(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 September 2009 (24.09.2009)

PCT

(10) International Publication Number
WO 2009/114917 A2

(51) International Patent Classification:
B05B 11/00 (2006.01) *A61M 11/00* (2006.01)
B65D 83/14 (2006.01)

(21) International Application Number:
PCT/BR2009/000069

(22) International Filing Date:
19 March 2009 (19.03.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PI0800657-1 19 March 2008 (19.03.2008) BR

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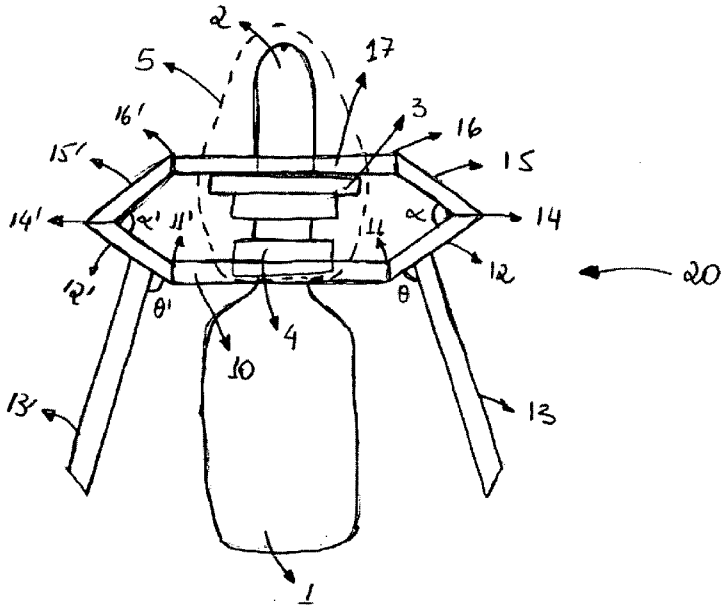
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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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(54) Title: ACTUATING DEVICE FOR LIQUID-DISPENSING PUMPS AND VALVES

FIG. 2



(57) Abstract: The present invention discloses a device attachable to liquid product packagings having vertically actuated dispensing valves or pumps, which promotes the vertical actuation movement of the valve or pump whereby the user applies substantially horizontal force in relation to the actuation axis. The device according to the present invention comprises an upper traction surface (17), a lower traction surface (10), drive levers (13, 13') and a combination of elements capable of transferring the force exerted on the drive levers (13, 13') to the approximation of the upper (17) and lower (10) traction surfaces.

WO 2009/114917 A2

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

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ACTUATING DEVICE FOR LIQUID-DISPENSING PUMPS AND VALVES

FIELD OF THE INVENTION

The present invention discloses a device attachable to liquid product packagings having vertically-actuated dispensing valves or pumps, which promotes the vertical actuation movement of the valve or pump whereby the user applies substantially horizontal force in relation to the actuation axis.

More particularly, the present invention discloses an actuating device, especially attachable to packagings having eye, ear and nose-product dispensing valves or pumps, wherein the transfer of the force of application exerted by the user on the pump or valve is carried out by means of a system comprising drive levers and traction elements.

BACKGROUND OF THE INVENTION

Various rigid packagings that dispense drops, jets or sprays of eye, ear and nose products, are provided with valves or pumps comprising an exit spout and tabs that contour the end of the liquid extraction element, whose actuation requires a vertically-exerted force (Figure 1). To extract the liquid, this force is commonly exerted by the user by pressing his thumb on the bottom of the flask and pressing his index and middle fingers, of the same

hand, on the support tab that contours the pumping combination, near the orifice of the liquid exit, just like a hypodermic syringe. This type of action is rather uncomfortable for the user, especially when used for the application of eye products, since the product should be applied with the flask in inverted vertical position, in which the liquid exit orifice should be turned downwards, in the direction of the user's eye, which requires a rotation of about 180º by the hand holding the flask. Moreover, this type of action puts the user at risk, since it requires the application of force towards the site of application and, if the flask escapes from the user's hand, the end of the spout or pump may hit his eye, ear or nose, which is extremely dangerous. Additionally, since there is a simultaneous displacement of the spout and of the flask in relation to place of application, a certain amount of practice will always be needed for the quality of the application to be uniform among different applications of the product, as such quality depends on the speed and/or force of actuation, as well as the position of the orifice of the liquid exit in relation to the site of application. An inefficient application is either due to an inappropriate quantity of the product or due to a deficient drop or sprinkling quality.

In order to remedy these problems, certain liquid-dispensing devices were proposed with side actuators in relation to axis of the dispensing flask, pump or valve,

such as, for example, those disclosed in North American patents US 6,419,124, US 7,108,159 and US 7,175,053.

The device disclosed in patent US 6,419,124 is exclusively destined to a flask whose liquid is under pressure, being dispensed in the form of a spray or jet, so it has a rather complex structural and operational arrangement and does not meet the requirements sought by the present invention.

Patent US 7,108,159 also refers to a device exclusively used in a flask whose liquid is under pressure, being dispensed in the form of a spray or jet. Albeit less complex, it nevertheless incorporates many elements that mutually cooperate for the transformation of the vertical actuation into horizontal actuation. Additionally, this device has a single actuating stem, which hinders its actuation and does not guarantee the due stability in the correct positioning of the product's exit spout in the exact direction of the user's eye, ear or nose. This device also fails to meet the requirements sought by the present invention.

Patent US 7,175,053 refers to a side actuation device suitable for use in a flask, exclusively for nasal use, provided with a liquid-dispensing pump, which is incorporated here as reference. The device disclosed in this patent, however, has a robust arrangement, involving practically all the flask, since it has, in each actuating element, an end having a wedge-shaped surface, involving

the bottom of the flask whose end displaces thereon so as to actuate the dispensing pump. Therefore, the working of the device will depend on the provision of surfaces of perfect and exactly identical wedges in order to guarantee the perfect sliding of the bottom of the flask over said surfaces, besides requiring an actuation near to its lower end, which may cause it to escape from the user's hand, if said user is not skilled at handling it. Further, this device should be manufactured exactly obeying the dimensions of diameter and height of the flask on which it will be adapted.

Accordingly, the development of actuating devices for liquid-dispensing valves and pumps that are easy to use and that solve the problems existing in the state of the art indicated herein is essential.

BRIEF DESCRIPTION OF THE INVENTION

It is an objective of the present invention to overcome the failures and deficiencies of the actuating devices for liquid-dispensing valves and pumps that make up the current state of the art. More specifically, actuating devices for eye, ear and nose liquid products.

