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Gueret

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(54) **DEFORMABLE APPLICATOR WITH CAPILLARY FEED**

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(73) Assignee: **L'Oreal**, Paris (FR)

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Related U.S. Patent Documents

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Appl. No.: **08/194,919**
Filed: **Feb. 14, 1994**

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(51) **Int. Cl.**[7] **A45D 34/00**; A45D 40/20

(52) **U.S. Cl.** **401/126**; 401/119; 401/130; 401/148

(58) **Field of Search** 401/119, 126, 401/130, 123, 148

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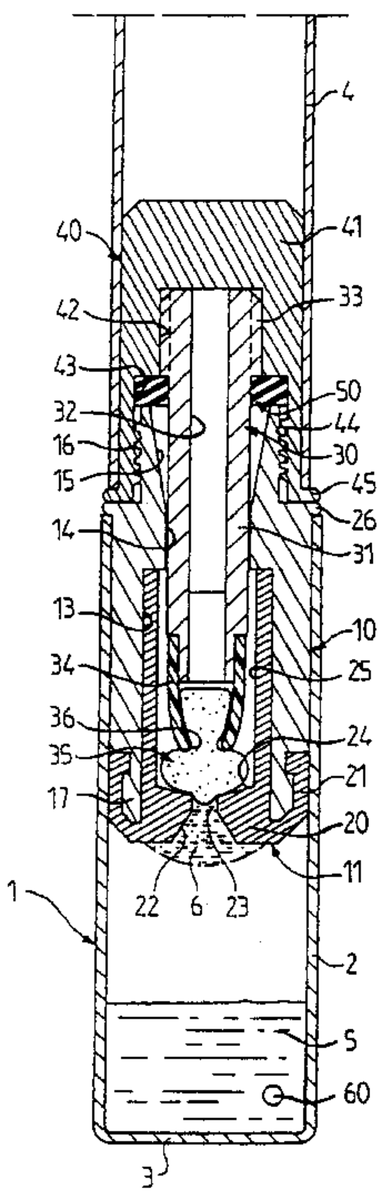
(74) *Attorney, Agent, or Firm*—Finnegan, Henderson, Farabow, Garrett & Dunner, LLP

(57) **ABSTRACT**

Applicator including a reservoir containing a substance to be applied, a cap intended to close the reservoir and supporting a stopper including an applicator holder supporting a deformable element for applying the substance. The deformable element has a shape memory, i.e., can return to its original shape after being deformed, and a roughened surface. The reservoir holding the substance includes an endpiece having a base equipped with a seat including at least one capillary orifice against which the deformable element deforms when the reservoir is closed by the cap.

