seal of the blister and expelling
the contents of the blister through the outlet 1208.

Figs. 33 and 34 display the final position of the device 1200 after the crushing piece
and dispensing piece have been completely pushed together. As the figure demonstrates, the
gradient of the ramps 1234 and 1230 are such that when the device is fully pushed together,
the plunger completely crushes the blister and is sandwiched between the dispensing piece
1202 and crushing piece 1204. The piercing nozzle 1240 protrudes from the outlet of the
dispensing device and expels the product outward.

Another embodiment of a personal care product dispensing device that uses an
internal ramping mechanism to crush an internally pierced blister is shown in Figs. 35 and
36. As Figs. 35 and 36 show, this embodiment 1300 has an overall configuration that is similar to the embodiment 1200 in Figs. 30-34. The device has a dispensing piece 1302 and a crushing piece 1304. The crushing piece wraps around the protruding rails 1314 on either side of the dispensing piece and can move up and down along those rails. To prevent the two pieces from becoming detached, the crushing piece has a linear slit 1320 along a portion of each of its sides. The dispensing piece 1302 has corresponding protrusions 1328 at the top of each of its rails, which fit inside of the slits of the crushing piece and prevent the crushing piece from sliding off of the dispensing piece. When the device is in the ready position, as in Fig. 35, the protrusions are at the bottom of the slit, preventing the crushing piece from sliding off of the rails on the dispensing piece. When the device is in the final dispensed position after the crushing and dispensing pieces have been pushed together, as shown in Fig. 37, the protrusions are at the uppermost point in the slits. On the outer face of the dispensing piece is a circular outlet 1308 through which the personal care product is sprayed or otherwise dispensed.

[00091] The feature that distinguishes embodiment 1300 from 1200 is the structure of the internal ramping mechanism that crushes the blister when the crushing piece is pushed together with the dispensing piece. As shown in Figs. 35 and 36, embodiment 1300 has a single elevated ramp 1340 located on the inner face of the crushing piece 1304 which produces the mechanical advantage of this device. Embodiment 1300 lacks a separate plunger piece between the crushing piece and the blister 1310. Rather, as the crushing and dispensing pieces are pushed together, the increasing width of the crushing piece, caused by the elevated ramp, creates pressure on the internally pierced blister.

[00092] Figs. 37 and 38 show the final dispensed position of 1300. As the figures show, once the crushing piece 1304 and dispensing piece 1302 have been completely pushed together, the blister 1310 is completely crushed by the ramp 1340 on the internal face of the crushing piece. The crushing of the blister causes the piercing nozzle to pierce the blister, protrude out of the outlet 1308, and expel the contents of the blister.

[00093] In certain embodiments, a dispensing device for personal care products is constructed from two elongated plates and a flexible band, as shown in Fig. 39. This embodiment 1400 is comprised of a dispensing plate 1402 and a crushing plate 1404 that face each other and are held together by a flexible band 1406, which wraps around the
outside of the plates, as shown in Fig. 39. On the internal face of the dispensing plate (i.e.,
the side that face the crushing plate) is a blister unit dose container 1420, which is attached to
the dispensing plate such that its pierceable seal is adjacent to the inner face of the dispensing
plate. The cross section view of 1400 in Fig. 40 better displays the configuration of the two
plates and the blister. The dispensing plate and crushing plate are oriented such that they
meet at one end and are spaced apart at the opposite end, separated by the blister, thereby
creating angle 1408. The dispensing plate has a dispensing outlet 1410 located at the position
adjacent to the center of the pierceable seal of the blister, just below the internal piercing
nozzle 1426, and the outlet 1410 has a diameter that is greater than that of the piercing
nozzle. There is a corresponding hole 1412 on the side of the flexible band 1406 that is
adjacent to the dispensing plate. The hole 1412 is positioned such that it is aligned with the
outlet 1410 in the dispensing plate. Thus there is a direct channel from the pierceable seal of
the blister to the outside of the device. The exploded view of device 1400 in Fig. 41 displays
the separate pieces of this device.

Fig. 42 shows the device 1400 in its final dispensed position. To dispense the
personal care product contained in the blister, a user pushes or pinches together the crushing
plate 1404 with the dispensing plate 1402, orienting the device such that the outlet 1410 faces
toward the direction in which the spray or stream is intended. The flexible band 1406 allows
the two plates to be pushed together, and the crushing plate 1404 crushes the blister, causing
the piercing nozzle to pierce the seal that is adjacent to the outlet 1410. The piercing nozzle
then protrudes into the outlet and expels the contents of the blister through the hole 1412 in
the flexible band in the general direction of the arrow.