Another objective of the present invention is to provide an actuating device for valves or pumps that dispense liquid products, with substantially horizontal actuation in relation to its actuation axis, which

satisfactorily meets the user's needs. Furthermore, according to preferred arrangements the actuating device that is the object of the present invention presents, among others, the following characteristics:

- It provides a uniform liquid jet, spray or drop, with suitable quality for applying the product;

- It is safe during application due to its easy handling, grip and form of actuation;

- It does not require much force to be used, due to its structure based on drive levers and traction elements;

- It does not significantly increase the size of the packaging, since it can be commercialized separately, for installation by the user himself;

- It can have an extremely simple structure and is preferably manufactured in a single part;

- It is adaptable to any packaging model provided with a liquid-dispensing valve or pump.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objectives, improvements and effects of the actuating device for liquid-dispensing valves or

pumps that are the object of the present invention will be apparent to specialists in the field, based on the schematic drawings appended hereto, wherein:

- Figure 1 is a front view of a packaging provided with a liquid-dispensing valve or pump described in the state of the art.

- Figure 2 is a front view of a packaging provided with a liquid-dispensing valve or pump and an attached actuating device, according to the invention, in non-actuated position.

- Figure 3 is a front view of the same packaging with an attached actuating device, illustrated in Figure 2, in totally actuated position.

- Figure 4 is a perspective view of an actuating device according to the present invention, in coupling arrangement.

- Figure 5 is a perspective view of a preferred arrangement of the actuating device, according to the present invention, in coupling arrangement.

- Figure 6 presents examples of locks that can be used to keep the parts of the actuating device together.

- Figure 7 is an upper view of the preferred arrangement of the actuating device, illustrated in Figure 5, in uncoupled arrangement.

- Figure 8 is a side view of the cut XZ (illustrated in Figure 6) of the actuating device, in uncoupled arrangement.

- Figure 9 is a front view of a packaging provided with a liquid-dispensing pump or valve and the actuating device with a generic traction system, in non-actuated arrangement.

- Figure 10 is a front view of a packaging provided with a liquid-dispensing valve or pump and the actuating device with an optional arrangement, in non-actuated arrangement.

- Figure 11 is a front view of a packaging provided with a liquid-dispensing valve or pump and the actuating device with another optional arrangement, in non-actuated arrangement.

- Figure 12 is a perspective view of a third optional arrangement of the actuating device, in coupling arrangement.

DETAILED DESCRIPTION OF THE INVENTION

The present invention discloses a device attachable to liquid product packagings provided with vertically-actuated dispensing valves or pumps, which promotes the vertical actuation movement of the valve or pump by means of application, by the user, of force, on the actuating device, substantially horizontal in relation to actuation axis, wherein the transfer of application force exerted by the user on the pump or valve is performed by means of a system comprising drive levers and traction elements.

Figure 1 shows a flask (1), attached to a liquid-dispensing valve or pump (5), which comprises a spout (2), a support tab (3) and a lower flask-coupling (4) portion. Examples of liquid-dispensing valve or pump (5) devices are the models Cartridge Systems and AmPump (Pfiffer), 3K (Ursatec), Equadel Freepod and VP6 (Valois).

Figure 2 shows a flask (1) attached to a dispensing valve or pump (5) and an actuating device (20) comprised of a lower traction surface (10), articulations (11, 11'), (14, 14') and (16, 16'), drive levers (13, 13'), lower traction arms (12, 12'), upper traction arms (15, 15') and upper traction surface (17). Still in Figure 2, the actuating device is coupled, with the upper traction surface (17) positioned immediately above the support tab (3) of the valve or pump. In this same figure, the lower traction surface (10) is positioned below or around the lower flask-coupling (4) portion of the valve or pump. Pressing the drive levers (13, 13'), which are fixed to the

corresponding lower traction arms (12, 12'), one towards the other, causes the movement of the actuator through the flexion of the articulations (14, 14') and reduction of the angles (α and α') formed by the lower (12, 12') and upper (15, 15') traction arms. This movement results in the approximation of the upper traction surface (17) and the lower traction surface (10) and, consequently in the actuation of the valve or pump (5).

Figure 3 shows the arrows (A, A') indicating the movements of approximation of the drive levers (13, 13'), when they are pressed one towards the other, and the arrows (B, B') indicating a flexion of the articulations (14, 14'), the reduction of the angles (α and α') formed by the lower (12, 12') and upper (15, 15') traction arms and the approximation of the upper traction surface (17) and the lower traction surface (10).

Figure 4 shows a perspective view of an actuating device in coupled arrangement. In this figure, the actuating device comprises two drive levers (13, 13'), fixedly connected, respectively, to the lower traction arms (12, 12'), forming a combination with sufficient rigidity such that the clamping angles (Θ, Θ') do not alter during actuation. At one of its ends, the lower traction arms (12, 12') are connected to the lower traction surface (10) by means of the articulations (11, 11'), respectively. At another of its ends, the lower traction arms (12, 12') are connected to the upper traction arms (15, 15') by means of

articulations (14, 14'), respectively. The upper traction arms (15, 15') are connected by means of the articulations (16, 16'), respectively, to the upper traction surface (17). The upper traction surface (17) may be solid or multipartite, and may be circle-shaped, substantially circular or any other shape that keeps it in contact with the support tab (3) of the valve or pump, illustrated in Figure 2, so as to permit its approximation towards the lower traction surface (10) when the actuator (20) is driven. The lower traction surface (10) can also be solid or multipartite, and may be circle-shaped, substantially circular or any other shape that keeps it in contact with the lower flask-coupling (4) portion of the valve or pump or with any part of the flask (1), illustrated in Figure 2, so as to permit the approximation of the lower traction surface (10) towards the upper traction surface (17) when the actuator (20) is driven.

Figure 5 illustrates, in perspective, a preferred arrangement of an actuating device in coupled arrangement that, according to a preferred aspect of the present invention, is essentially symmetric in relation to its vertical axis. This figure shows how the drive levers (13, 13') can be anatomically shaped, facilitating the grip and the actuation of the device. In this preferred arrangement, the lower traction surface is bipartite (10A, 10B) and has support wedges (19, 19'), which are fixed on the lower flask-coupling portion (4) of the valve or pump or to the flask (1), illustrated in Figure 2. In this

arrangement, the lower traction surface has locks (18, 18'), designed to keep the two halves of the lower traction surface bipartite (10A, 10B) fixedly jointed after coupling to the flask (1) or to the lower flask-coupling portion (4) of the valve or pump.