16 Claims, 3 Drawing Sheets



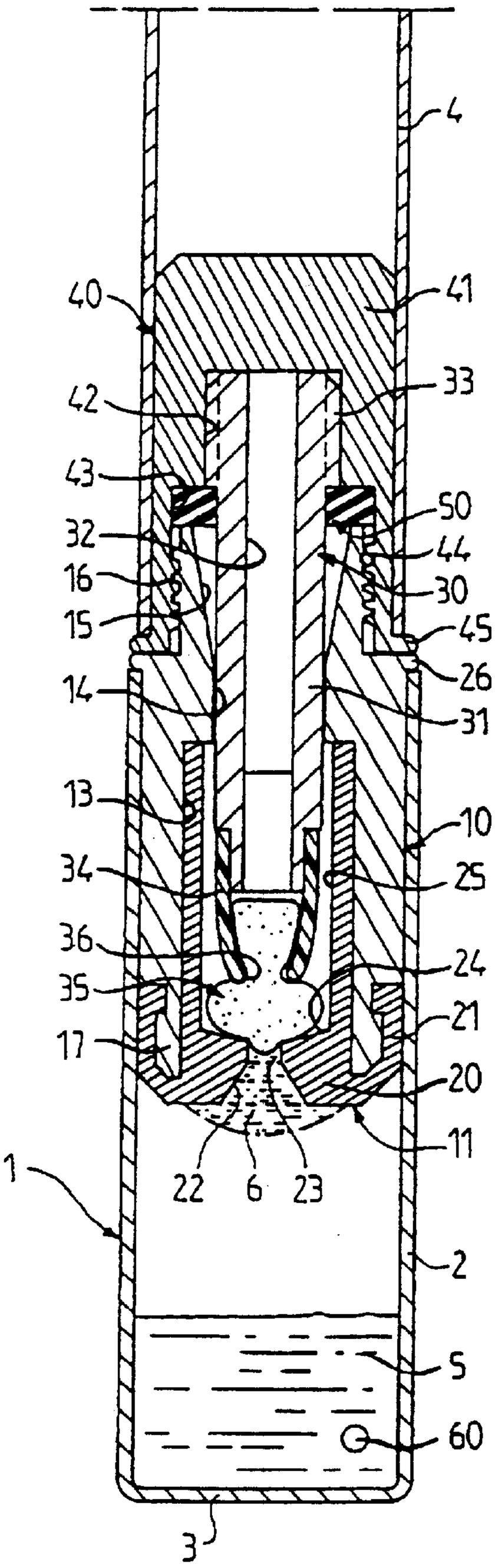

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FIG. 1

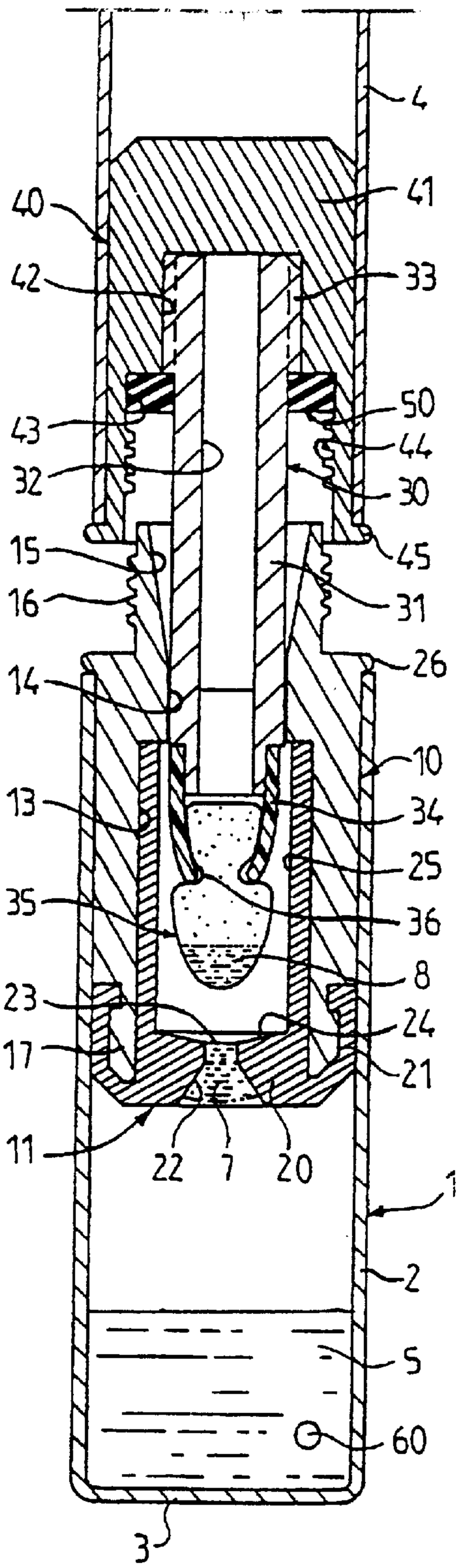
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FIG. 2

FIG.3

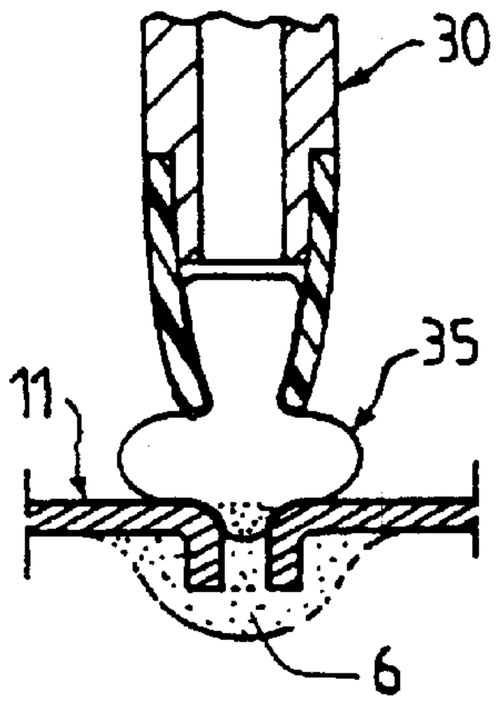


FIG.4

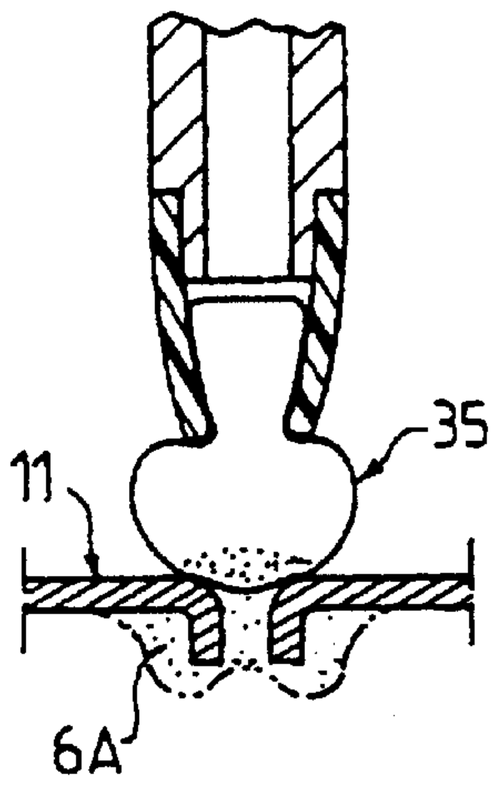
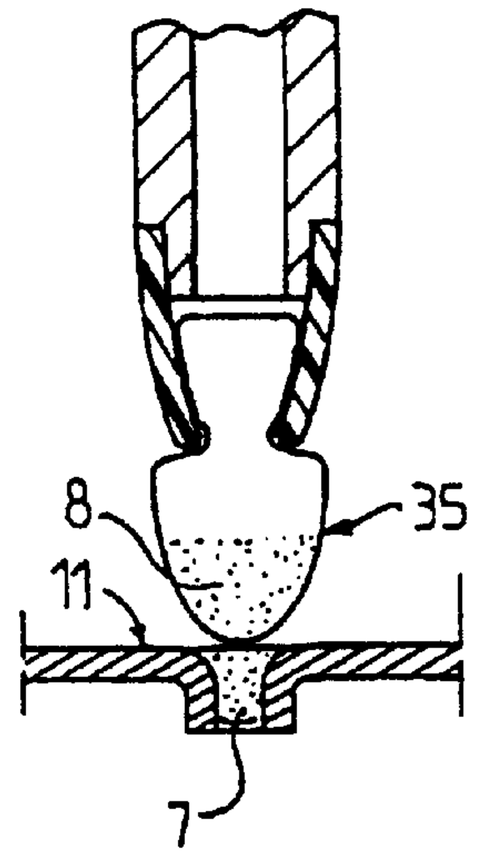


