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**EUROPEAN PATENT SPECIFICATION**

- ④⑤ Date of publication of patent specification: **25.01.89**      ⑤① Int. Cl.<sup>4</sup>: **A 45 D 34/00**  
②① Application number: **84110232.0**  
②② Date of filing: **28.08.84**

⑤④ **Dispensing container.**

③① Priority: **02.09.83 US 529059**

④③ Date of publication of application:  
**25.09.85 Bulletin 85/39**

④⑤ Publication of the grant of the patent:  
**25.01.89 Bulletin 89/04**

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

⑤① References cited:  
**GB-A-2 084 455**  
**US-A-2 975 465**  
**US-A-3 340 561**  
**US-A-4 111 567**  
**US-A-4 384 589**

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## Description

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.

5 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  
10 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.

15 GB—A—2 084 455 discloses a device of the above-mentioned type of liquid applicator which has means to create pressure on the liquid.

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  
20 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,  
25 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  
30 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 "Porox" 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  
35 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  
40 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  
45 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  
50 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,  
55 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,  
60 suntan lotions, fragrances (perfumes, colognes, etc.), topical therapeutics (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.

65 Since the porous plastic materials are hydrophobic and do not "wet" with water, it may be necessary

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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.

5 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;

Figure 3 is a bottom plan view of the liquid container;

10 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

15 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 through 7, the liquid delivery system comprises an outer case 10 having a base 12 and a cap 14 which is 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 1, 6 and 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 right 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 addition, 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 53 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. As shown in Fig. 1 and 4. Applicator head 20 has an inner cylindrical portion 44 which fits within outer cylindrical segment 36 of spring 35. The applicator head-spring and tower assembly is inserted into container 10 and the outer segment 36 of spring 35 forms a fluid tight friction fit with flange 37 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 40 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 26 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 antiperspirant 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 34 over a surface. Any liquid that runs down the sides will be reabsorbed by the thickened area 21 of head 20. An advantageous alternative, is to provide a

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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.

5 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.

10 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

15 After shave lotion

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

#### Example 2

After shave lotion (high emollience)

25

		% Weight
	Alcohol (SDA-40)	75.00
	Di-isopropyl adipate	10.00
	Propylene glycol	5.00
30	Water, deionized	9.25
	Fragrance	0.75

#### Example 3

After shave lotion (low alcohol, antiseptic)

35

		% Weight
	Alcohol (SDA-40)	40.000
	Hyamine 10X (Rohm & Haas) methyl benzethonium chloride	0.250
40	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)

45

		% Weight
50	Alcohol (SDA-40)	80.00
	Di-isopropyl adipate	5.00
	Menthol	0.05
	Propylene glycol	3.70
	Lactic acid (80%)	0.30
55	Water, deionized	9.95
	Perfume	1.00

#### Example 5

Pre-shave lotion

60

		% Weight
	Standamul G (Henkel) (octyl dodecanol)	10.00
	Alcohol (SDA-40)	90.00
65	Perfume, color, preservatives	q.s.

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### Example 6 Suntan liquid

		% Weight
5	Ucon fluid LB-625 (Union Carbide)	60.775
	PPG-24 butyl ether	30.000
	Alcohol, SDA-40 (95%)	8.000
	Homomenthyl salicylate	1.200
10	Perfume	0.025
	Color (1% FD & C Yellow #6)	

### Example 7

		% Weight
15	Propylene glycol para amino benzoate	4.0
	Tween 20 (polyoxyethylene sorbitan monolaurate)	9.0
	Alcohol SDA-40 (95%)	45.0
20	Water	42.0

### Fragrance

### Example 8 Cologne (men's or ladies)

		% Weight
25	Alcohol SDA-40	80—90
	Perfume	4—6
	Water, deionized	4—16

### 30 Claims

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; characterised by annular spring means (35) comprising concentric cylindrical segments joined by an undulate annular planar member (40), said spring means being positioned in said container, sleeve means (17) associated with the inner of said concentric cylindrical segments, hollow applicator means (20) secured on said sleeve means (17); said annular spring and sleeve means forming a liquid tight seal between said applicator means (20) and said container (10); said applicator means (20) comprising a non-flexible, non-deformable, sintered, porous synthetic 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 (35) fits in the opening of said container (10).

3. The liquid applicator of claim 1 wherein said sleeve means is a separate sleeve (17) fitting within the inner cylindrical segment of said annular spring means (35).

4. The liquid applicator of claim 1 wherein said sleeve means is an integral part of said annular spring means (35), said sleeve (53) extending upwardly from the inner cylindrical segment of said spring means.

