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

(11) Publication number: **0 155 349**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **84110232.0**

(51) Int. Cl.⁴: **A 45 D 34/00**

(22) Date of filing: **28.08.84**

(30) Priority: **02.09.83 US 529059**

(43) Date of publication of application:
25.09.85 Bulletin 85/39

(84) Designated Contracting States:
BE DE FR GB IT LU NL SE

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(54) **Dispensing container.**

(57) Device for applying liquid materials to the skin, said device having a liquid container, a poromeric plastic applicator head, and a diaphragm spring, and an impervious sleeve holding the applicator in said device. The applicator head fits over the impervious sleeve. The diaphragm spring provides a liquid tight seal between the impervious sleeve and the liquid container and also allows movement of the sleeve and poromeric applicator head in a vertical direction to create a pressure within the liquid container and provide force to aid in moving the liquid through the poromeric applicator head to its outer surface.

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DISPENSING CONTAINER

The present invention relates to a liquid applicator for dispensing toiletries to the skin, and particularly for the application of antiperspirants and deodorants to the human axilla.

Liquid applicators in general are well-known in the prior art, particularly the roll-on type commonly for antiperspirants and deodorants. These are disclosed, for example in U. S. Patent Nos. 2,749,566; 2,923,957; and 2,998,616. Because of problems with roll-on type applicators, Berghahn et al., U. S. Patents 4,050,826 and 4,111,567, devised a liquid applicator comprising a container fitted with a head having a fixed, shaped form made of a non-flexible, non-deformable, sintered porous synthetic plastic resin having a controlled porosity and having omni-directional, interconnecting pores. The liquid overflow problems associated with conventional roll-ons is also present with this type of head and is solved by the provision of a liquid collecting channel adjacent the shaped applicator, permitting the excess liquid to drain back via the channel into an opening through the head into the liquid reservoir. This avoids an accumulation of liquid on the surface of the applicator and resulting crystallization of product being delivered.

In a real sense, the porous plastic applicator of Berghahn et al. resembles the conventional roll-on applicator except that the applicator is stationary and has a drain channel. The liquid product being delivered must be brought into contact with the applicator head in order for

the liquid to be delivered to the surface by capillary action. This requires inverting the container as is true of the roll-on type of head, since there will always be dead space between the liquid in the reservoir and the applicator head. Thus, no way is provided for the liquid in the reservoir always to be in contact with the applicator head.

In the present invention, the applicator head may be of any suitable configuration, but a convex outer surface has been found to be particularly suitable for contact with various parts of the human body. Thus, the applicator head may have a hemispherical outer surface.

The materials which are used to make the shaped applicator head are non-flexible, non-deformable, sintered, porous synthetic resins having a controlled porosity and having omni-directional interconnecting pores, formed of aggregates of united polymer particles. The degree of porosity of the porous materials can be controlled in their manufacture, thus insuring a wide range of porosity to suit a wide range of liquid products of varying viscosities. Sintered, porous applicator heads may be fabricated of high-density polyethylene, low-density polyethylene, ultra-high molecular weight polyethylene, polypropylene, polyvinylidene fluoride, and the like. Products are available commercially under the trade designations "Porex" porous plastics and "Porous Polv." The pore size of the applicator may vary widely, depending on the liquid to be delivered. Low-viscosity liquids, such as perfumes, may best be delivered via a small-pore plastic applicator, e.g., one micron or less. In general, the pore size may vary between about one to 200 microns, and for most purposes, generally about 10-50 microns are preferred.

The porous applicator is hollow and fits onto a cylindrical impervious sleeve or tower which in turn fits into an annular plastic diaphragm spring. The spring in turn, fits into the top opening of the container which forms a reservoir for the liquid material to be dispensed. The