Figure 6 illustrates examples of locks (18,18') that can be used to keep the parts of the actuating device together, such as, for example, the two parts of the lower traction surface (10A, 10B) when latter is bipartite. Figure 6A illustrates a cut view of a locking system of the male-female kind with fins (h, h') which, after the parts (D, D') are fitted together cannot be unfitted. Figure 6B illustrates a perspective view of a system of locks in the form of clamps (y, y') and jagged grooves (k, k') which once the parts (D, D') are fitted together cannot be unfitted. Figure 6C illustrates a perspective view of a system of locks provided with wedges with internal thread (g, g') which once the screws (w) have been tightened, does not allow the parts (D, D') to be unfitted.

Figures 7 and 8 illustrate more clearly the arrangement of the actuating device presented in Figure 5 which, according to a preferred aspect, is manufactured in a single part. Figure 7 is an upper view of the actuating device in uncoupled arrangement. It shows greater details of the two halves of the bipartite lower traction surface (10A, 10B), the safety locks (18, 18') and the drive levers (13, 13'). Figure 8 illustrates a side view of cut XZ

(indicated in Figure 7) of the actuating device, in uncoupled arrangement. It shows greater detail of the two halves of the lower traction surface (10A, 10B) and a possible arrangement of the support wedge (19, 19').

The lists of lengths and distances of the elements that make up the actuating device may vary according to the size of the combination formed by the flask (1) and by the valve or pump (5), and according to the path needed for the actuation of the valve or pump (5) to which it will be coupled. In any hypothesis, they should be proportional so as to permit the perfect working of the actuating device (20).

The actuating device that is the object of the present invention can be made of the most varied materials, especially those with quality for use in packagings of pharmaceutical products. The materials should have rigidity, flexibility and suitable resistance to permit the movement of the various elements of the actuator and withstand repeated drives of the device. Examples of materials that can be used for producing the device are: polypropylene; high density polyethylene (HDPE), low density polyethylene (LDPE), medium density polyethylene (MDPE), and it is possible to use mixtures of LDPE and HDPE in varied concentrations, polyethylene teraphthalate (PET) and acrylonite copolymer, butadiene and styrene (ABS), polypropylene being a material of particular interest.

In a preferred arrangement, the device can be produced in the form of a single part, as illustrated in Figures 7 and 8, by means of injecting plastic material in pre-formed molds. In this arrangement, the articulations (11, 11'), (14, 14') and (16,16') can be made of the same material used in the rest of the applicator, but differ from the other elements due to their lesser thickness and, consequently, greater flexibility. Optionally, the connection of the drive levers (13, 13') to the lower traction arms (12, 12') can be reinforced by an additional support in the form of an angle bracket, so that the clamping angles (Θ, Θ') do not alter during actuation.

In an optional arrangement, the combination formed by the drive levers (13, 13'), lower (12, 12') and upper (15, 15') traction arms and by the articulations (11,11') (14, 14') and (16, 16') can be substituted by another other system capable of transferring the actuation force applied to the drive levers for the approximation of the upper (17) and lower (10) traction surfaces.

Figure 9 illustrates the actuator in a generic arrangement that includes a system comprised of drive levers (13, 13'), upper traction surface (17), lower traction surface (10) and traction elements (25, 25') that promote the approximation between the upper traction surface and the lower traction surface when the drive levers are pressed one towards the other. In this figure, the traction elements (25, 25') are marked with dotted

lines to indicate that they may comprise different arrangements, provided that their functionality is maintained. According to preferred embodiments of the invention, the traction elements (25, 25´) may be lower traction arms, upper traction arms, articulations, compressible arches or combinations thereof.

Figure 10 illustrates the actuator in an optional arrangement wherein the drive levers (13, 13') are connected to compressible arches (30, 30') linked to the upper (17) and lower (10) traction surfaces by means of the articulations (16, 16') and (11, 11'), respectively. Pressing the drive levers (13, 13'), one towards the other, causes movement of the actuator through the reduction of the curvature of the flexible arch, resulting in the approximation of the upper traction surface (17) and of lower traction surface (10) and, consequently in the actuation of the valve or pump (5).

Figure 11 illustrates the actuator in another optional arrangement, similar to that presented in Figure 2, wherein the drive levers (13, 13') are fixedly connected, respectively, to the upper traction arms (15, 15'), forming a combination with sufficient rigidity such that the clamping angles (δ, δ') do not alter during actuation. Pressing the drive levers (13, 13'), one towards the other, causes movement of the actuator through flexion of the articulations (14, 14') and reduction of the angles (α and α') formed by the lower (12, 12') and upper (15, 15')

traction arms. This movement results in the approximation of the upper traction surface (17) and the lower traction surface (10) and, consequently in the actuation of the valve or pump (5).

Figure 12 illustrates the actuator in a third optional arrangement wherein the upper traction surface (17) of the actuating device incorporates the spout (2) and/or the support tab (3) of the spout or valve.

The actuating device that is the object of the present invention may be provided separately for coupling by the user himself to the packaging of liquid products provided with dispensing pumps or valves, or already coupled by the manufacturer, eliminating subsequent coupling. Structural modifications to the device actuator exemplified in the drawings appended hereto may be reproduced by persons skilled in the art, but said modifications will not digress from that which is described and claimed herein.

CLAIMS

1. Actuating device of dispensing valves or pumps actuated vertically, which promotes the actuation movement of the valve or pump by means of applying force, on the actuating device, substantially horizontal in relation to the actuation axis of the valve or pump, comprising a system composed of drive levers (13, 13'), upper traction surface (17), lower traction surface (10) and traction elements (25, 25') that promote the approximation between the upper traction surface and the lower traction surface when one of the drive levers is pressed towards other.

2. Device according to claim 1, wherein the traction elements are comprised of: (a) two lower traction arms (12, 12'), (b) two upper traction arms (15, 15') and (c) six articulations (11,11', 14, 14' and 16,16').

3. Device according to claim 2, wherein the two drive levers (13, 13') are fixedly connected, respectively, to the lower traction arms (12, 12'), forming a combination with sufficient rigidity such that the clamping angles (Θ, Θ') do not alter during actuation.

4. Device according to claim 3, wherein the lower traction arms (12, 12') are connected to the lower traction surface (10) and to the upper traction arms (15, 15') by way of articulations (11, 11') and (14, 14') respectively.

5. Device according to claims 2 to 4, wherein the upper traction surface (17) is connected to the upper traction arms (15, 15') by way of articulations (16, 16').