Certain embodiments of this disclosure are directed to dispensing devices for
sequentially dispensing or administering single doses of a personal care product from
individual blisters housed on a strip which contains multiple blister unit doses. Figs. 43-48
show an embodiment 1500 of a multiple dose dispensing device. As shown in Fig. 43, the
device has a circular base structure 1502 which houses the blister strip 1516, which is visible
in Figs. 45-46. The base has a dispensing outlet 1510 at one end. On top of the base, the
device has a circular flap 1506 which covers the top of the base and is attached to the base by
a hinge 1508 such that the flap can be lifted to open the device and reveal the blister strip
located inside of the base. Toward the middle of the flap 1506 is trigger lever 1504, which is
lifted when the device is in the ready position before crushing a blister and dispensing the
contained product. Fig. 44 displays the bottom surface of the device \textbf{1500}, which has a
mechanism \textbf{1512} for manually rotating the blister strip inside the base so that a new, unused
blister can be moved into the position adjacent to the outlet after a blister is crushed.

Figs. 45 and 46 display the internal features of the device \textbf{1500}. Fig. 45 is a cross
section of the device in the ready position. As the figure shows, the device contains a
multiple blister strip \textbf{1516} oriented such that the pierceable seals of the blisters face outward.
The strip wraps around the internal walls of the base \textbf{1502}. At any given time, a single
"loaded" blister \textbf{1518} is located in the position that is adjacent to the dispensing outlet \textbf{1510}
with its pierceable seal facing the outlet. Attached to the upper flap \textbf{1506} of the device is a
plunging mechanism \textbf{1520}. As shown in Fig. 45, when the device is closed with the circular
flap pushed down onto the base \textbf{1502}, the plunger is positioned immediately in front of the
loaded blister \textbf{1518} that is in the position next to the outlet. Attached to the trigger lever
\textbf{1504} is a driving mechanism \textbf{1530}. In order to crush the loaded blister \textbf{1518} against the outlet
\textbf{1510}, a user must push down on the trigger lever \textbf{1504}. This force pushes the driving
mechanism into the plunging mechanism \textbf{1520}, causing the plunging mechanism to be
pushed forward into the blister \textbf{1518}, crushing the blister against the outlet \textbf{1510}. Figs. 47
and 48 display the device \textbf{1500} in its final position after a blister has been crushed. As the
figures show, the trigger lever has been pushed down into the circular flap \textbf{1506} and the
plunging mechanism \textbf{1520} has been pushed forward, having completely crushed the blister
\textbf{1518}. When the blister is crushed by the plunger, the personal care product contained in the
blister to be dispensed through the outlet \textbf{1510} in the direction of the arrow.

All of the devices and methods disclosed and claimed herein can be made and
executed without undue experimentation in light of the present disclosure. While the devices
and methods of this invention have been described in terms of preferred embodiments, it will
be apparent to those of skill in the art that variations may be applied to the devices and/or
methods and in the steps or in the sequence of steps of the methods described herein without
departing from the concept, spirit and scope of the invention. All such similar substitutes and
modifications apparent to those skilled in the art are deemed to be within the spirit, scope and
concept of the invention as defined by the appended claims.
Claims

1. A packaging and delivery system for dispensing single use amounts of a personal care product comprising:
   a dispensing device comprising:
   (a) a housing defining a cavity shaped to hold a blister delivery device, the housing comprising:
       a pair of opposing arms joined by a hinged connection at one end thereof; and
   (b) an internally pierced formed blister disposed in the cavity adjacent the dispensing outlet, said blister comprising:
       a blister formed from a stretched flexible film material into a recess with an open end;
       a piercable surface sealed to the open end of the blister to form an internal chamber enclosed by the formed recess;
       a flowable personal care product contained in the internal chamber;
   the piercing nozzle comprising:
       a base,
       a hollow elongated body projecting from the base at a first end and forming a discharge nozzle at a second end opposite the base,
       one or more inlet openings and channels providing a fluid path from the internal chamber through the base and into the internal channel of the piercing nozzle and out the discharge nozzle; and
   (c) a ram device disposed in the housing with a first end adjacent the cavity;
   wherein the blister is disposed in the cavity with the discharge nozzle proximate the outlet and the base proximate the ram and wherein when the device is activated, the ram is forced into the cavity effective to crush the blister and dispense the flowable personal care product.