impervious sleeve and diaphragm spring may also be molded as a single part. The impervious sleeve serves two functions. First, it locks the porous plastic applicator head to the diaphragm spring. Second, it directs fluid flow to the uppermost area of the porous applicator which is the area mainly used for application. The container can be filled solely with the liquid product. As an alternative, the reservoir may contain an absorbent material, onto which the liquid to be delivered is absorbed, and this absorbent material is in direct and intimate contact with the porous applicator head. This aspect of the invention insures continuous contact of the liquid with the applicator head and ease of delivery of the liquid on demand by capillary flow. The absorbent material used in the reservoir may be any material capable of absorbing the liquid to be delivered, such as cellulose acetate, polyester, cotton, rayon, nylon, or other suitable material, and capable of transferring the liquid therefrom continuously on demand by capillary flow (wicking). The absorbent material may take any suitable shape or form. In one embodiment, the absorbent material is the same non- deformable, non-flexible, sintered, porous synthetic resin material from which the applicator head is constructed. The form may vary, but a particularly advantageous delivery system will consist essentially of a container to hold the contents to be delivered, fitted with the porous head having a cylindrical porous plastic tube extending to the bottom of the container, and having a hemispherical top. The diameter of the cylindrical piece need not be uniform, i.e., the portion extending into the container is of a lesser diameter than the portion extending out of the container in order to fit into the annular plastic spring.

The container may obviously be of any suitable material, such as metal, glass or plastic.

The delivery system of the invention may be used to deliver any topical liquid product to the skin. These

may include, for example, after-shave lotions, pre-shave lotions, skin lubricants or emollients, suntan lotions, fragrances (perfumes, colognes, etc.), topical theraputics (analgesics, acne formulations, antiseptics, etc.), lip and face rouge and the like. The delivery system is particularly useful in applying antiperspirants and deodorants and avoids the problems associated with roll-on applications. Thus, the invention provides a means of applying a low viscosity, fast drying, non-sticky solution of aluminum chlorohydrate, avoiding the undesirable features of roll-ons, pump sprays, and sticks.

Since the porous plastic materials are hydrophobic and do not "wet" with water, it may be necessary to add alcohol to an antiperspirant formula to transfer the product from the container to the applicator head. Crystallization of the solid components of the solution, such as aluminum chlorhydrate, may be avoided by the addition of certain esters, such as isopropyl myristate or isopropyl palmitate.

The invention may be better understood by reference to the drawings in which,

Figure 1 is a front elevational view of the dispenser with cap removed with parts broken away to show a cross section of the applicator head, diaphragm spring and liquid reservoir;

Figure 2 is a side elevational view of the container and cap with cap in cross-section;

Figures 3 and 5 are bottom plan views of the liquid container;

Figure 4 is a partial view of the container shown in Figure 1, in an inverted position, to show directed liquid flow;

Figures 5, 6 and 7 are respectively top plan view, elevation view in cross-section and bottom plan view of the diaphragm spring;

Figures 8, 9 and 10 are respectively top plan view, elevational view with parts broken away and bottom

plan view of the impervious sleeve; and

Figures 11, 12 and 13 are respectively top plan view, elevation view with partial cross-section and bottom plan view of single piece impervious sleeve and diaphragm spring.

Referring to the Figures 1 and 2, the liquid delivery system comprises an outer case 10 having a base 12 and a cap 14 which ius attached by means of threads 16 at the top of case 10. It will be understood that cap 14 could be attached by a friction fit also. Case 10 contains the liquid product 34 to be dispersed. A porous plastic applicator head 20 is fitted onto impervious sleeve or tower 17 in fluid tight relationship by a friction fit. Impervious sleeve 17, in turn fits into an annular elastic spring 35 through central opening 41 of spring 35 by friction fit or by snap lock engagement as shown at 19. As shown in Figures 8 through 10, sleeve 17 has annular ridges 48 around the periphery of the outer surface at the upper end which are slightly larger than the inner diameter of the applicator head 20, so that when sleeve 17 is pressed into head 20, ridges engage the inner surface head 20 to assist in holding head 20 in position on sleeve 17. At the lower end of sleeve 17, there is a flange 49 extending outwardly which holds sleeve 17 against the lower edge 50 of diaphragm spring 35. In Figure 1, the head assembly is shown as a split image so that the left half illustrates diaphragm spring 35 in its raised or relaxed position, and the left half illustrates head 20 depressed and spring 35 at its lowest limit of travel. Head 20 is designed so that lower surface 20A has sufficient clearance in the upper position to allow a full stroke of downward spring 35. In additon, the right half of Figure 1 shows that diaphragm spring 35 and tower 17 may be made as a single piece unit 47. (See Figures 11 through 13). This is a production advantage for the part, eliminates an assembly step and also provides better fluid tight conditions. The one piece sleeve and