6. Device according to claim 2, wherein the two drive levers (13, 13') are fixedly connected, respectively, to the upper traction arms (15, 15'), forming a combination with sufficient rigidity such that the clamping angles (δ, δ') do not alter during actuation.

7. Device according to claim 1, wherein the traction elements are comprised of: (a) two compressible arches (30, 30') and (b) four articulations (11,11' and 16,16').

8. Device according to claim 7, wherein the two traction levers (13, 13') are fixedly connected, respectively, to the compressible arches (30, 30'), forming a combination with sufficient rigidity such that the clamping angles (β, β') do not alter during actuation.

9. Device according to claims 1 to 8, wherein the lower (10) and superior (17) traction surfaces are solid or multipartite.

10. Device according to claim 9, wherein the lower traction surface is bipartite (10A, 10B).

11. Device according to claim 10, wherein the lower traction surface is bipartite (10A, 10B) and has a locking device (18, 18').

12. Device according to claims 9 and 10, wherein the bipartite lower traction surface has a support wedge (19, 19').

13. Device according to claims 1 to 12, wherein the upper traction surface (17) is solid.

14. Device according to claims 1 to 13, wherein the lower traction surface (10) is attached under the lower coupling portion (4) of the valve or pump.

15. Device according to claims 1 to 14, wherein the upper traction surface (17) is attached above the support tab (3) of the valve or pump.

16. Device according to claims 1 to 15, wherein being manufactured with at least one of the materials chosen from the group comprising: polypropylene; high density polyethylene (HDPE), low density polyethylene (LDPE), medium density polyethylene (MDPE), polyethylene teraphthalate (PET) and acrylonite copolymer, butadiene and styrene (ABS).

17. Device according to claim 16, wherein being manufactured of polypropylene.

18. Device according to claims 1 to 17, wherein being attachable to flasks provided with valves or pumps dispensing ophthalmic or nasal products.

19. Device according to claims 1 to 18, wherein being produced in the form of a single part.

20. Device according to claims 1 to 19, wherein being produced by means of injecting plastic material into a pre-formed mold.

21. Device according to claims 1 to 20, wherein functioning independently of the height of the packaging.

22. Device according to claims 1 to 21, wherein being constructed entirely separately from the parts that make up the valve or pump or flask.

23. Device according to claims 1 to 21, wherein being constructed incorporating elements that make up the valve or pump or flask.

24. Device according to claim 23, wherein the upper traction surface (17) incorporates the spout (2) and the support tab (3) of the valve or pump.