2. The packaging and delivery system of claim 1, wherein the ram device comprises lever, hinge, cam or inclined plane.
3. The packaging and delivery system of claim 1, wherein the flowable personal care product comprises a liquid, powder, high viscosity liquid or combinations thereof.

4. The packaging and delivery system of claim 1, wherein the flowable personal care product is a cosmetic, cosmeceutical, nutraceutical, nutricosmetic, hygienic product, fragrance, lotion, cream, gel, a serum, essential oil, dermal treatment, skin coloring agent, skin masking agent, liquid soap, makeup, toothpaste, breath freshener, hair serum, shaving cream, lotion, or hair gel.

5. The packaging and delivery system of claim 1, wherein the flowable personal care product is a product for topical application to the mouth, lips, skin, hair, or nails of a user.

6. The packaging and delivery system of claim 1, wherein a first arm provides the outlet and the opposing arm is the ram.

7. The packaging and delivery system of claim 6, wherein a band is wrapped lengthwise around the two arms to hold the arms together against the blister during storage.

8. The packaging and delivery system of claim 7, wherein the band is a flexible material selected from a group consisting of paper, plastic, rubber, and tape.

9. The packaging and delivery system of claim 1, the blister contains from 50 to 200 milliliters of flowable personal care product.

10. The packaging and delivery system of claim 1, the blister contains from 10 to 50 microliters of flowable personal care product.

11. The packaging and delivery system of claim 1, the blister contains from 1 to 3 milliliters of flowable personal care product.

12. A packaging and delivery system for dispensing single use amounts of a personal care product comprising:

   a dispensing device comprising:

   (a) a housing defining a cavity shaped to hold a blister delivery device, the housing comprising:

   a pair of opposing substantially rectangular, planar members each member comprising opposing ends and opposing sides, wherein the members are connected along the sides in a slidable, telescopic connection; and
a dispensing outlet disposed a first planar member and providing an opening from the outside into the cavity;

(b) an internally pierced formed blister disposed in the cavity adjacent the dispensing outlet, said blister comprising:

a blister formed from a stretched flexible film material into a recess with an open end;

a piercable surface sealed to the open end of the blister to form an internal chamber enclosed by the formed recess;

a flowable personal care product contained in the internal chamber;

a piercing nozzle wholly contained in the internal chamber, the piercing nozzle comprising:

a base,

a hollow elongated body projecting from the base at a first end and forming a discharge nozzle at a second end opposite the base,

one or more inlet openings and channels providing a fluid path from the internal chamber through the base and into the internal channel of the piercing nozzle and out the discharge nozzle; and

(c) a ramp device disposed in the housing attached to an inner face of the second planar member;

wherein the ramp is inclined such that sliding the members such that one telescopes into the other forces the ramp against the blister effective to crush the blister and dispense the flowable personal care product.

13. The packaging and delivery system of claim 12, wherein the device further comprises a planar member disposed between the ramp and the blister.

14. The packaging and delivery system of claim 12, wherein the flowable personal care product comprises a liquid, powder, high viscosity liquid or combinations thereof.

15. The packaging and delivery system of claim 12, wherein the flowable personal care product is a cosmetic, cosmeceutical, nutriceutial, nutricosmetic, hygienic product, fragrance, lotion, cream, gel, a serum, essential oil, dermal treatment, skin coloring agent, skin masking agent, liquid soap, makeup, toothpaste, breath freshener, hair serum, shaving cream, lotion, or hair gel.
16. The packaging and delivery system of claim 12, wherein the flowable personal care product is a product for topical application to the mouth, lips, skin, hair, or nails of a user.

17. The packaging and delivery system of claim 12, the blister contains from 50 to 200 milliliters of flowable personal care product.

18. The packaging and delivery system of claim 12, the blister contains from 10 to 50 microliters of flowable personal care product.

19. The packaging and delivery system of claim 12, the blister contains from 1 to 3 milliliters of flowable personal care product.