FIG.5



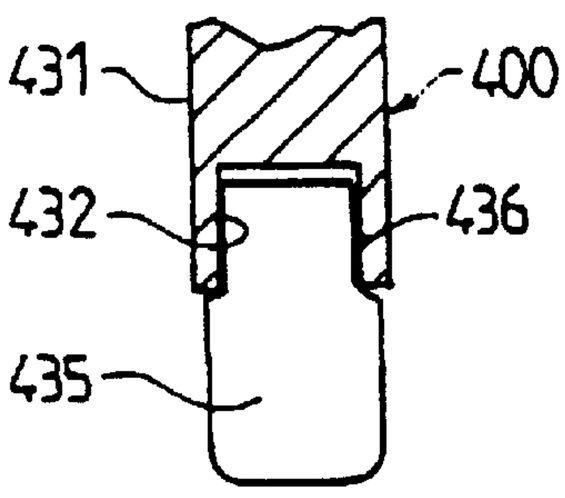


FIG.9

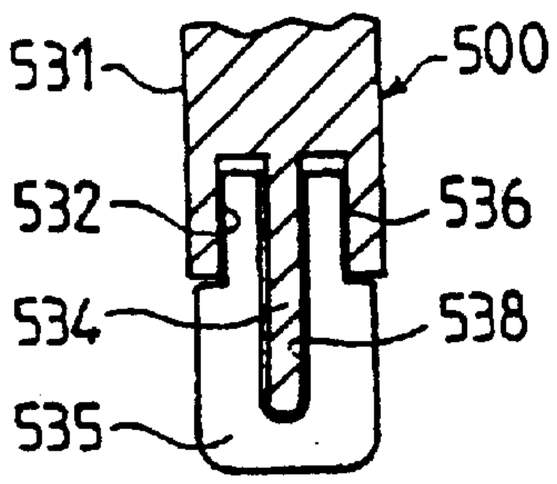


FIG.10

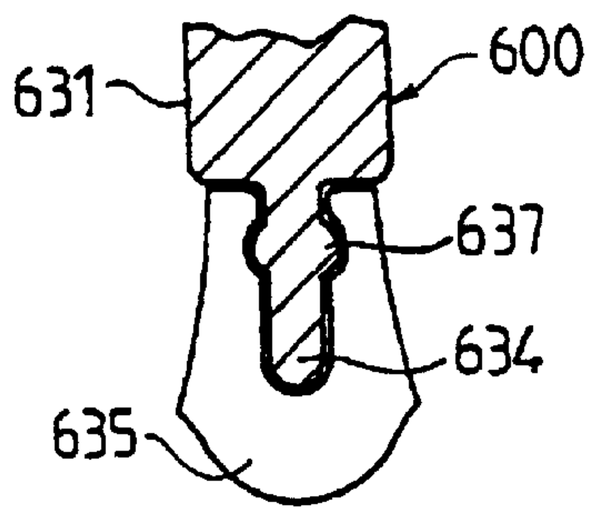


FIG.11

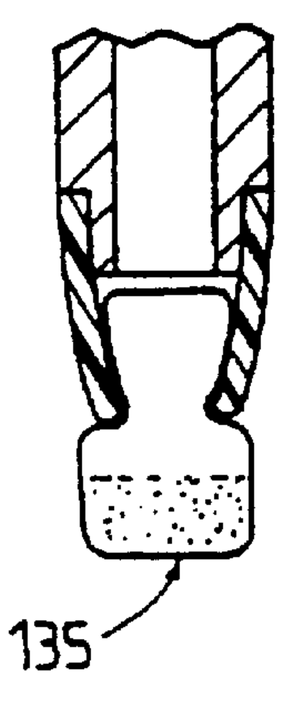


FIG.6

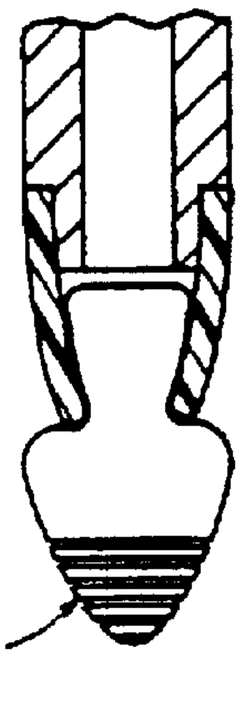


FIG.7

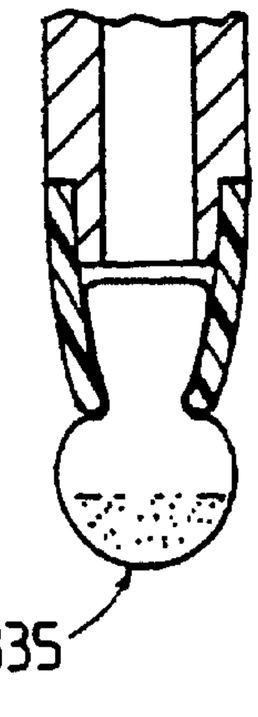


FIG.8

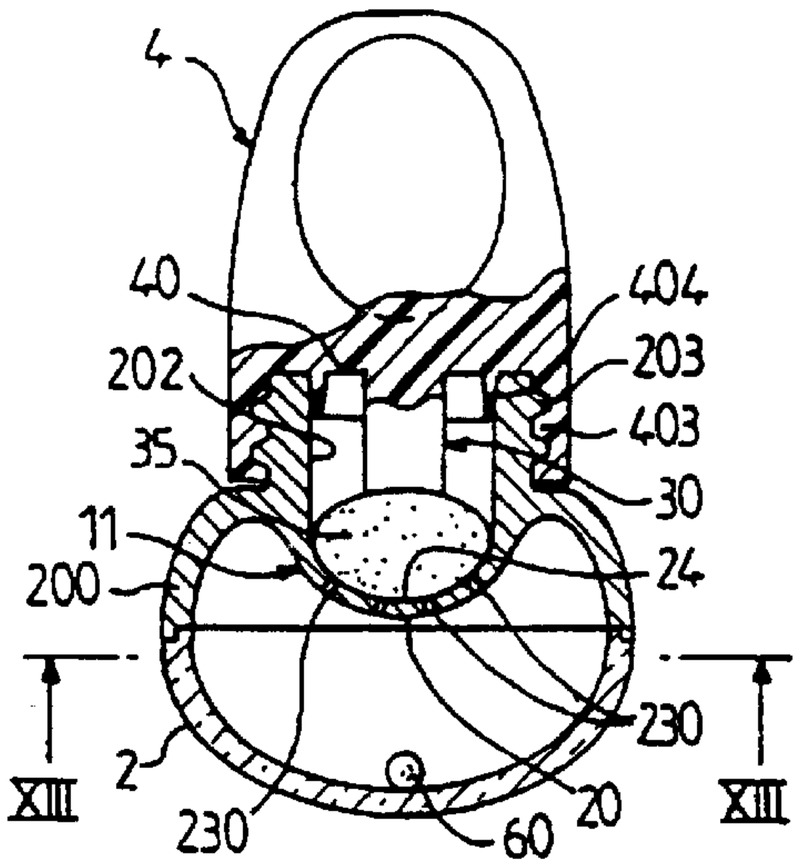


FIG.12