FIG. 1

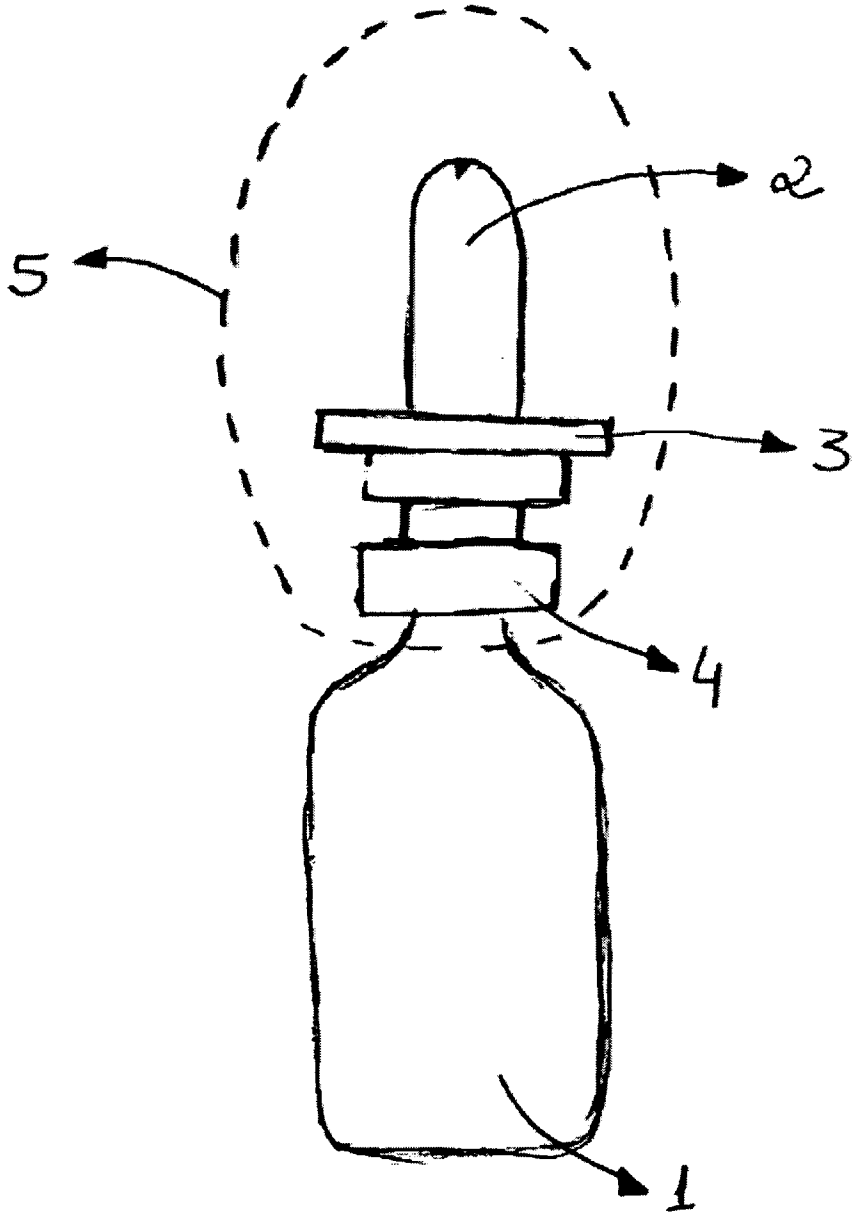


FIG. 2

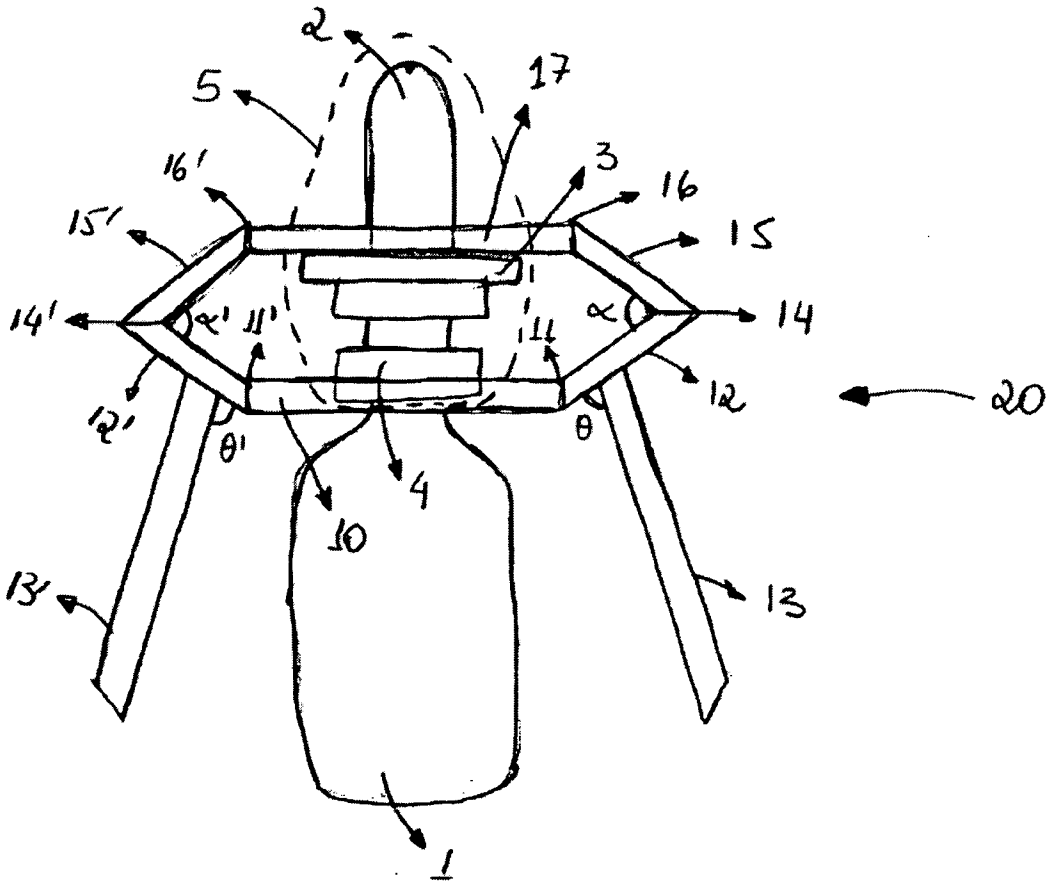


FIG. 3

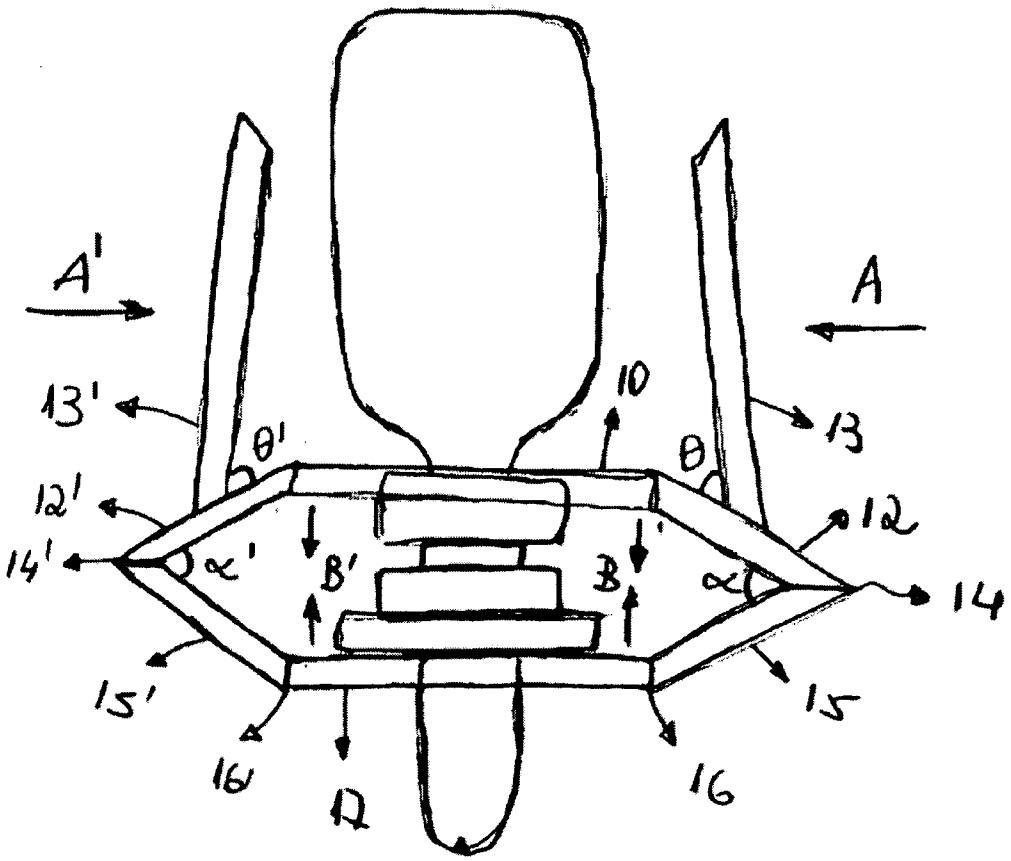


FIG. 4