5. The liquid applicator of claim 1 wherein said applicator head (20) 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 member (40) has a downward annular undulation.

8. The liquid applicator of claim 1 wherein said container (10) 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 (14) fitted over said applicator means (20).

### Patentansprüche

1. Flüssigkeitsapplikator für die Applikation von Flüssigkeit auf die Oberfläche des menschlichen Körpers, umfassend einen Behälter mit einem Behälterkörper, der zur Lagerung einer Quantität der Flüssigkeit eingerichtet ist, wobei der Behälter an seinem oberen Ende eine Öffnung aufweist; gekennzeichnet durch ringförmige Federeinrichtungen (35), umfassend konzentrische, zylindrische Segmente, die durch ein gewelltes, ringförmiges, planares Bauteil (40) verbunden sind, wobei die

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Federeinrichtungen in dem Behälter positioniert sind, Hülseneinrichtungen (17) mit der Innenseite der genannten konzentrischen, zylindrischen Segmente assoziiert sind, hohle Applikatoreinrichtungen (20) auf den Hülseneinrichtungen (17) befestigt sind; wobei die ringförmigen Feder- und Hülseneinrichtungen eine flüssigkeitsdichte Abdichtung zwischen den Applikatoreinrichtungen (20) und dem Behälter (10) bilden; wobei die Applikatoreinrichtungen (20) eine nicht-flexible, nicht-deformierbare, gesinterte, poröse Kunstharzstruktur mit einer eingestellten Porosität und mit omnidirektional miteinander verbundenen Poren umfaßt.

2. Flüssigkeitsapplikator nach Anspruch 1, wobei das äußere zylindrische Segment der erwähnten Federeinrichtungen (35) in die Öffnung des Behälters (10) paßt.

3. Flüssigkeitsapplikator nach Anspruch 1, wobei es sich bei den erwähnten Hülseneinrichtungen um eine gesonderte Hülse (17) handelt, die in das innere zylindrische Segment der erwähnten ringförmigen Federeinrichtungen (35) paßt.

4. Flüssigkeitsapplikator nach Anspruch 1, wobei es sich bei den erwähnten Hülseneinrichtungen um ein integrales Bauteil der erwähnten ringförmigen Federeinrichtungen (35) handelt, wobei die Hülse (53) sich vom inneren zylindrischen Segment der erwähnten Federeinrichtungen aufwärts erstreckt.

5. Flüssigkeitsapplikator nach Anspruch 1, wobei der erwähnte Applikatorkopf (20) auf die erwähnte Hülseneinrichtungen paßt.

6. Flüssigkeitsapplikator nach Anspruch 1, wobei die obere Kante des inneren zylindrischen Segments in einer axialen Richtung niedriger ausgebildet ist als die obere Kante des erwähnten äußeren zylindrischen Segments.

7. Flüssigkeitsapplikator nach Anspruch 1, wobei das erwähnte gewellte Bauteil (40) eine abwärtsgerichtete, ringförmige Wellung aufweist.

8. Flüssigkeitsapplikator nach Anspruch 1, wobei der Behälter (10) eine Absorptionsmittelreservoir-Einrichtung für die erwähnte Flüssigkeit enthält.

9. Flüssigkeitsapplikator nach Anspruch 1, wobei die Reservoir-Einrichtung ein natürliches oder synthetisches Fasermaterial umfaßt.

10. Flüssigkeitsapplikator nach Anspruch 2, umfassend zusätzlich eine Kappe (14), die über die erwähnte Applikatoreinrichtung (20) paßt.

### 30 Revendications

1. Applicateur de liquide destiné à être utilisé pour l'application de liquide sur une surface du corps humain, comprenant un récipient ayant un corps de récipient destiné à contenir une certaine quantité du liquide, le récipient ayant une ouverture à son extrémité supérieure, caractérisé par un ressort annulaire (35) comprenant des segments cylindriques concentriques raccordés par un organe annulaire plan ondulé (40), le ressort étant placé dans le récipient, un manchon (17) associé au segment cylindrique interne, un applicateur creux (20) fixé au manchon (17), le ressort annulaire et les manchons formant un joint étanche entre l'applicateur (20) et le récipient (10), l'applicateur (20) ayant une structure formée d'une résine synthétique poreuse, frittée, non déformable et non souple, ayant une porosité réglée et ayant des pores omnidirectionnels interconnectés.

2. Applicateur de liquide selon la revendication 1, dans lequel le segment cylindrique externe du ressort (35) s'ajuste dans l'ouverture du récipient (10).