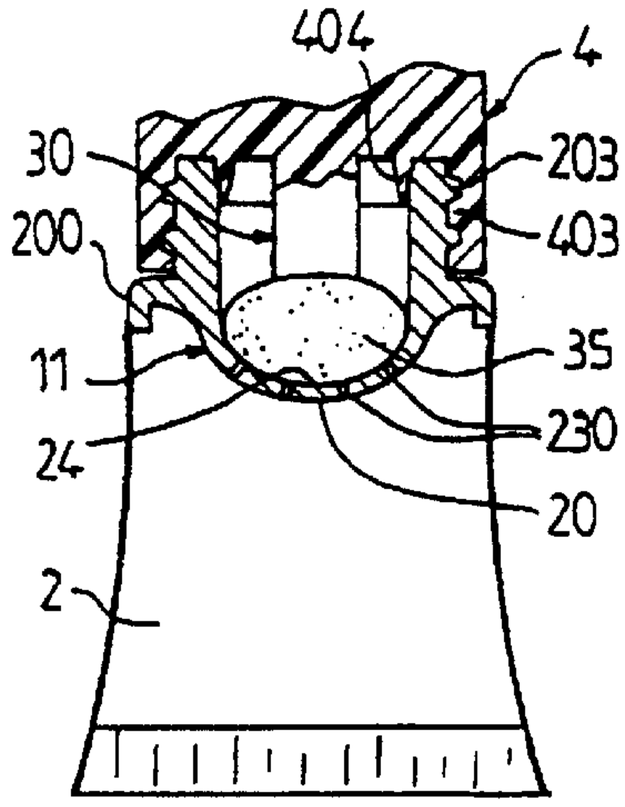


FIG.14

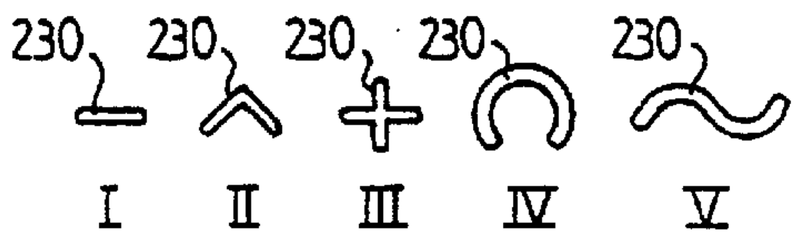


FIG.16

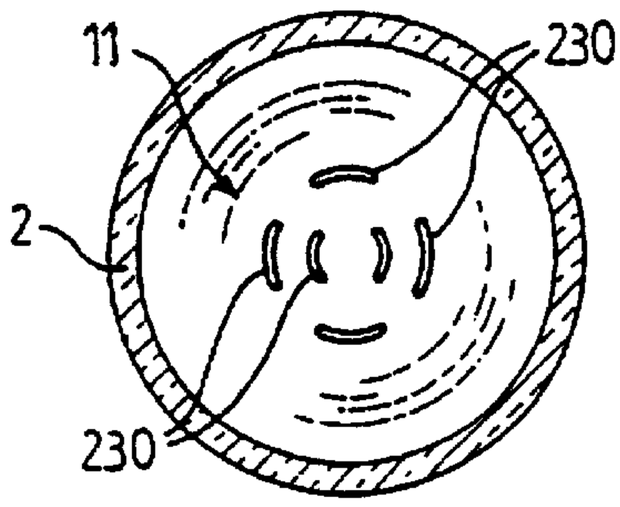


FIG.13

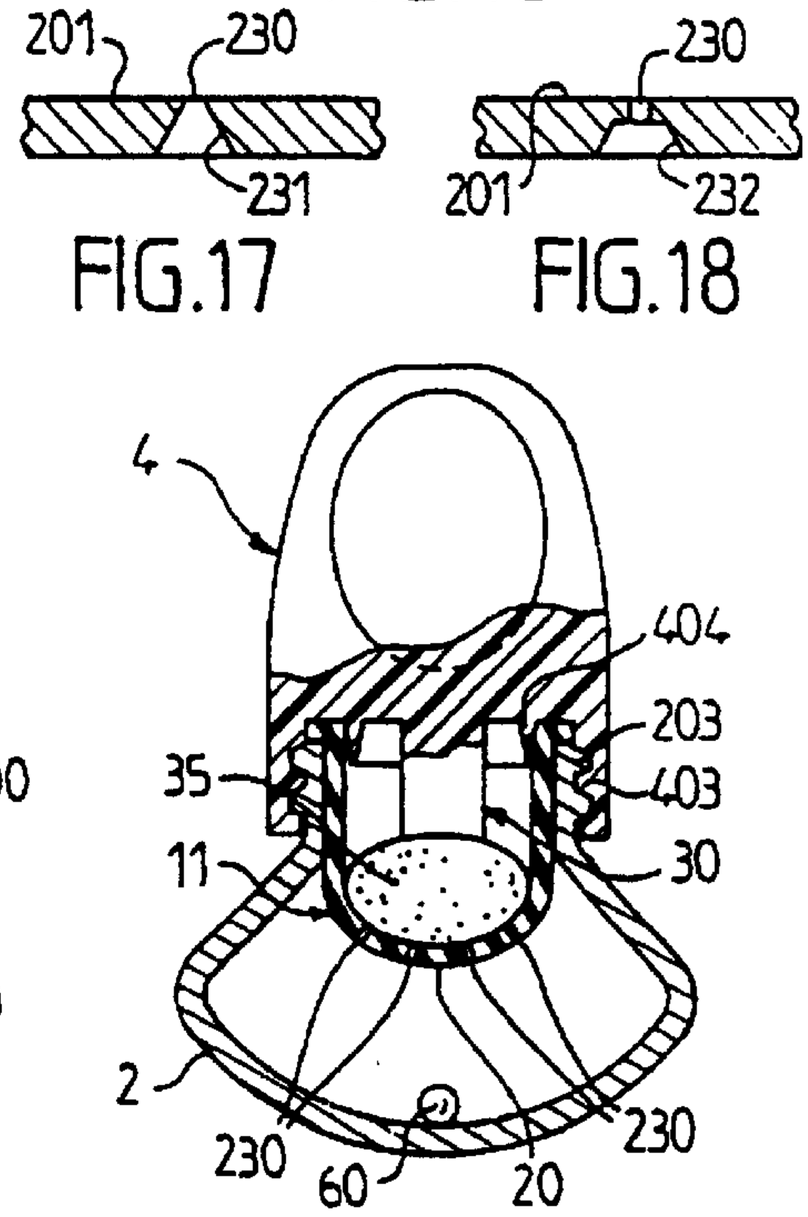


FIG.17 FIG.18

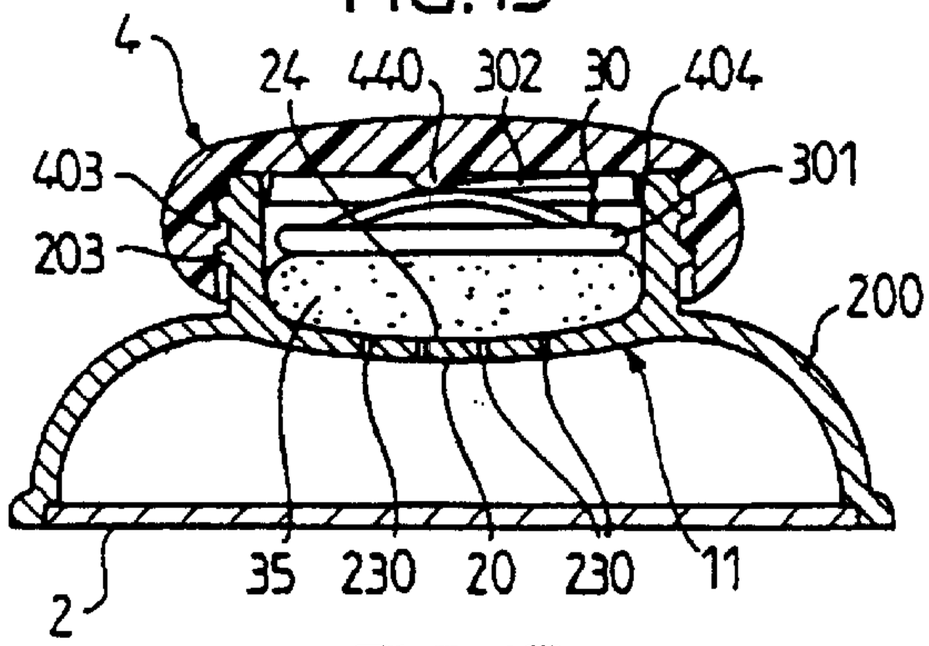


FIG.15

FIG.19

DEFORMABLE APPLICATOR WITH CAPILLARY FEED

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

BACKGROUND OF THE INVENTION

The present invention relates to an applicator intended for local treatment of the skin; such a treatment is, for example, treatment for spots or for blotches. The aim of the invention is to provide an applicator which is capable of delivering an infinitesimal dose directly to the skin in a very precise manner and of additionally permitting the massage of the skin.