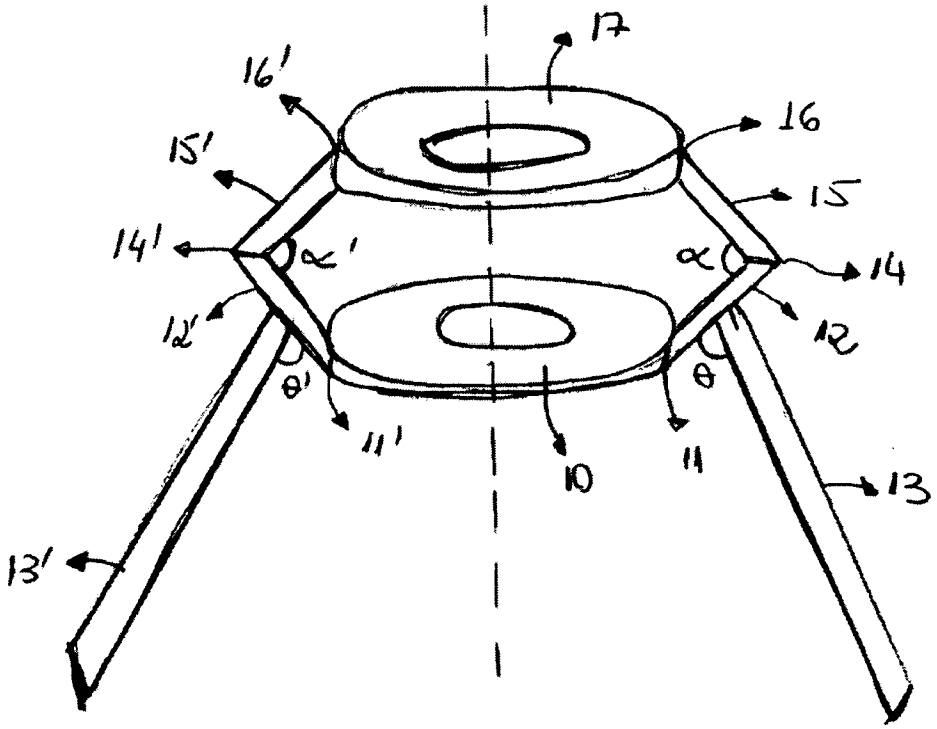


FIG. 5

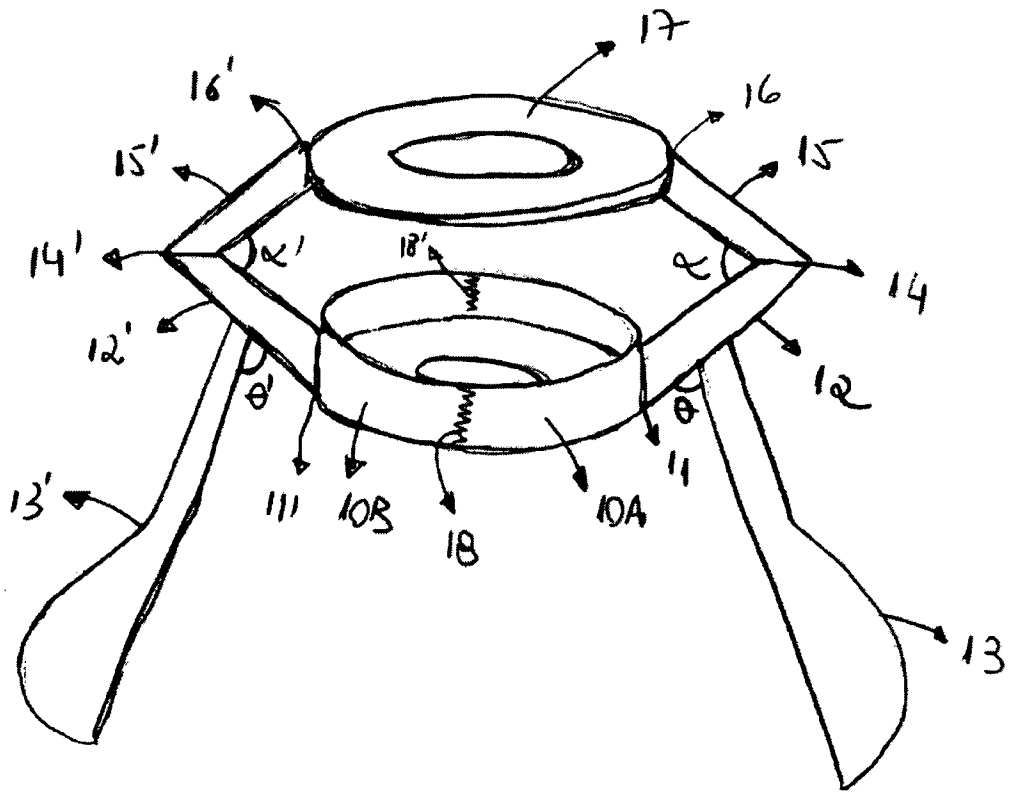
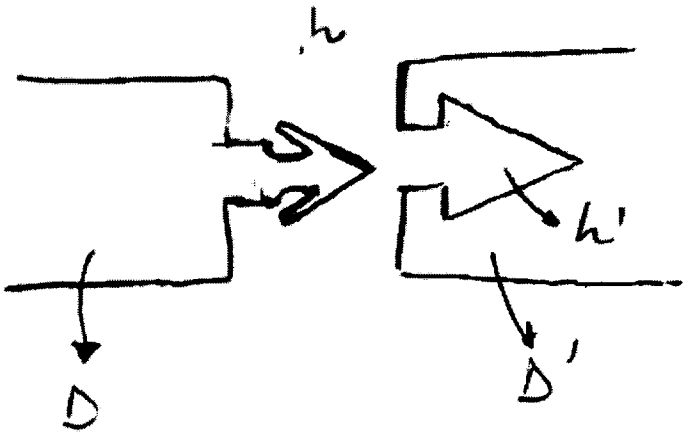
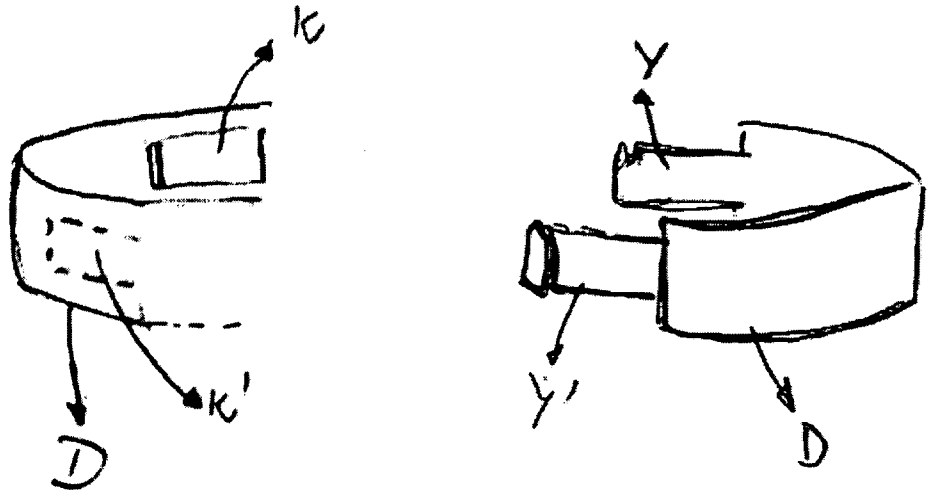