diaphragm spring 47 consists of spring portion 52 which is basically similar to spring 35 of Figures 5 through 7, and sleeve 53 which is basically similar to sleeve 17 of Figures 8 through 10. Since sleeve portion 53 is an integral part of the diaphragm spring, it will be made of the same plastic material. Thus, while a unitary structure offers certain advantages as discussed above, it might also be desirable that the sleeve be of a different material to obtain different characteristics. Thus the use of the two piece diaphragm spring and sleeve may be advantageous sometimes. The single piece sleeve and spring 47 has ridges 48 on sleeve portion holding to applicator head 20. Spring portion 52 has an inward taper 58 on the lower end of the outer cylindrical segment 54 to facilitate insertion into container 10. An abutment 55 is provided at the base of sleeve 53 where it leads into the inner cylindrical segment 56 of spring 52. Abutment 55 is to aid in positioning applicator head 20 on the sleeve. Flange 57 is provided around the upper edge of outer spring segment 54 and seats on upper edge 42 of container 10. Applicants' head 20 has an inner cylindrical portion 44 which fits within outer cylindrical segment 36. The applicator head-spring and tower assembly is inserted into container 10 and the other segment 36 of spring 35 forms a fluid tight friction fit with flange 38 resting on the top rim 42 of container 10. In this position, the inner cylinder 44 of the applicator head 20 extends within outer cylindrical segment 36 of spring 35. In this arrangement the head 20 can move into the container 10 when pressure is applied to the head and the undulate surface 39 of spring 35 is deformed. Applicator head 20 may be depressed until the shoulder 22 of head 20 contacts flange 37 of spring 35 which then acts as a stop. Container 10 is filled with liquid product 34 and the product is delivered to the surface of head 20 by first wetting the inner surface 28 by inverting the container as shown in Figure 4, and then by capillary flow through the

pores of head 20. As seen in Figure 4, liquid 34 will be directed by impervious sleeve 17 to the upper part 26 of the inner surface of applicator head 20 so that this area only is wetted. This is the area where spreading will be done and thus unnecessary flow through the sidewalls of head 20 is avoided. After inversion and wetting of inner surface 26 of head 20, the container may again be held in an upright position to apply the liquid to a surface, e.g. an anti-perspirant to the underarm area. When the outer surface 24 of head 20 is rubbed against the skin, liquid product 34 is applied to the skin. The pressure on head 20 pushes the head into container 10 increasing the pressure in the container, forcing liquid 34 out through the pores of head 20, thus supplementing the capillary flow and assuring an adequate flow of liquid product 34 to the outer surface of head 20. Applicator head 20 has a somewhat flattened outer surface 24 with the vertical side section 21 being thicker than the upper surface 24. The flattened head provides a larger spreading area for spreading the liquid 24 over a surface. Any liquid that runs down the sides will be reabsorbed by the thickened area 22 of head 20. An advantageous alternative, is to provide a slight degree of flexibility to the upper surface 24 of head 20, either by thinning this area, or by molding the head of a material which will provide this flexibility.

To facilitate wetting of applicator head 20, case 10 may be filled with an absorbent material, not shown, filling container 10 and in contact with inner surface 26 of applicator head 20.

As shown in Figures 1 and 2, cap 14 may have an inner absorbent member 59 which fits closely over outer surface 24 of applicator head 20. Absorbent member 59 absorbs excess liquid and also vapors which pass through head 20 due to changes in relative pressure outside and inside the container, and also releases these back into the container.