SUMMARY OF THE INVENTION

According to the present invention, such an applicator includes a reservoir which contains a substance to be applied, a cap which is intended to close the reservoir, and an applicator holder supporting a deformable element for applying the substance, the element being made of foam or of low-hardness elastomer, and is characterized by the fact that the deformable element has a roughened surface and is provided with a substantial shape memory, and in that the reservoir holding the substance is limited by a finger-shaped capillary end-piece having a base equipped with a seat which is pierced with at least one capillary orifice against which the deformable element is applied and deformed in the position in which the reservoir is closed by the cap.

The application element advantageously includes a foam with open cells which communicate with one another when the deformable element is not deformed.

By virtue of this arrangement, when the deformable element is compressed on the seat of the base of the capillary end-piece, its surface in contact with the seat is increased; when the applicator is opened, that is to say when the cap is separated from the reservoir, the deformable element recovers its initial shape which it has in the free state and creates a suction effect which draws up the drop of substance, held hitherto by capillary on that face of the base of the capillary end-piece which is opposite the one bearing the seat, on account of the presence of the capillary orifice.

The design of the applicator according to the invention permits, in a simple manner, the provision of several functions. The deformable element compressed on the seat ensures the sealing of the reservoir. The considerable shape memory of the deformable element permits the function of pumping and suctioning of the substance. The flexibility of the deformable element permits a local massage of the skin.

The capillary orifice, of which there is at least one, is advantageously circular and its diameter is between 0.5 and 3 mm; alternatively, the capillary orifice, of which there is at least one, is a slit having a cross-section of between 0.2 and 7 mm^2.

The end of the deformable element which cooperates with the seat and the orifice is flat, or in the shape of a conical tip, or round.

The applicator holder supporting the deformable element preferably includes a hollow rod; alternatively, it includes a rigid support sleeve in the shape of an ogive.

According to another alternative, the applicator holder includes, a rigid solid rod; the solid rod is advantageously equipped, at its end, with a stiffening element of elongate shape for guiding the deformable element during its deformation.

The capillary end-piece is supported by a spacer element which is integral with the reservoir and through which the applicator holder passes.

According to a preferred embodiment, the capillary orifice opens into the reservoir along a flared, frustoconical portion which serves as a capillary reservoir. The dimensions of the capillary orifice will be adjusted depending on the viscosity of the substance to be applied.

The capillary end-piece is advantageously made of semi-rigid material; alternatively, the end-piece is made of a rigid material.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to permit a better understanding of the subject-matter of the invention, a description will now be given, by way of a purely illustrative and non-limiting example, of an embodiment thereof which is shown in the attached drawings:

In the drawings:

FIG. **1** is a partial sectional view of an applicator according to the invention;

FIG. **2** is similar to FIG. **1**, but the applicator is shown in the open position;

FIGS. **3** to **5** are partial sections showing the respective positions of the deformable element during the functioning as a capillary pump;

FIGS. **6** to **8** each show an alternative of the deformable element for an applicator according to the invention;

FIGS. **9** to **11** each show an alternative of the applicator holder supporting an alternative of the deformable element, for an applicator according to the invention;

FIG. **12** is a partial sectional view of an alternative of the applicator according to the invention;

FIG. **13** is a view along XIII—XIII in FIG. **12**;

FIG. **14** is a partial sectional view of an alternative of the applicator according to FIG. **12**;

FIG. **15** is a partial sectional view of another applicator according to the invention;

FIGS. **16**/I to **16**/V show different cross-sectional shapes of the capillary orifice;

FIGS. **17** and **18** represent, in longitudinal section, two alternatives of the capillary orifice;

FIG. **19** is a partial sectional view of another alternative of the applicator according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to FIG. **1**, an applicator **1** includes a reservoir **2** in the shape of a cylinder which has a base and is open at one end; a spacer element **10** of the same cross-section as the reservoir **2** is force-fitted through this end until a flange **26** of the spacer element **10**, of an external diameter equal to the external diameter of the reservoir **2**, abuts the frontal outer edge of the opening of the reservoir **2**.

The spacer element **10** supports a finger-shaped end-piece **11**; to do this, the spacer element **10** includes an axial cylindrical recess **13** extended via a coaxial passage **14** of smaller diameter, which is itself extended via a flared area **15** opening to the outside; in line with this flared area **15**, the spacer element **10** has an external thread **16** on the surface of a cylindrical end portion which is of a smaller diameter than that of the part of the spacer element **10** fitted in the reservoir **2**.

At the end of the spacer element **10** distinct from the end which has the thread **16**, the spacer element **10** is equipped with an annular bulge **17** for snap-in fitting; the end piece **11** is housed in the cylindrical **13**; the end-piece **11** is in the shape of a finger and defines a cylindrical chamber **25** and a base **20**: the base **20** has a seat **24** pierced with a capillary orifice **23**; the base **20** is bordered by a flange **21** for snap-fitting which is of a shape complementary to that of the annular bulge **17** of the spacer element **10**, allowing the end-piece **11** to be joined to the spacer element **10** by snap-fitting. The base **20** of the end-piece **11** is at a distance from the base **3** of the reservoir **2** for a substance **5** to be applied.