FIG. 6

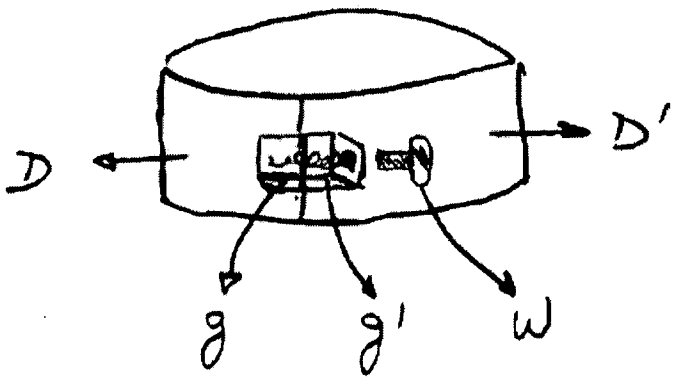
6A



6B



6C



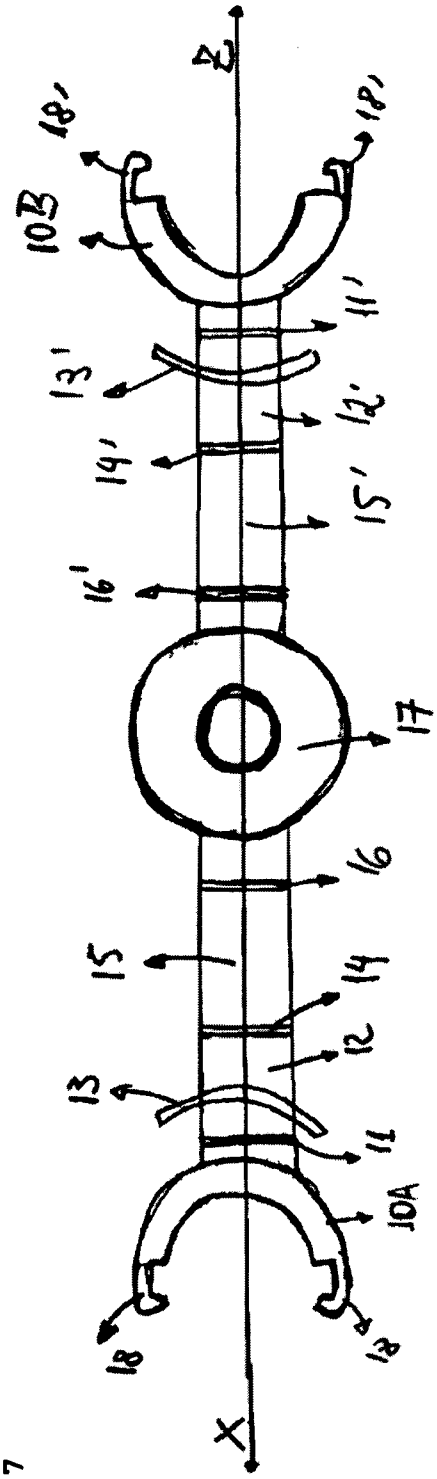

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FIG. 7

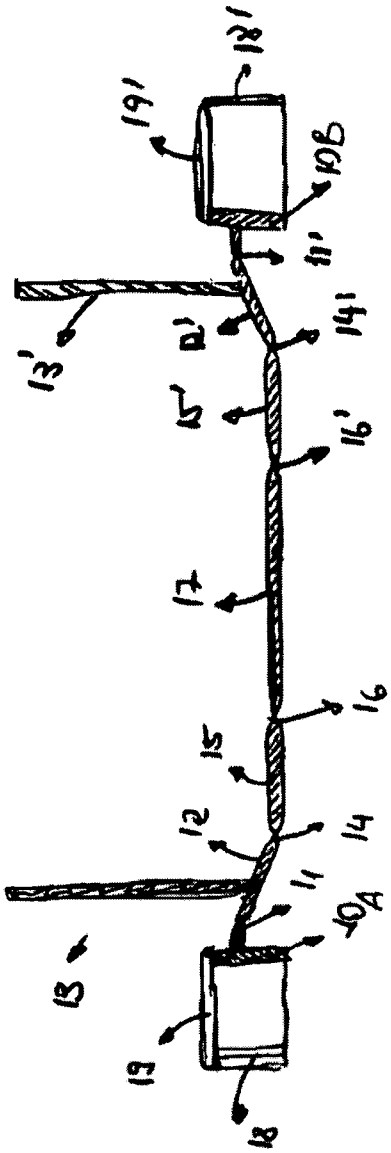