3. Applicateur de liquide selon la revendication 1, dans lequel le manchon est un manchon séparé (17) qui s'ajuste dans le segment cylindrique interne du ressort annulaire (35).

4. Applicateur de liquide selon la revendication 1, dans lequel le manchon est solidaire du ressort annulaire (35), le manchon (53) remontant au-dessus du segment cylindrique interne du ressort.

5. Applicateur de liquide selon la revendication 1, dans lequel la tête (20) de l'applicateur s'ajuste sur le manchon.

6. Applicateur de liquide selon la revendication 1, dans lequel le bord supérieur du segment cylindrique interne se trouve plus bas, en direction axiale, que le bord supérieur du segment cylindrique externe.

7. Applicateur de liquide selon la revendication 1, dans lequel l'organe ondulé (40) a une ondulation annulaire tournée vers le bas.

8. Applicateur de liquide selon la revendication 1, dans lequel le récipient (10) contient un réservoir absorbant du liquide.

9. Applicateur de liquide selon la revendication 8, dans lequel le réservoir contient un matériau fibreux synthétique ou naturel.

10. Applicateur de liquide selon la revendication 2, comprenant en outre un capuchon (14) disposé sur l'applicateur (20).

60

65

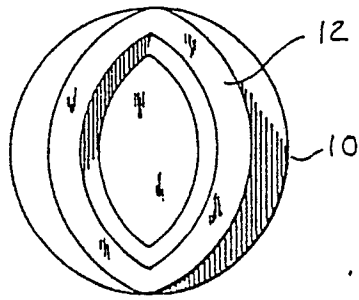


FIG. 3

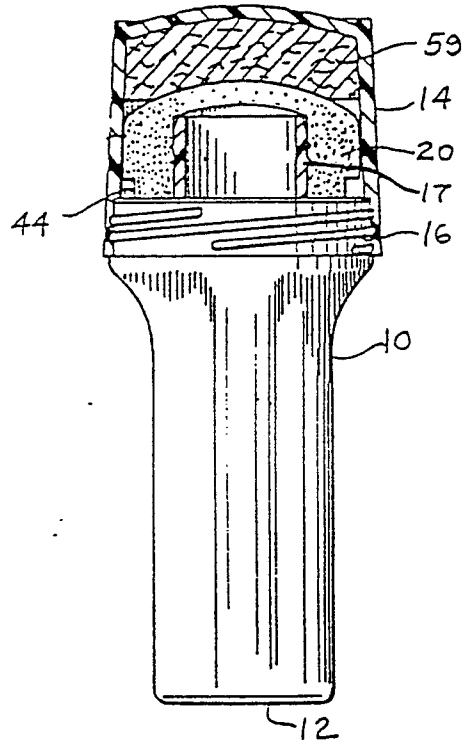


FIG. 2

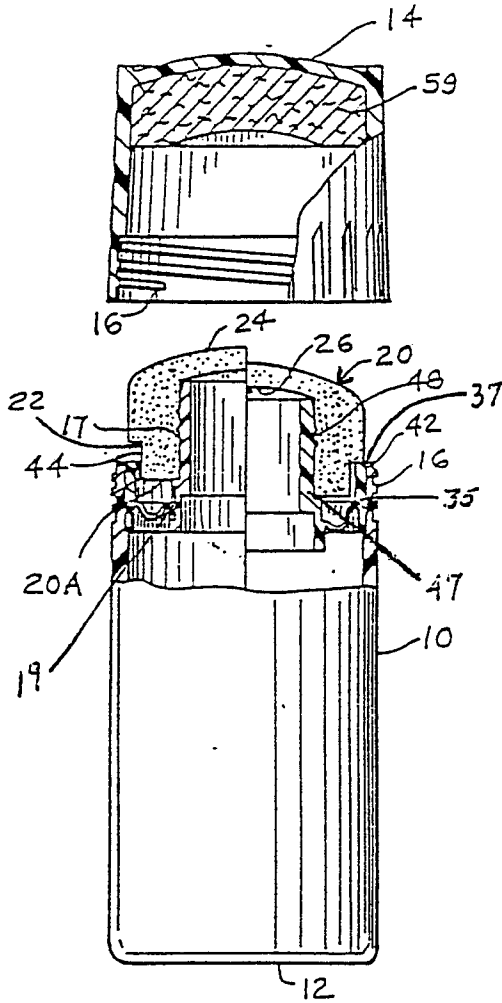


FIG. 1

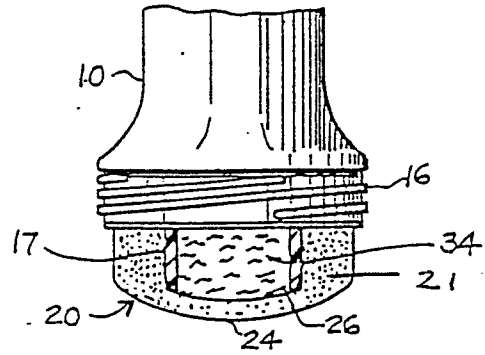


FIG. 4

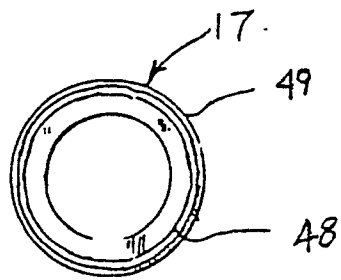


FIG. 8

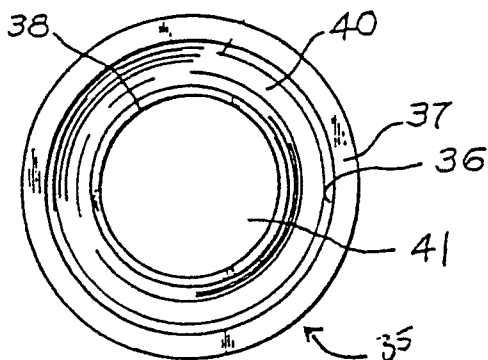


FIG. 5

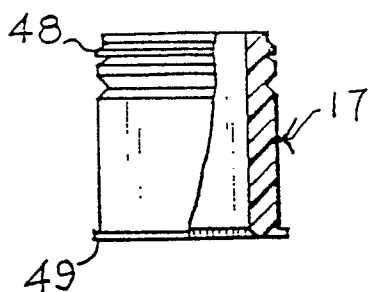


FIG. 9

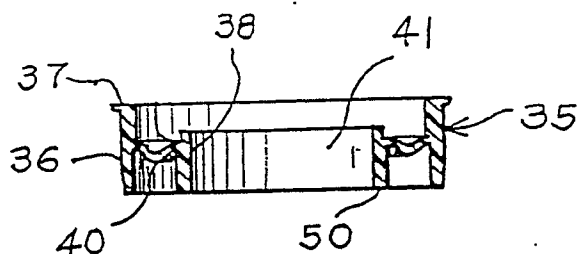


FIG. 6

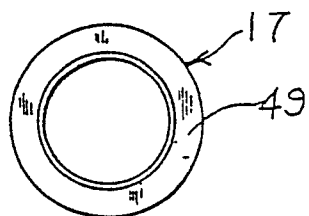


FIG. 10

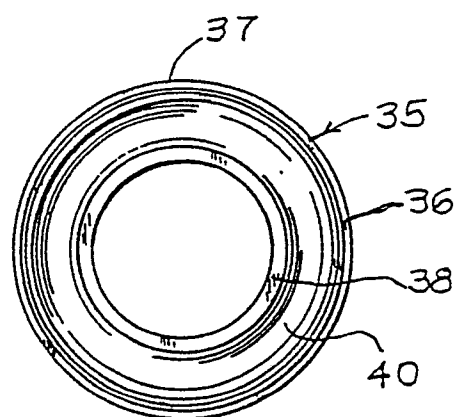


FIG. 7



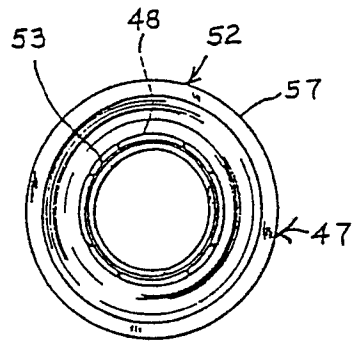


FIG. 11

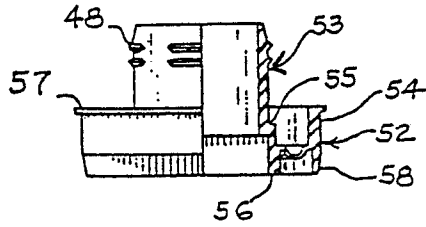


FIG. 12

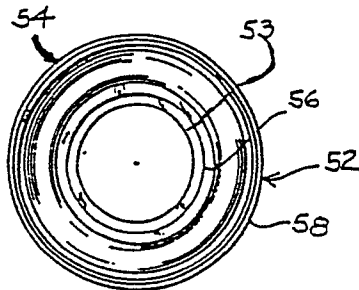


FIG. 13