The applicator **1** also includes a cap **4** represented partially in the figures; the cap **4** is also in the shape of a cylinder which has a base (not represented) and is open at one end; a stopper **40** having the same cross-section as the cap **4** is force-fitted through this end, the cap **4** itself having a cross-section similar to that of the reservoir **2**; the stopper **40** is fitted into the cap **4** until a flange **45** of the stopper **40** abuts the outer edge of the opening of the cap **4**. The stopper **40** has a top **41** in which there is formed a cavity **42** extended via a bore **43** of greater diameter which has on the inside a thread **44** complementary to the thread **16** of the spacer element **10**.

The stopper **40** is integral with an applicator holder **30** supporting a deformable application element **35** made in this example, of a foam; the applicator holder **30** includes a hollow rod **31**; pierced with a bore **32**, one end of which has longitudinal **33** for holding the rod **31** in the cavity **42** of the top **41** by forcefitting. The other end of the rod **31** is equipped with a rigid supporting sleeve **34** in the shape of an ogive holding the deformable element **35** via its end of smaller diameter defining of constriction **36**. In an alternative which is not represented, the deformable element **35** is held directly by the hollow rod **31**. The deformable element **35** is made of a material having a considerable shape memory.

In the position represented in FIG. **1**, the applicator is closed; the cap **4** is screwed onto the reservoir, a seating joint **50** being placed around the rod **31**, between the stopper **40** and the spacer element; in this closure position, the deformable element **35** is crushed against the seat **24** and the orifice **23**. A ball **60** is housed in the reservoir **2** and permits agitation of the substance **5**, if necessary. The orifice **23** opens into the reservoir **2** along a flared, frustoconical portion **22**. By virtue of the capillary orifice **23**, whose diameter is of the order of 0.5 to 3 mm, a drop **6** of substances adheres by capillarity to the surface of the base **20** opposite the seat **24**.

FIG. **2** shows the applicator **1** in an open position, just before use; in this position, which corresponds to a position in which the cap **4** is drawn back with respect to the reservoir **2**, the deformable element **35** has recovered its initial position; the deformable element **35** is charged with a part **8** of the drop **6** of substance, the remainder **7** of the substance obstructing the orifice **23** in which it is held by capillarity.

The manner in which the deformable element **35** is charged with substance is illustrated in FIGS. **3** to **5**; in these figures, the base of the end-piece **11**, in which the capillary orifice **23** is formed, has been represented diagrammatically. FIG. **3** corresponds to the closed applicator, the drop **6** of substance being held by capillarity; FIG. **5** corresponds to the position in which the deformable element **35** is charged with a part **8** of the drop **6** of substance **5**, the orifice being obstructed by the remainder **7** of the substance **5**; FIG. **4** corresponds to an intermediate position in which a drop **6**A is smaller than the drop **6** in FIG. **3**, the deformable element **35** having begun to be charged with substance, as it gradually recovers its original shape.

The deformable element **35** can have different shapes at rest: thus, according to FIG. **6**, the deformable element **135** has a flat end; according to FIG. **7**, the deformable element **235** has the shape of a rounded conical tip; according to FIG. **8**, the deformable element **335** has a spherical end.

The deformable element has a roughened surface which can be of any type: it can include a large number of protrusions separated by small cavities, or of fine circular and parallel grooves, as illustrated in FIG. **7**.

According to the alternatives in FIGS. **9** to **11**, the applicator holder **400**, **500**, **600** includes a solid rod **431**, **531**, **631** whose end is shaped to support the deformable element **435**, **535**, **635**, here preferably made of low-hardness elastomer; low-hardness elastomer is understood to mean an elastomer whose hardness is between 15 Shore A and 70 Shore A. This elastomer is made up of open-cell foam.

According to FIG. **9**, the solid rod **431** has, at its end, a cylindrical recess **432** in which an end **436** of the deformable element **435** is tightly fitted.

According to FIG. **10**, the solid rod **531** has, at its end, an annular cylindrical recess **532** bordered at the center with a stiffening element **534** of elongate shape, along the axis of the rod **531**, the axial length of the stiffening element **534** being greater than that of the recess **532**; the deformable element **535** has a cavity **538** of a shape complementary to that of the stiffening element **534** on which it is engaged tightly, the end **536** of the element **535** being likewise fitted tightly in the recess **532**; the stiffening element **534** makes it possible to guide the deformable element **535** during its deformation.

According to FIG. **11**, the solid rod **631** has, at its end, a stiffening element **634**, without the annular recess in the preceding alternative; a radial protrusion **637** with which the stiffening element **634** is equipped permits a better axial support of the deformable element **635**.

FIGS. **12** and **13** show an alternative of the applicator in which the capillary end-piece **11**, which limits the substance reservoir **2**, is equipped with a seat **24** pierced with several capillary slits **230**, six slits in the shape of arcs of a circle in the example represented in these figures; these slits can of course have, in cross-section, any suitable shapes, such as, for example, those represented in FIGS. **16**/I to **16**/V; these slits can have, in longitudinal section of the base **201**; frustoconical shapes **231**, as shown in FIG. **17**, or partially frustoconical shapes **232**, as shown in FIG. **18**, in such a way as to form a reserve of substance. The end-piece **11** in this alternative is made of a rigid material and has threads **203** on the outer surface of an upper part **202** thereof; the upper part **202** is extended downwards via a flared skirt **200** surrounding the seat **24**, being at a radial distance from the latter; the skirt **200** covers the reservoir **2**, of the hemispherical-shaped type, and is made integral with the reservoir **2**, for example by adhesive bonding; the reservoir **2** is advantageously made of a transport material. The threads **203** of the end-piece **11** cooperate with threads **403** on the cap **4**, which also has, on the inner face of its upper part, an annular sealing lip **404** for sealed closure of the capillary end-piece **11**, the lip **404** surrounding a solid transverse wall constituting the stopper **40**.