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FIG. 8

FIG. 9

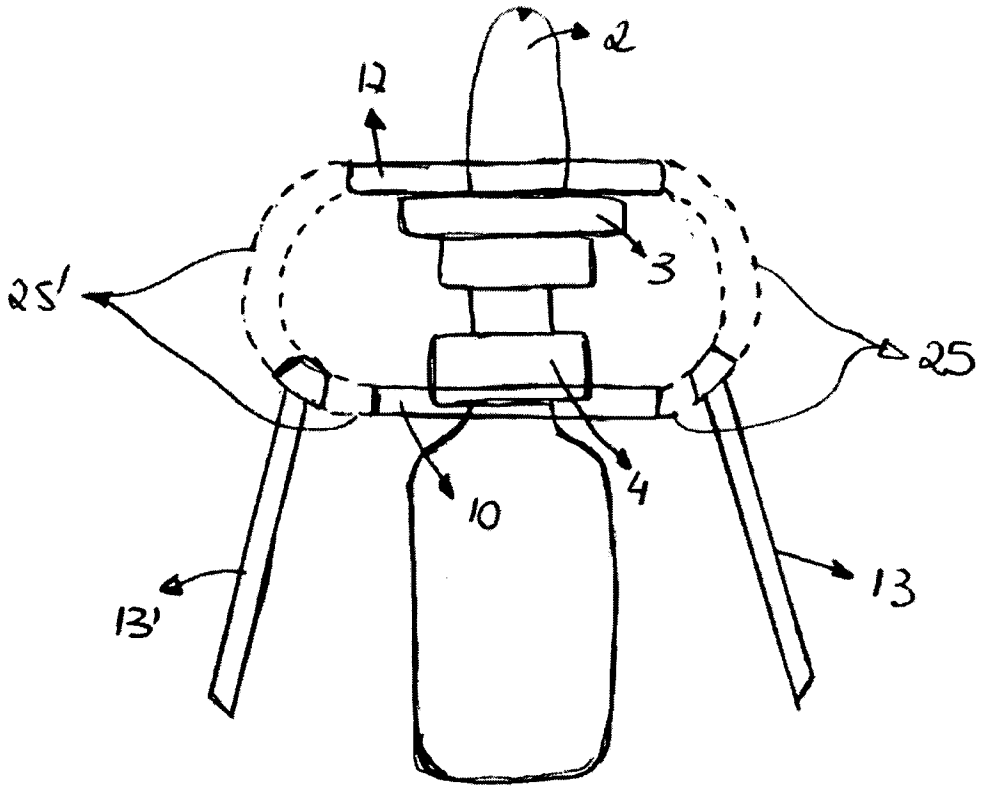


FIG. 10

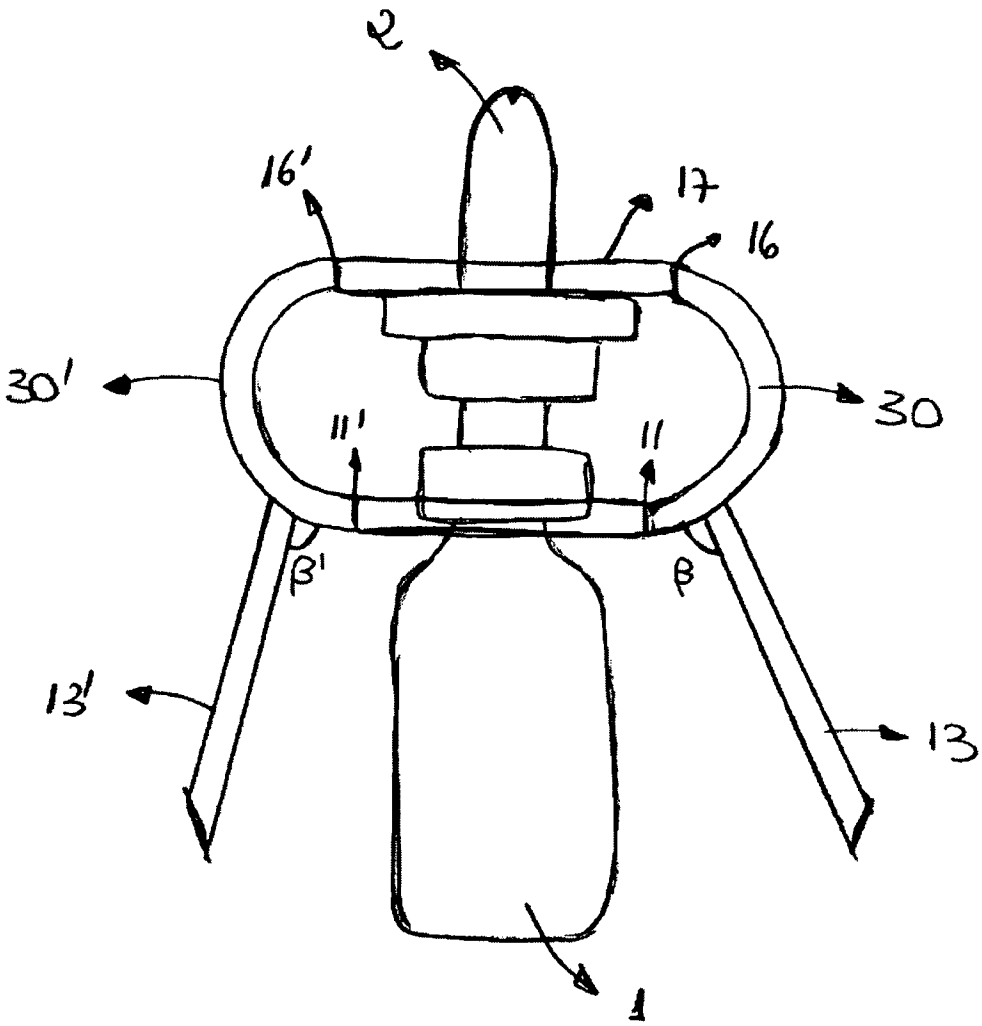


FIG. 11

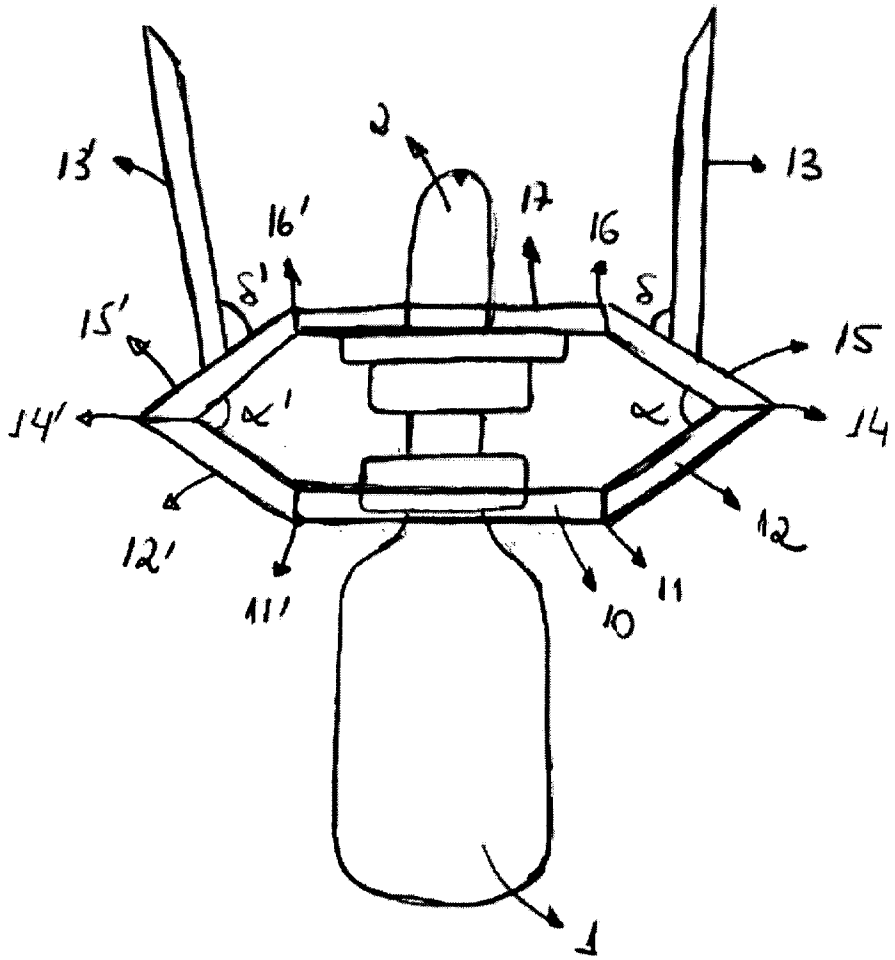


FIG. 12