20. A method for providing samples or single use packaging of a personal care product comprising:

   providing a single dose dispensing device comprising:
   a blister formed from a stretched flexible film material into a recess with an open end;
   a piercable surface sealed to the open end of the blister to form an internal chamber enclosed by the formed recess;
   a flowable personal care product contained in the internal chamber; and
   a piercing nozzle wholly contained in the internal chamber, and
   a mechanism for manually crushing said internally pierced blister;

   wherein crushing the blister in the device dispenses a precise single dose amount of personal care product in a spray, mist or stream through the piercing nozzle.

21. The method of claim 20, wherein the packaging protects the personal care product from light, moisture, and air prior to dispensing.

22. The method of claim 20, wherein the personal care product comprises a liquid, powder, high viscosity liquid or combinations thereof.

23. The method of claim 20, wherein the personal care product is a cosmetic, cosmeceutical, nutriceutial, nutricosmetic, hygienic product, fragrance, lotion, cream, gel, a serum, essential oil, dermal treatment, skin coloring agent, skin masking agent, liquid soap, makeup, toothpaste, breath freshener, hair serum, shaving cream, lotion, or hair gel.

24. The method of claim 20, wherein the personal care product is a product for topical application to the mouth, lips, skin, hair, or nails of a user.
25. The method of claim 20, wherein the blister contains from 50 to 200 milliliters of personal care product.
26. The method of claim 20, wherein the blister contains from 10 to 50 microliters of personal care product.
27. The method of claim 20, wherein the blister contains from 1 to 3 milliliters of flowable personal care product.
28. The method of claim 20, wherein the dispensing device is reusable.
29. The method of claim 20, wherein the dispensing device contains multiple single dose blisters which can be dispensed in sequence.
30. The method of claim 20, wherein the personal care product is a fragrance.
31. A method for providing samples or single use packaging of a personal care product comprising:
   providing a single dose dispensing device sized to be contained in a magazine or standard size letter envelope, said dispensing device comprising:
   a blister formed from a stretched flexible film material into a recess with an open end;
   a piercable surface sealed to the open end of the blister to form an internal chamber enclosed by the formed recess;
   a flowable personal care product contained in the internal chamber; and
   a piercing nozzle wholly contained in the internal chamber, and
   a mechanism for manually crushing said internally pierced blister;
   wherein crushing the blister in the device dispenses a precise single dose amount of personal care product in a spray, mist or stream through the piercing nozzle;
   placing a single dose dispensing device into a magazine or bulk advertising mailer.
32. The method of claim 31, wherein the personal care product comprises a liquid, powder, high viscosity liquid or combinations thereof.
33. The method of claim 31, wherein the personal care product is a cosmetic, cosmeceutical, nutriceutial, nutricosmetic, hygienic product, fragrance, lotion, cream, gel, a serum, essential oil, dermal treatment, skin coloring agent, skin masking agent, liquid soap, makeup, toothpaste, breath freshener, hair serum, shaving cream, lotion, or hair gel.
34. The method of claim 31, wherein the personal care product is a product for topical application to the mouth, lips, skin, hair, or nails of a user.

35. The method of claim 31, wherein the personal care product is a fragrance.

36. The method of claim 35, wherein the dispensing device is asthetically designed to resemble a fragrance bottle pump spray top.
Fig - 14

Fig - 15
Fig-16

Fig-17

Fig-18

Fig-19
Fig-32
### A. CLASSIFICATION OF SUBJECT MATTER

**IPC(8) -** A61M 15/00 (2015.01)

**CPC -** A61M 15/0028 (2015.05)

According to International Patent Classification (IPC) or to both national classification and IPC

### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

<table>
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<th>IPC(8)</th>
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<th>USPC</th>
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<td>A61M 5/24, 11/00, 15/00</td>
<td>A61B 5/41 1; A61M 15/0028, 15/0031, 15/0036, 15/0045</td>
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**Documental minimality: 5/0028, 1/00; May completion: 604/58, 244 (keyword delimited)**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

**USPC -** 129/203.21; 239/327; 604/58; 244 (keyword delimited)

**Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)**

Orbit, Google Patents, Google Scholar, Google.com, YouTube.com

Search terms used: fragrance, unit dose, mist, incline ramp, blister, crush, ram

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>Y</td>
<td>US 7,988,073 B2 (LIGNY et al) 02 August 2011 (02.08.2011) entire document</td>
<td>4, 23, 30-36</td>
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</table>

* Special categories of cited documents:
  * "A" - document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search: 22 May 2015

Date of mailing of the international search report: 2 JUN 2015

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