According to FIG. **14**, the applicator is similar to that in FIG. **12**, except that the reservoir **2** is a flexible tube connected to the flared skirt **200**, which is in the case shorter than that in the alternative in FIG. **12**.

According to FIG. **15**, the applicator includes an applicator holder **30** which is not integral with the cap **4**; the applicator holder **30**, which supports the deformable element **35**, is made of a plate **301** on one face of which the element **35** is secured, while the other face of the plate **301** bears a grip **302**, the applicator holder **30** thereby constituting a sort of powder puff application. The cap **4** has, on the inner face of its upper part, a central rib **440** intended to cooperate with the grip **302**, by means of which the applicator holder **30** is applied on the seat **24** when the cap **4** is screwed on to the upper part of the end-piece **11**, by cooperation of the threads **203** and **403** on, respectively, the capillary end-piece **11** and the cap **4**; the cap **4** also has, on the inner face of its upper part, an annular sealing lip **404** for sealed closure of the capillary end-piece **11**; a transverse plate closes the skirt **200** at its lower part in order to form the reservoir **2**.

According to FIG. **19**, the applicator is of the same type as the applicators described with reference to FIGS. **12** to **15**, except that the capillary end-piece **11** is made of semi-rigid material, secured in the neck of the reservoir **2**, the capillary end-piece **11** being a component distinct from the reservoir **2**, as described with reference to FIGS. **1** to **11**.

I claim:

1. Applicator comprising:

a reservoir for containing a substance to be applied;

a cap engageable with the reservoir for closing the reservoir; and

an applicator holder supporting a deformable element for applying the substance, said deformable element being movable between a first configuration when the cap is disengaged from the reservoir, and a second configuration deformed relative to the first configuration, when the cap is engaged with and closes the reservoir,

wherein the deformable element has a roughened surface, and

wherein the reservoir includes an end-piece having a base equipped with a seat including a capillary orifice against which the deformable element is applied,

wherein the deformable element assumes the second deformed configuration when the reservoir is closed by the cap, and collects through capillary action the substance.

2. Applicator according to claim **1**, wherein the capillary orifice is circular and has a diameter between 0.5 and 3 mm.

3. Applicator according to claim **1**, wherein the capillary orifice is a slit having a cross-section of between 0.2 and 7 mm^2.

4. Applicator according to claim **1, 2** or **3**, wherein an end of the deformable element which cooperates with the seat and the orifice is flat.

5. Applicator according to claim **1, 2** or **3**, wherein an end of the deformable element which cooperates with the seat and the orifice is conical.

6. Applicator according to claim **1, 2** or **3**, wherein an end of the deformable element which cooperates with the seat and the orifice is round.

7. Applicator according to claim **1, 2** or **3**, wherein the applicator holder supporting the deformable element comprises a hollow rod.

8. Applicator according to claim **7**, wherein the applicator holder supporting the deformable element comprises a rigid support sleeve in the shape of an ogive.

9. Applicator according to claim **1, 2** or **3**, wherein the applicator holder supporting the deformable element comprises a solid rod.

10. Applicator according to claim **9**, wherein the solid rod is equipped, at an end thereof, with a stiffening element of elongate shape for guiding the deformable element during movement between the first and second configurations.

11. Applicator according to claim **1, 2** or **3**, wherein the end-piece is supported relative to the reservoir by a spacer element which is integral with the reservoir and through which the applicator holder passes.

12. Applicator according to claim **1, 2** or **3**, wherein the orifice opens out in the reservoir along a flared, frustoconical portion which serves as a capillary reservoir.

13. Applicator according to claim **1, 2** or **3**, wherein the end-piece is made of semi-rigid material.

14. Applicator according to claim **1, 2** or **3**, wherein the end-piece is made of a rigid material.

15. Applicator according to claim **1, 2** or **3**, wherein the deformable element is made of a low-hardness elastomer in the form of an open-cell foam.

16. Applicator according to claim 1, wherein the seat includes a plurality of capillary orifices against which the deformable element is applied.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

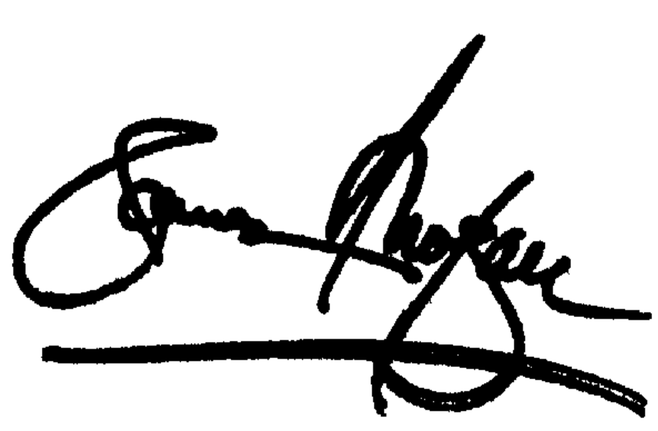
PATENT NO. : RE 37,931 E
DATED : December 10, 2002
INVENTOR(S) : Jean-Louis Gueret

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 5,
Line 24, after "Applicator" insert -- , --.

Signed and Sealed this

Eleventh Day of March, 2003



JAMES E. ROGAN
Director of the United States Patent and Trademark Office