A variety of liquid products may be dispensed by means of the invention. Illustrative products are set forth in the following specific examples:

AFTER SHAVE LOTIONS

Example 1 - after shave lotion

	% Weight
Alcohol (SDA-40 or 39C)	60.00
Propylene Glycol	3.00
Water, deionized	36.00
Fragrance	1.00

Example 2 - after shave lotion (high emollience)

	% wt.
Alcohol (SDA-40)	75.00
Di-isopropyl Adipate	10.00
Propylene Glycol	5.00
Water, deionized	9.25
Fragrance	0.75

Example 3 - after shave lotion (low alcohol, antiseptic)

	%/wt.
Alcohol (SDA-40)	40.000
Hyamine 10X (Rohm & Haas) methyl benzethonium chloride	0.250
Menthol	0.005
Ethyl p-aminobenzoate	0.025
Water, deionized	59.720
Fragrance	q.s.

PRE-SHAVE LOTIONS

Example 4 - pre-shave (beard softener and lubricant)

	%/wt.
Alcohol (SDA-40)	80.00
Di-isopropyl Adipate	5.00
Menthol	0.05
Propylene Glycol	3.70
Lactic Acid (80%)	0.30
Water, deionized	9.95
Perfume	1.00

Example 5 - pre-shave lotion

	%/wt.
Standamul G (Henkel) (octyl dodecanol)	10.00
Alcohol (SDA-40)	90.00
Perfume, Color, Preservatives	q.s.

Example 6 suntan liquid

	%/wt.
Ucon Fluid LB-625 (Union Carbide) PPG-24 Butyl ether	60.775
Alcohol, SDA-40 (95%)	30.000
Homomenthyl Salicylate	8.000
Perfume	1.200
Color (1% FD&C Yellow #6)	0.025

Example 7

	%/wt.
Propylene Glycol para Amino Benzoate	4.0
Tween 20 (polyoxyethylene sorbitan monolaurate)	9.0
Alcohol SDA-40 (95%)	45.0
Water	42.0

FRAGRANCE

Example 8 cologne (men's or ladies)

	%/wt.
Alcohol SDA-40	80 - 90
Perfume	4 - 6
Water, deionized	4 - 16

WHAT IS CLAIMED IS:

1. A liquid applicator suitable for use in the application of liquids to a surface of the human body comprising a container having a container body adapted for storing a quantity of said liquid, said container having an opening at the upper end thereof; annular spring means said annular spring means comprising concentric cylindrical segments joined by an undulate annular planar member, said spring means being positioned in said container, sleeve means associated with the inner of said concentric cylindrical segments, hollow applicator means secured on said sleeve means; said annular spring and sleeve means forming a liquid tight seal between said applicator means and said container; said applicator means comprising a non-flexible, non-deformable, sintered, porous synthetic resin resin structure having a controlled porosity and having omni-directional interconnecting pores.

2. The liquid applicator of claim 1 wherein the outer cylindrical segment of said spring means fits in the opening of said container.

3. The liquid applicator of claim 1 wherein said sleeve means is a separate sleeve fitting within the inner cylindrical segment of said annular spring means.

4. The liquid applicator of claim 1 wherein said sleeve means is an integral part of said annular spring means, said sleeve extending upwardly from the inner cylindrical segment of said spring means.

5. The liquid applicator of claim 1 wherein said applicator head fits on said sleeve means.

6. The liquid applicator of claim 1 wherein the upper edge of inner cylindrical segment is lower in an axial direction than the upper edge of said outer cylindrical segment.

7. The liquid applicator of claim 1 wherein said undulate planar member has a downward annular undulation.

8. The liquid applicator of claim 1 wherein said container contains an absorbent reservoir means for said liquid.

9. The liquid applicator of claim 8 wherein said reservoir means comprises a natural or synthetic fibrous material.

10. The liquid applicator of claim 2 comprising in addition a cap fitted over said applicator means.

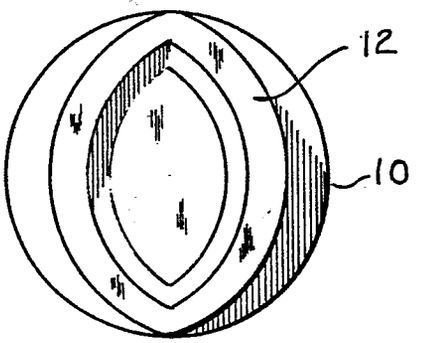
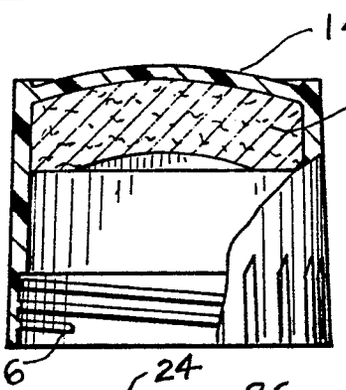


FIG. 3



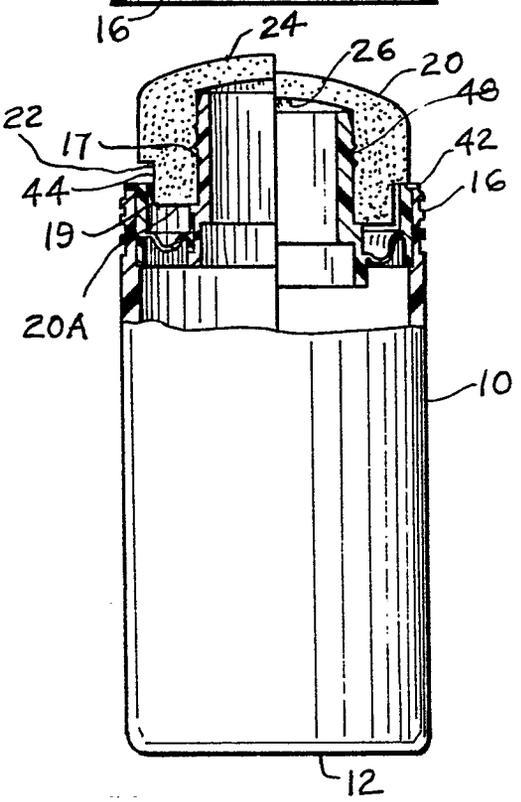


FIG. 1

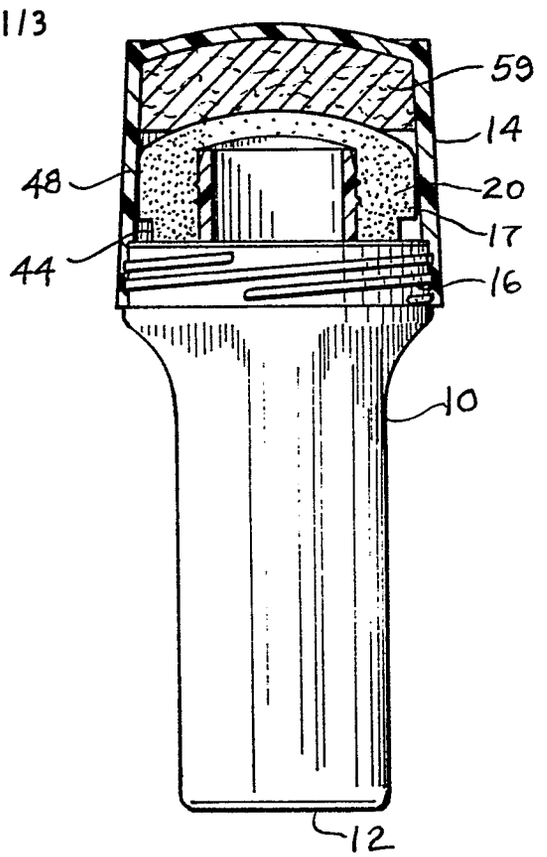


FIG. 2

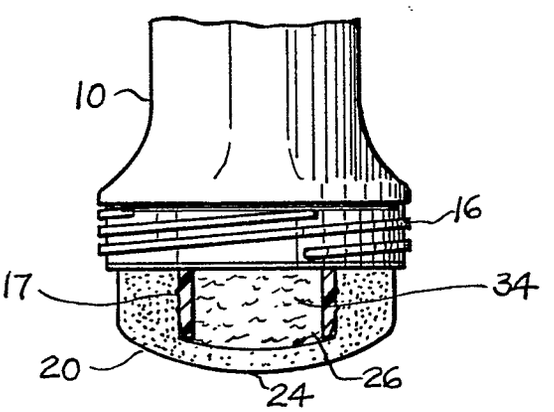


FIG. 4

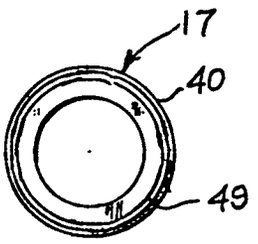


FIG. 8

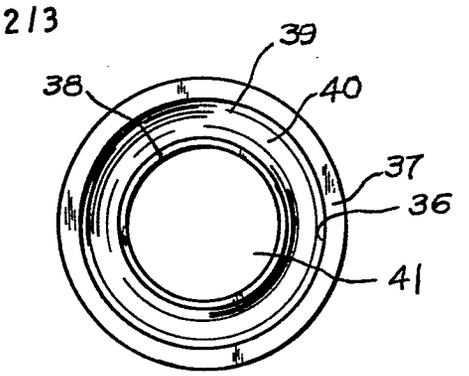


FIG. 5

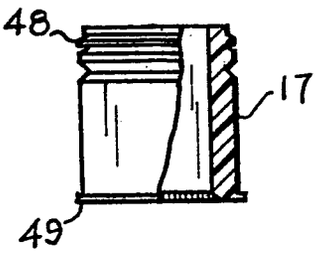


FIG. 9

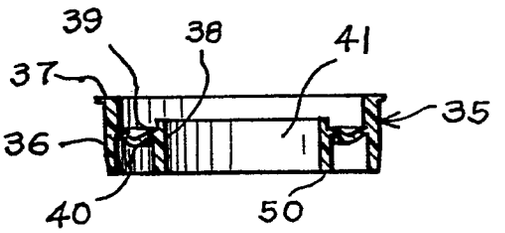


FIG. 6

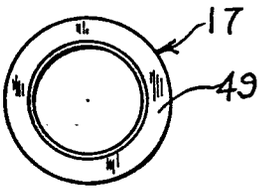


FIG. 10

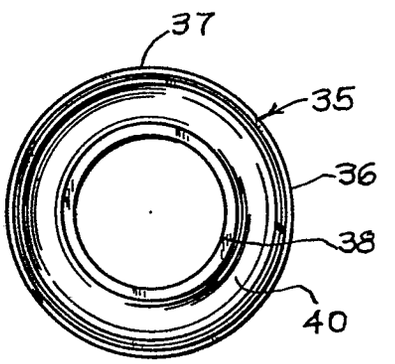


FIG 7

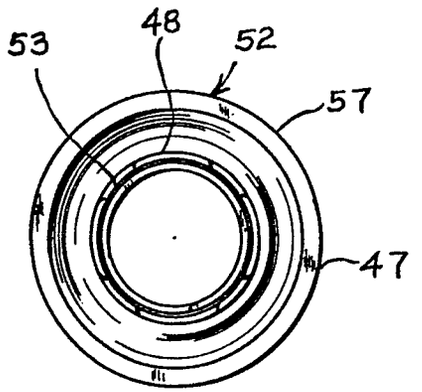


FIG. 11

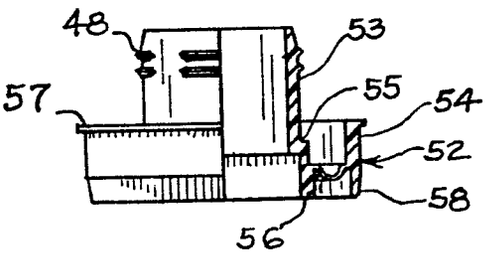


FIG. 12

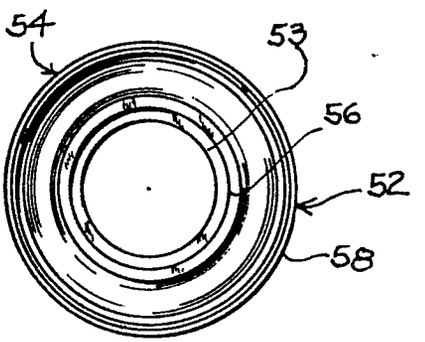


FIG. 13